PLAN PERFORMANCE

ENVIRONMENTAL JUSTICE

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

TECHNICAL REPORT

ADOPTED ON SEPTEMBER 3, 2020

CONNECT SoCal

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EXECUTIVE SUMMARY

The concept of environmental justice (EJ) is about equal and fair access to a healthy environment with the goal of protecting minority and low-income communities from incurring disproportionate negative environmental impacts. Southern California, in its unique demographic and geographic diversity, presents a keen opportunity to promote EJ in the administration of transportation and land use decisions that affect residents' daily lives. The Southern California Association of Governments' (SCAG) 2020 Regional Transportation Plan/Sustainable Communities Strategy (Connect SoCal) is designed to create region-wide benefits that are distributed equitably, while ensuring that any one group does not carry the burdens of development disproportionately. It's particularly important that Connect SoCal considers the consequences of transportation projects on low-income and minority communities, and avoids, minimizes, or mitigates disproportionately high and adverse human health and environmental impacts on low-income and minority populations (also referred to as EJ communities).

Consideration of EJ in the transportation planning process stems from Title VI of the Civil Rights Act of 1964, which establishes the need for transportation agencies to disclose to the general public the benefits and burdens of proposed projects on minority populations. As a Metropolitan Planning Organization (MPO) that receives federal funding, SCAG is required to conduct an EJ analysis for Connect SoCal. The Connect SoCal EJ Technical Report (EJ Technical Report) will address the potential impacts of the Plan on low-income and minority populations and will also examine historical trends related to EJ throughout the region. To prepare for the technical analysis, SCAG staff conducted extensive

outreach to EJ stakeholders and the general public during the EJ Working Group (EJWG) meetings, targeted EJ outreach, and Connect SoCal Public Workshops to gather feedback. Input received were considered and, when applicable, implemented during the development of the report.

Building on the success of the 2012 and 2016 RTP/SCS, SCAG identified 18 performance indicators and conducted analyses of existing and future social and environmental equity in the region in various areas of analysis, which are environmental justice areas, Senate Bill 535 (SB 535) disadvantaged communities, and communities of concern.

Connect SoCal EJ Technical Report Areas of Analysis

Region	SCAG region
EJ Areas (EJA)	Transportation Analysis Zones (TAZs) that have a higher concentration of minority population OR low-income households that is seen in the region as a whole
SB 535 Disadvantaged Communities (DAC)	Census tracts that have been identified by the California Environmental Protection Agency (Cal/EPA) as Disadvantaged Communities based on the requirements set forth in SB 535, which seek to identify disproportionately burdened by and vulnerable to multiple sources of pollution
Communities of Concern (COC)	Census Designated Places (CDPs) and City of Los Angeles Community Planning Areas (CPAs) that fall in the upper one-third of all communities in the SCAG region for having the highest concentration of minority population AND low-income households

To make this report more user-friendly and applicable, the 18 performance indicators were categorized under four EJ focused questions as presented in the following table. Furthermore, per Senate Bill 1000 (SB 1000), local jurisdictions in California with disadvantaged communities are required to develop an EJ Element or consider EJ goals, policies, and objectives in their General Plans. As such, the EJ Technical Report includes General Plan Element (GPE) icons next to each performance indicator to indicate which EJ performance indicator can be used as a resource for that specific GPE for the purpose of SB 1000 requirement. The GPE icons (legend provided in the following table) are used throughout the EJ Technical Report and in the EJ Toolbox.

Connect SoCal EJ Technical Report Performance Indicators

CI = Circulation; CO = Conservation; H = Housing; LU = Land Use; N = Noise; OS = Open Space; S = Safety

How will this impact quality of life?	Jobs-Housing Imbalance (LU, H) Neighborhood Change and Displacement (CI, H) Accessibility to Employment and Services (CI, LU) Accessibility to Parks and Educational Facilities (CI, CO, LU, OS)
How will this impact health and safety?	Active Transportation Hazards (CI, LU, S) Climate Vulnerability (LU, S) Public Health Analysis (S) Aviation Noise Impacts (CI, LU, N, S) Roadways Noise Impacts (CI, LU, N, S) Emissions Impacts Analysis ($PM_{2.5}$ & CO) (CI, LU, S) Emissions Impacts Along Freeways (CI, LU, S)
How will this impact the commute?	Travel Time & Travel Distance Savings (CI) Rail-Related Impacts (CI)
How will this impact transportation cost?	Share of Transportation System Usage (CI) Connect SoCal Revenue Sources in Terms of Tax Burdens (CI, LU) Connect SoCal Investments vs. Benefits (CI, LU) Geographic Distribution of Transportation Investments (CI) Impacts from Funding Through Mileage-Based User Fees (CI)

The EJ Technical Report concludes that Connect SoCal implementation will not result in disproportionate or adverse impacts on low income and minority populations in most performance areas. Specifically, conditions will improve regionally for EJ communities in most performance areas like accessibility to employment and services and parks and educational facilities, impacts along freeways and high-traffic roads, travel time and travel distance savings, revenue sources in terms of tax burdens and geographic distribution of transportation investments. Current condition analyses on jobs-housing imbalance indicate that Connect SoCal implementation will improve the jobs-housing balance and current conditions analyses on neighborhood change and displacement indicate EJ communities can experience adverse impacts based on community dynamics and should be examined on a case-by-case basis. Current conditions analyses for active transportation hazards, climate vulnerability and public health indicate that EJ communities incur a higher risk of adverse impacts but such impacts can potentially be mitigated or avoided with recommended practices and approaches listed in the EJ Toolbox at the end of this report. Lastly, roadway noise impacts and rail-related impact analyses show adverse impacts at the local level for certain regions but improvements at a regional level. The EJ Toolbox at the end of this report includes recommended practices and approaches for performance areas that may result in disproportionate adverse impacts on EJ communities and can be a resource to local jurisdictions or EJ stakeholders to combat disproportionately adverse impacts on EJ communities. Overall, Connect SoCal implementation will generally improve conditions regionally for EJ communities in many performance areas.

INTRODUCTION

VISION AND PURPOSE

The Connect SoCal envisions a more compact and connected region where all communities have an equitable share of seamless access to numerous public transit options, live closer to work, school, shopping and other essential services, and neighborhoods are safer, more walkable, and ideal for promoting more active living. However, low-income and minority communities may not always reap the same benefits as other communities which can cause environmental injustices. EJ is the fair treatment and meaningful involvement of all people regardless of race, color, national origin or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies and the transportation planning process. As such, this Report will address the potential impacts of the Plan on low-income and minority populations, and examine historical trends related to EJ performance areas throughout the region.

As a governmental entity that receives federal funding, SCAG is required to conduct an EJ analysis for its regional transportation plan/sustainable communities strategy. SCAG's EJ program includes two main elements: technical analysis and public outreach. In the regional transportation-planning context, SCAG's role is to 1) ensure that low-income and minority communities have ample opportunity to participate in the decision-making process when transportation decisions are made and 2) identify whether such communities receive an equitable distribution of benefits and not a disproportionate share of burdens. As such, SCAG adheres to all federal and state regulations on EJ and is committed to be a pioneer in the analysis of the environmental, health, social and economic impacts of Connect SoCal on low-income and minority populations in the SCAG region. As part of program, the agency also:

- Provides early and meaningful public access to decision-making processes for all interested parties, including minority and low-income populations.
- Seeks out and considers the input of traditionally underrepresented groups, such as minority and low-income populations, in the regional transportation planning process.
- When disproportionately high and adverse impacts on minority or low-income populations are identified, SCAG takes steps to propose mitigation measures or consider alternative approaches for the SCAG region.
- Continues to evaluate and respond to EJ issues that arise during and after the implementation of SCAG's regional plans.

Beyond the definitions outlined in federal law, executive order and state law, SCAG also considers other population characteristics in developing its EJ analysis. Factors such as children, elderly populations, vehicle-less households, individuals without a high school diploma, and areas designated as disadvantaged by SB 535 (DeLeon) are also included as part of SCAG's EJ analysis, along with several other factors.

ORGANIZATION OF THE REPORT

The format of this report will include a brief background of EJ and why SCAG is required to conduct an analysis, the process taken to prepare and develop the analysis, the methodology and technical analysis of the 18 EJ performance indicators and an EJ Toolbox with recommended practices and approaches to avoid or mitigate any disproportionate adverse impacts on EJ communities. After conducting extensive outreach with SCAG's EJ stakeholders, SCAG conducted technical analyses for the existing 18 EJ performance indicators and added relevant elements to make the report more user-friendly and readable. The additional elements include reorganizing the performance indicators into four EJ focused questions (i.e. How will this impact quality of life? How will this impact health and safety? How will this impact the commute? How will this impact transportation costs?) and General Plan Element indicator icons per SB1000 requirements which is discussed below**. TABLE 1** lists the impacts for each performance indicator, comparing the outcome of the Plan to the Baseline scenario, and includes a summary of results for indicators that examine historical trends and existing conditions. Definitions of Plan and Baseline are explained in detailed in the below "How Will Impacts be Analyzed?" section; in short, baseline is the estimated 2045 conditions without the implementation of Connect SoCal. In addition, this table includes the new General Plan Element icons that indicate appropriate and applicable General Plan Elements for each performance indicator that can be used or considered for local jurisdictions to develop policies and approaches and for EJ stakeholders to advocate for in their initiatives per SB 1000 (legislation that requires local jurisdictions with disadvantaged communities to develop an EJ Element or incorporate EJ goals, policies and objectives in their General Plans). The applicable General Plan Element icons will also be used throughout the report.

TABLE 1 Comparison of EJ Performance Measures Between 2045 Plan and 2045 Baseline

(1) HOW WILL THIS IMPACT QUALITY OF LIFE?					
EJ Topics	**EJ Performance Measures**	**Current Conditions Analysis**			
Jobs-Housing Imbalance (H, LU)	Jobs-Housing Imbalance	Historical and current results show that higher wage workers tend to commute longer distances than lower wage workers. The median commute distance grew in all six counties between 2002 and 2016, especially more rapidly in the Inland counties where there is a lower job-to-worker ratio than coastal counties. Coastal counties have a substantial concentration of low-wage jobs, but lack an adequate number of affordable rental units, while Inland counties have a substantial concentration of affordable rental units and workers, relative to the number of low-wage jobs that match their skills. The Plan will contribute to improvements in jobs-housing balance throughout the region, and especially in inland counties.			
Neighborhood Change and Displacement (H, LU)	Neighborhood Change and Displacement	Establishing that gentrification and displacement result from transportation investment is challenging on a region-wide basis. Recent studies of LA County have shown that the opening and the continued presence of LA Metro rail stations can increase neighborhood outflow rates up to 10% above baseline levels; however, most of the observed moves are for middle- and upper-income groups while limited evidence is found that rail station openings disproportionately increase move rates for low-income households. More broadly, recent research shows that wholesale displacement is not the result of changing neighborhoods, but attention should instead be given on a project-by-project basis to carefully understand local neighborhood dynamics and ensure equitable access to the benefits of improved infrastructure. Local analysis can also facilitate better monitoring of related outcomes which may not rise to the level of displacements such as household overpayment or overcrowding, in addition to the possibility of decreased accessibility when minority or EJ populations suburbanize. SCAG's analysis of neighborhood change across the region identifies 40 census tracts that have been persistently changing across recent decades; however, these tracts are not disproportionately located in EJAs, DACs, or COCs.			
EJ Topics	**EJ Performance Measures**	**SCAG Region**	**EJA**	**DAC**	**COC**
Accessibility to Employment and Services (CI, LU)	Accessibility to Employment (time-based) by 30 Minute Auto	Improve	Improve	Improve	Improve
	Accessibility to Employment (time-based) by 45 Minute All Transit	Improve	Improve	Improve	Improve
	Accessibility to Employment (time-based) by 45 Minute Local Bus	Improve	Improve	Improve	Improve
	Accessibility to Shopping (time-based) by 30 Minute Auto	Improve	Improve	Improve	Improve
	Accessibility to Shopping (time-based) by 45 Minute All Transit	Improve	Improve	Improve	Improve
	Accessibility to Shopping (time-based) by 45 Minute Local Bus	Improve	Improve	Improve	Improve

TABLE 1 Comparison of EJ Performance Measures Between 2045 Plan and 2045 Baseline - Continued

(1) HOW WILL THIS IMPACT QUALITY OF LIFE?					
EJ Topics	EJ Performance Measures	SCAG Region	EJA	DAC	COC
Accessibility to Parks and Educational Facilities (CI CO LU OS)	Accessibility to Local Parks by 30 Minute Auto	Improve	Improve	Improve	Improve
	Accessibility to Local Parks by 45 Minute All Transit	Improve	Improve	Improve	Improve
	Accessibility to Local Parks by 45 Minute Local Bus	Improve	Improve	Improve	Improve
	Accessibility to Natural Lands by 30 Minute Auto	Improve	Improve	Improve	Improve
	Accessibility to Natural Lands by 45 Minute All Transit	Improve	Improve	Improve	Improve
	Accessibility to Natural Lands by 45 Minute Local Bus	Improve	Improve	Improve	Improve

(2) HOW WILL THIS IMPACT HEALTH AND SAFETY?		
EJ Topics	EJ Performance Measures	Current Conditions Analysis
Active Transportation Hazards (CI LU S)	Active Transportation Hazards	The 2016 traffic collisions analysis have shown that low-income and minority communities incur a higher rate of bicycle and pedestrian risk. Improvements in active transportation infrastructure and complete streets measures, such as those proposed in the Plan (e.g. Toward Zero Death, *GoHuman*, etc.), have been shown to reduce hazard to cyclists and pedestrians. The EJ Toolbox, available at the end of this report, lists potential strategies to reduce risk at the local level.
Climate Vulnerability (LU S)	Climate Adaptation	Existing conditions show that minority and low-income population are at a greater risk for experiencing negative impacts from climate change, like extreme heat, flooding, and other extreme events. These populations have fewer resources to cope with climate consequences. Lack of air conditioning and transportation options may exacerbate vulnerability in heat prone areas and access to cooling centers may be limited. In addition, minority and low households may be disproportionately impacted by the disruption to their place of work and the local economy, since many may have limited financial resources. Please refer to the EJ Toolbox section for potential strategies to reduce harms at the local level.
Public Health Analysis (S)	Public Health Analysis	Recent trends indicate that air quality is improving throughout the region. For areas that show less improvement of air quality, there is sometimes a higher proportion of minority and low income population. When examining public health indicators from the CalEnviroScreen tool, it appears that areas with the highest concentrations of minority and low income population incur some of the highest risks throughout the region.

TABLE 1 Comparison of EJ Performance Measures Between 2045 Plan and 2045 Baseline - Continued

(2) HOW WILL THIS IMPACT HEALTH AND SAFETY?					
EJ Topics	**EJ Performance Measures**	**Current Conditions Analysis**			
Noise Impact Analysis CI LU N S	Aviation Noise Impacts	Although the air passenger demand in the SCAG region might raise concerns about aviation noise, the increased passenger activity did not translate to increased aircraft operations. Therefore, by reducing the number of aircraft operations, the newer technology and practices being employed by the airlines is also affecting overall noise impacts. In summary, the areas around the airports experiencing significant sounds levels have been reduced through the following: the FAA noise certification standards; the development of new technology by aircraft and engine manufacturers; investments by U.S. airlines in newer, quieter aircraft; and mandates by the FAA and the U.S. Congress to retire older, noisier aircraft. However, concerned communities and individuals should monitor aviation noise levels and impacts, including viewing the noise contour maps and visiting the noise abatement websites of the airports within their vicinity.			
	EJ Performance Measures	**SCAG Region**	**EJA**	**DAC**	**COC**
	Roadway Noise Impacts	Improve	Improve	Does Not Improve	Does Not Improve
EJ Topics	**EJ Performance Measures**	**SCAG Region**	**EJA**	**DAC**	**COC**
Emissions Impact Analysis CI LU S	Emissions Impact Analysis ($PM_{2.5}$)	Improve	Improve	Improve	Improve
	Emissions Impact Analysis (CO)	Improve	Improve	Improve	Improve
EJ Topics	**EJ Performance Measures**	**Within 500 Feet of Freeways and High-Traffic Roads**			
Impacts Along Freeways and High-Traffic Roads CI LU S	Impacts Along Freeways and High-Traffic Roads (Percentage of Minority Population)	Improve			
	Impacts Along Freeways and High-Traffic Roads (Percentage of Low-Income Households)	No Change			
	Emissions Impact Analysis (CO)	Improve			
	Emissions Impact Analysis ($PM_{2.5}$)	Improve			

TABLE 1 Comparison of EJ Performance Measures Between 2045 Plan and 2045 Baseline - Continued

(3) HOW WILL THIS IMPACT THE COMMUTE?					
EJ Topics	**EJ Performance Measures**	**SCAG Region**	**EJA**	**DAC**	**COC**
Travel Time and Travel Disance Savings CI	Distribution of Travel Distance (30 Minute Auto)	Improve	Improve	Improve	Improve
	Distribution of Travel Time (30 Minute Auto)	Improve	Improve	Improve	Improve
	Distribution of Travel Distance (45 Minute All Transit)	Improve	Improve	Improve	Improve
	Distribution of Travel Time (45 Minute All Transit)	Improve	Improve	Improve	Improve
EJ Topics	**EJ Performance Measures**	**Railroad Adjacent Areas**		**Areas Adjacent to Grade Separation Projects**	
Rail-related impacts CI	Rail-Related Impacts (Percentage of Minority Population)	No Change		No Change	
	Rail-Related Impacts (Percentage of Low-Income Households)	No Change		No Change	
(4) HOW WILL THIS IMPACT TRANSPORTATION COSTS?					
EJ Topics	**EJ Performance Measures**	**SCAG Region**	**EJA**	**DAC**	**COC**
Connect SoCal Revenue Sources In Terms of Tax Burdens CI LU	Share of Transportation System Usage	Improve			
	RTP/SCS Revenue Sources In Terms of Tax Burdens				
	RTP/SCS Investments vs. Benefits				
Geographic Distribution of Transportation Investments CI	Transportation Investments in Bicycle (by lanemile) - Existing vs Plan	Improve	Improve	Improve	Improve
	Transportation Investments in Highway (by lanemile) - Existing vs Plan	Improve	Improve	Improve	Improve
	Transportation Investments in Transit (by lanemile) - Existing vs Plan	Improve	Improve	Improve	Improve
Impacts from Milege-Based User Fee CI	Impacts from Funding Through Mileage Based User Fee	There is no disproportionate impact. The proposed mileage-based user fee system is deemed more equitable to low income groups than both the gasoline tax and sales tax, which are highly regressive. Under the current structure, low income households pay more per mile in gasoline tax than their higher earning counterparts due to their lower adoption rates of new (more fuel efficient) vehicles. With the mileage-based user fee system, all households will pay in proportion to their usage of the transportation system.			

Source: EJ Technical Report

CONNECTING CONNECT SOCAL

Because EJ intersects many different topic areas, it is echoed throughout the Plan as well as in other technical reports. Environmental justice is discussed in Chapter 5, Measuring Our Progress, of the 2020 Connect SoCal Main Document. Environmental justice is also discussed and referenced in many technical reports like the Public Health Technical Report, the Active Transportation Technical Report, the Performance Measures Technical Report, the Goods Movement Technical Report and the Public Participation and Consultation Technical Report.

REGULATORY FRAMEWORK

FEDERAL REQUIREMENT

Consideration of EJ in the transportation planning process stems from Title VI of the Civil Rights Act of 1964, 42 U.S.C. § 2000d et seq. (Title VI). Title VI establishes the need for transportation agencies to disclose to the public the benefits and burdens of proposed projects on minority populations. Title VI states that "No person in the United States shall, on the ground of race, color or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." Additionally, Title VI not only bars intentional discrimination, but also unjustified disparate impact discrimination. Disparate impacts result from policies and practices that are neutral on their face (i.e., there is no evidence of intentional discrimination), but have the effect of discrimination on protected groups.

In the 1990s, the federal executive branch issued orders on EJ that amplified Title VI, in part by providing protections based on income as well as race. These directives, which included President Clinton's Executive Order 12898 (1994) and subsequent U.S. Department of Transportation (USDOT) and Federal Highway Administration (FHWA) orders (1997 and 1998, respectively), along with a 1999 USDOT guidance memorandum, ordered every federal agency to make EJ part of its mission by identifying and addressing the effects of all programs, policies and activities on underrepresented groups and low-income populations. Reinforcing Title VI, these measures ensure that every federally funded project nationwide consider the human environment when undertaking the planning and decision-making process.

On August 4, 2011, 17 federal agencies signed the "Memorandum of Understanding on EJ and Executive Order 12898." The signatories, including the USDOT, agreed to develop EJ strategies to protect the health of people living in communities overburdened by pollution and to provide the public with annual progress reports on their efforts. The MOU advances agency responsibilities outlined in the 1994 Executive Order 12898 and directs each of the federal agencies to make EJ part of its mission and to work with other agencies on EJ issues as members of the Interagency Working Group on EJ.

In response to this MOU, USDOT revised its EJ strategy. The revisions reinforce the USDOT's programs and policies related to EJ and strengthen its efforts to outreach to minority and low-income populations. In addition, the Federal Transit Authority (FTA) issued two Circulars on Title VI and EJ in 2011 and 2012 to clarify the requirements and offer guidance. FTA Circular 4702.1A, Title VI Requirements and Guidelines for Federal Transit Administration Recipients (Docket No. FTA-2011-0054) provides information required in the Title VI Program, changes the reporting requirement from every four years to every three years, and adds a requirement for mapping and charts to analyze the impacts of the distribution of state and federal public transportation funds. The FTA Circular 4703.1, EJ Policy Guidance for Federal Transit Administration Recipients (Docket No. FTA-2011-0055) provides recommendations to MPOs (and other recipients of FTA funds) on how to fully engage EJ populations in the public transportation decision-making process; how to determine whether EJ populations would be subjected to disproportionately high and adverse human health or environmental effects as a result of a transportation plan, project, or activity as well as how to avoid, minimize or mitigate these effects.

STATE REQUIREMENT

In addition to Federal requirements, SCAG must comply with California Government Code Section 11135, which states that, "no person in the State of

California shall, on the basis of race, national origin, ethnic group identification, religion, age, sex, sexual orientation, color, or disability, be unlawfully denied full and equal access to the benefits of, or be unlawfully subjected to discrimination under, any program or activity that is conducted, operated, or administered by the state or by any state agency that is funded directly by the state, or receives any financial assistance from the state." California Senate Bill 115, passed in 1999, also established the definition of "EJ" in the California Government Code as "the fair treatment of people of all races, cultures and income with respect to development, adoption and implementation of environmental laws, regulations and policies."

The State of California also provides guidance for those involved in transportation decision-making to address EJ. In 2003, the California Department of Transportation (Caltrans) published the Desk Guide on EJ in Transportation Planning and Investments to provide information and examples of ways to promote EJ. The Desk Guide identified requirements for public agencies, guidance on impact analyses, recommendations for public involvement and mitigation.

Under Senate Bill 375 (SB 375), SCAG is required to include a Sustainable Communities Strategy within Connect SoCal. Connect SoCal represents the collective vision of the six counties in the SCAG region, and provides a framework for the future development of our regional transportation system. Through SB 375, the California Air Resources Board (ARB) established per-capita targets for greenhouse gas emissions reduction for cars and light trucks for the SCS. The targets for the SCAG region are eight percent in 2020 and 19 percent in 2035, from 2005 levels. During the first target setting process, ARB appointed a Regional Target Advisory Committee (RTAC) to recommend factors to be considered and methodologies to be used for setting the targets. The RTAC report was finalized in September 2009 and included a recommendation on housing and social equity. The report recognized the impact that policies to reduce Vehicle Miles Traveled (VMT) could have on social equity, specifically calling for appropriately located affordable housing to match local wage levels. The RTAC further recommended that displacement and gentrification, as a result of changing land uses and increased housing costs, should be addressed and specifically avoided to the extent possible in the SCS. As a result of the RTAC recommendation and input from our EJ stakeholders, SCAG updated its methodology in the 2016 RTP/SCS to include additional areas of analysis, including gentrification and displacement, and continues this analysis in Connect SoCal.

Other legislation relevant to EJ that has been passed in the recent years include Senate Bill 1000 (SB 1000), the Planning for Healthy Communities Act, which requires all local jurisdictions in California with disadvantaged communities, as defined by SB 535, to develop an EJ Element as part of their General Plan Update or consider EJ goals, policies, and objectives throughout their General Plan, and Assembly Bill 617 (AB 617), which brings air quality monitoring to a more localized level. While SCAG does not have statutory requirements from these legislations, it is evident that EJ is becoming an increasingly significant topic in all sectors of planning. As a result of this, SCAG's EJ program will anticipate such changes and aim to provide support as needed to SCAG's stakeholders.

ANALYTICAL APPROACH

OUTREACH EFFORTS

A key component of Connect SoCal development process is seeking public participation. Public input from our EJ stakeholders helped SCAG prioritize and address needs in the region. As part of the EJ outreach effort, SCAG compiled a list of key stakeholders to be contacted regarding Connect SoCal programs and policies. This list is comprised of more than 600 individuals and organizations that were involved with Connect SoCal, as well as additional stakeholders such as advocacy groups concerning environment, poverty, public health, and housing; public agencies; and other involved groups. SCAG maintains this list regularly and allows interested stakeholders to sign up online for the mailing list.

In efforts to establish an ongoing EJ Program, SCAG created the EJ Working Group (EJWG) which consists of many EJ stakeholders including environmental advocacy groups, non-profit organizations, academics, local jurisdictions and subregional agencies like County Transportation Commissions (CTCs) and Councils of Governments (COGs). The EJWG was established in April 2018 and held its first

meeting on May 17, 2018 with close to 50 participants attending. The EJWG aims to provide a platform for stakeholders to facilitate continuous opportunities for discussion, provide discuss important EJ-related issue areas and gather input from EJ stakeholders, provide information sharing, and support local implementation. However, the primary focus for the EJWG in 2018-2020 was to provide a platform for EJ stakeholders to receive updates and provide input on the development of Connect SoCal and the EJ report. SCAG held six EJWG meetings to discuss developments of Connect SoCal and EJ technical analysis and gather input from EJ stakeholders. The meetings were held on May 17, 2018, August 9, 2018, November 8, 2018, January 24, 2019, April 18, 2019, and August 15, 2019. Each meeting was held at the SCAG Los Angeles office but also provided videoconferencing options at the five SCAG regional offices in Imperial County, Orange County, Riverside County, San Bernardino County, and Ventura County, and webinar options to reach a wider audience. Each meeting was attended by at least 30 participants in person or online and represented a variety of stakeholders and EJ interests.

SCAG staff also conducted targeted outreach to stakeholder groups that were interested in the EJWG but were unable to attend the meetings. SCAG staff sought out EJ organizations and individuals that have worked with SCAG before as well as new contacts to collect valuable and meaningful input from SCAG stakeholders. SCAG held one meeting in the Coachella Valley on May 28, 2019 with attendance of seven different organizations and discussed the development of Connect SoCal EJ Technical Report and collected input for the technical analysis. The targeted outreach meetings are intended to be an opportunity for staff to connect with EJ stakeholders on an ongoing basis so meetings in other regions and with other groups continued throughout the development and release of Connect SoCal and will continue after the adoption of the Plan. In addition to the meeting in Coachella Valley, SCAG staff had e-mail and phone call correspondences with various organizations throughout the region to gather input on the EJ report.

In addition to the EJWG meetings and targeted outreach, SCAG included EJ as a component to Connect SoCal workshops, held between May and June 2019, to conduct outreach to the general public. Twenty-eight (28) Connect SoCal workshops and one tele-town hall were held throughout the region with over 550 in total attendance, which is an average of about 20 participants per workshop. The workshops were held in all six counties in the SCAG region (one (1) in Imperial County, eight (8) in Los Angeles County, four (4) in Orange County, seven (7) in Riverside County, five (5) in San Bernardino County, and three (3) in Ventura County) and were held during the day and in the evenings to make the workshops more accessible to the general public. Connect SoCal workshops included an EJ interactive poster, asking participants to pick three EJ issue areas they are most concerned with. As expected, each region had differing results because each region faces different issue areas. **TABLE 2** lists the EJ issue areas and provides an overall vote for all workshop participants. Input received from the workshops were incorporated into the technical analysis. For example, the top five issue areas (jobs-housing imbalance, regional air pollution and health impacts, bicycle and pedestrian safety, access to employment and services and climate vulnerability) were either enhanced through the technical analysis or expanded in the EJ Toolbox.

TABLE 2 EJ Survey Results from Connect SoCal Public Workshops

Connect SoCal EJ Issue Areas Interactive Poster Counts	Total
Jobs-Housing Imbalance	209
Regional Air Pollution & Health Impacts	162
Bicycle & Pedestrian Safety	127
Access to Employment & Services	121
Climate Vulnerability	117
Gentrification & Displacement	99
Access to Parks & Natural Land	88
Air Pollution Impacts Along Freeways & Corridors	62
What I paid vs. Benefits Received from Transportation Investments	59
Impacts on Populations Living Adjacent to Railroad & Grade Separation Projects	33
Roadway Noise Impacts	23
Aviation Noise Impacts	16

Source: SCAG

Through extensive outreach from the EJWG, targeted outreach, and Connect SoCal workshops, SCAG received a lot of feedback that helped shape the development of the EJ Technical Report. SCAG received a wide range of comments from input on how to conduct outreach to improvements on specific technical analysis areas. SCAG reviewed all comments and have incorporated as many as possible and when applicable. Comments that were incorporated include:

- Consider expanding outreach to more grassroots groups, public health departments, faith-based organizations, Air Pollution Control Districts, neighborhood councils, and cultural groups
- When conducting outreach, understand that there are food, childcare, and transit costs for participants and consider compensation for participants
- Consider innovative ways of outreach like pop-up events, farmers markets, and neighborhood forums
- Develop purpose and objective for public meetings and frame meetings with the question "What's in it for me" to benefit participants
- Consider communities under AB 1550 for the EJ analysis
- Consider Healthy Places Index, MATES IV study from AQMD, LA County Health Profile, Riverside County Climate Adaptation Plan and develop an inventory of Health Impact Study in the region to identify the gap
- Consider expanding the "Gentrification and Displacement" analysis to non-transit areas; Consider race, educational attainment, rent vs. homeowners as indicators to determine communities vulnerable to gentrification and displacement
- Consider expanding on traffic safety to include collisions involving trucks
- Consider including Heat island effects (consider Urban Heat Islands (UHI) Index maps on CalEPA's website), seismic risk, liquefaction, and disaster resilience in the "Climate Vulnerability" section
- Consider reorganizing performance measures into categories to make it easier to digest
- Consider utilizing matrices to better show results of EJ analyses

There are also input received that staff was not able to incorporate into this EJ Technical Report but will be considered for future EJ Technical Reports. They are:

- Consider having bilingual meetings and materials for distribution
- Consider identifying ways to combine multiple EJ areas to create new EJ areas by combing their indices
- Consider creating an interactive application

TECHNICAL ANALYSIS

The following section summarizes the technical approach conducted for each performance indicator in Connect SoCal EJ report. Detailed methodologies and results are available within their respective sections. As with previous plans, the goal of Connect SoCal is to ensure that when transportation decisions are made, low-income and minority populations have ample opportunity to participate in the decision-making process and receive an equitable distribution of benefits, rather than a disproportionate share of burdens. All performance indicators are analyzed by using three planning periods—2016 Base Year, 2045 Baseline, and 2045 Plan—to identify potential disproportionate impacts on low-income and minority populations. Detailed information is described in the following sections within this chapter.

WHO DOES THE PLAN IMPACT?

Identifying low-income and minority populations are necessary for both conducting effective public participation and assessing the distribution of benefits and burdens of transportation plans and projects. For the purposes of this analysis, SCAG focused on all low-income and minority populations. Executive Order 12898, USDOT, and FHWA Orders on EJ define "minority" as persons belonging to any of the following groups, as well as "other" categories that are based on the self-identification of individuals in the Census: African American, Hispanic, Asian/Pacific Islander, and Native American and Alaskan Native. SCAG based its analysis on the best available data for ethnic/racial groups in the SCAG region at the census tract level and Transportation Analysis Zone (TAZ).

The poverty classification is a federally established income guideline used to define persons who are economically disadvantaged as outlined by the U.S. Department of Health & Human Services guidelines. The poverty level applicable to the SCAG region is chosen based on regional average household size for a given census year. In 2016, a family of three earning less than $19,105 was classified as living in poverty.[1]

TABLE 3 lists the demographic categories that are used in SCAG's EJ analysis. In addition to complying with federal guidance, SCAG also conducts income equity analyses by breaking down total regional income figures into five income quintiles. A quintile, by definition, is a category into which 20 percent of the ranked households fall and is updated based on the most recent census data on household income. Once the income quintiles are established, the incidence of benefits and costs can be estimated and compared across these income categories for multiple datasets. Examples include the number of income tax returns, households, workers/commuters, and consumer units. From statistics provided by the Census Bureau, the Bureau of Labor Statistics (BLS), Bureau of Transportation Statistics (BTS), and the National Household Travel Survey (NHTS), staff produced various distributions by income quintile, which were further allocated by racial/ethnic groups within each income quintile. In the analysis of the Plan, behavioral differences that are largely determined by income levels are processed to determine the number of variables (e.g. mode usages by trip purposes—work versus non-work, consumer expenditures by categories—taxable items and gasoline, adjusted gross income, tax paid, etc.). With the framework and information described above, key EJ determinants, with respect to major policy instruments for Connect SoCal, can be allocated to geographic areas based on various mode usage assumptions for each income quintile at areas as small as Tier 2 TAZ, which are more than 11,000 zones and equivalent to census block groups. Using the 2013-2017 American Community Survey (ACS), SCAG staff produced a regional household distribution by income quintile. Household income ranges for these groups are presented in **TABLE 4**.

TABLE 3 Demographic Categories

Ethnic/Racial/Other Categories (Persons)
Hispanic (Latino)
White (Non-Hispanic)
African-American (Non-Hispanic)
Native American (Non-Hispanic)
Asian/Pacific Islander (Non-Hispanic)
One or More Race/Some Other Race (Non-Hispanic)
Young Children Age 4 and Under
Seniors, Age 65 and Above
Disabled/Mobility Limited
Non-English Speakers
Individuals without a High School Diploma
Foreign Born Population
Households without a Vehicle
Income Categories (Households)
Households Below Poverty (Poverty 1)
Households at 1.5x Poverty Level (Poverty 2)
Households at 2x Poverty Level (Poverty 3)
Households by Ranked Income Quintiles

Source: 2013-2017 ACS 5-Year Estimates

TABLE 4 Income Distribution by Quintiles

Income Quintiles	Income Range
Quintile 1	$0 to $28,000
Quintile 2	$28,001 to $52,000
Quintile 3	$52,001 to $82,000
Quintile 4	$82,001 to $128,000
Quintile 5	$128,000 and Higher

Source: 2013-2017 ACS PUMS ($2011)

1 U.S. Census Bureau. Historical Poverty Thresholds. Retrieved from U.S. Census Bureau website.

WHERE SHOULD IMPACTS BE ASSESSED?

In measuring the outcomes of the Plan, SCAG conducted analysis on all topics to identify any potential disproportionately high and adverse impacts for various EJ groups.

Adverse effects are defined by the Federal Transit Administration (FTA) in the 2012 EJ Policy Guidance for Federal Transit Administration Recipients as:

- "the totality of significant individual or cumulative human health or environmental effects, including interrelated social and economic effects, which may include, but are not limited to: bodily impairment, infirmity, illness, or death; air, noise, and water pollution and soil contamination; destruction or disruption of man-made or natural resources; destruction or diminution of aesthetic values; destruction or disruption of community cohesion or a community's economic vitality; destruction or disruption of the availability of public and private facilities and services; vibration; adverse employment effects; displacement of persons, businesses, farms, or non-profit organizations; increased traffic congestion, isolation, exclusion or separation of individuals within a given community or from the broader community; and the denial of, reduction in, or significant delay in the receipt of benefits of [Department of Transportation] programs, policies, or activities".

Adverse effects are disproportionate when they are:

- (1) "predominately borne by minority population and/or low income population", or (2) "will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority and/or non-low-income population" (Federal Register Volume 77, Issue 137).

In order to determine if there are disproportionately high and adverse impacts to EJ communities, SCAG conducted a regional analysis and also focused into specific areas of concern to address the potential impacts of Connect SoCal for a selection of performance areas. This "community-based approach" was also developed by the Bay Area's Metropolitan Transportation Commission (MTC) and has been tailored to suit our region based on guidance from stakeholders.

Specific areas of concern include:

- **EJ Areas (EJA):** Transportation Analysis Zones (TAZ), which are similar to census block groups that have a higher concentration of minority population or low-income households than is seen in the region as a whole. The inclusion of this geography helps to fulfill SCAG's Title VI requirements, along with other state and federal EJ guidelines (**EXHIBIT 1**).
- **Senate Bill 535 Disadvantaged Communities (DAC):** Census tracts that have been identified by the California Environmental Protection Agency (Cal/EPA) as DAC based on the requirements set forth in SB 535, which seek to identify areas disproportionately burdened by and vulnerable to multiple sources of pollution (**EXHIBIT 2**). **EXHIBIT 4** shows the overlap of DAC with EJA.
- **Communities of Concern (COC):** Census Designated Places (CDP) and the City of Los Angeles Community Planning Areas (CPA) that fall in the upper one-third of all communities in the SCAG region for having the highest concentration of minority population and low-income households (**EXHIBIT 3**).

Building on the analysis of the 2016 RTP/SCS, SCAG is also continuing to examine the impacts of the Plan for areas that are known to have specific environmental concerns. These include:

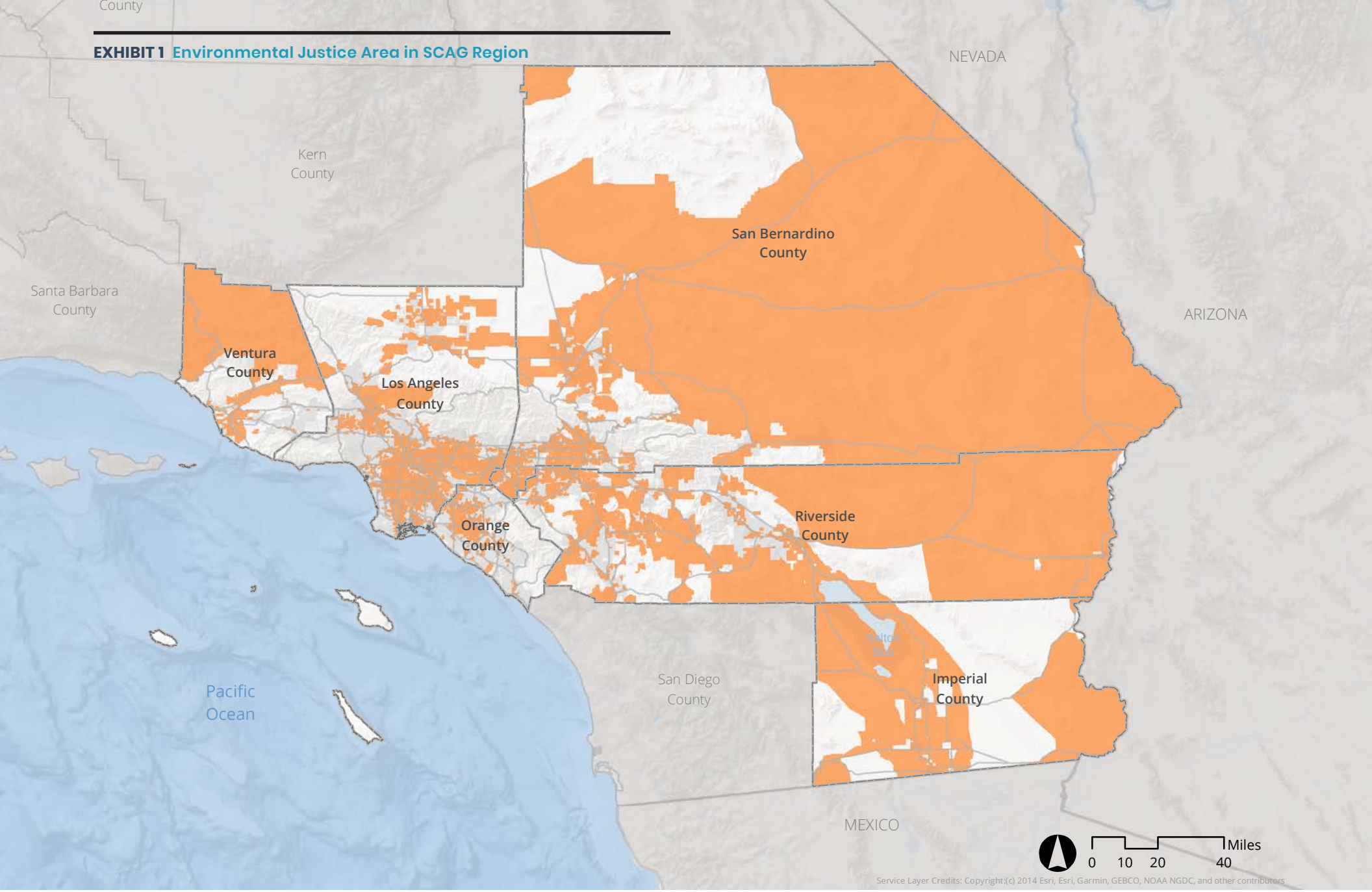
- **Jobs-Housing Imbalance –** As a part of the jobs-housing imbalance/mismatch analysis in the 2016 RTP/SCS, SCAG conducted the Jobs-Housing Fit analysis for cities in the SCAG region, based on the JHFIT methodology developed by UC Davis Center for Regional Change. For Connect SoCal, SCAG applied an updated JHFIT methodology that characterizes low-wage jobs-housing fit at both a jurisdiction and the census tract scale, by examining a ratio between low-wage jobs and affordable rental units. In contrast to overall jobs-housing balance, the low-wage fit analysis is helpful to highlight those jurisdictions and

neighborhoods where there is a substantial shortage of affordable housing in relation to the number of low-wage jobs. To conduct the JHFIT analysis, SCAG employed publicly available data on job numbers from the LEHD Origin-Destination Employment Statistics and housing numbers from the 2013-2017 American Community Survey 5-Year Estimates

- **Neighborhood Change and Displacement –** For neighborhood change and displacement analysis, four variables such as education, race/ethnicity, household income and growth rent were applied to analyze gentrification for almost four decades from 1980 to 2017. To analyze displacement, ACS Public User Microdata Sample data were used to see migration flows in the region. Staff also collaborated with Dr. Rodnyansky of Occidental College, who has access to franchise tax board data to analyze mover types by transit and non-transit neighborhood
- **Benefits and Burdens –** and qualitative analysis of Senate Bill 1, which is the Road Repair and Accountability Act of 2017, signed into law on April 2017. The bill increases state funding for different transportation segments—roads, freeways, bridges, transit, and safety—from various state transportation taxes and fees, including gasoline excise taxes, diesel excise and sales taxes, and vehicle taxes and fees. Staff has provided a comparative analysis between SB1 and user-based mileage fees, which is a long-term replacement to the gasoline tax. The gas tax is inherently regressive and adversely impact low-income and minority population who have been always negatively and disproportionally impacted. However, Connect SoCal continues to advocate the user-based mileage fees after 2030 to replace gasoline taxes and with its success, will completely reverse the EJ concerns with gasoline taxes

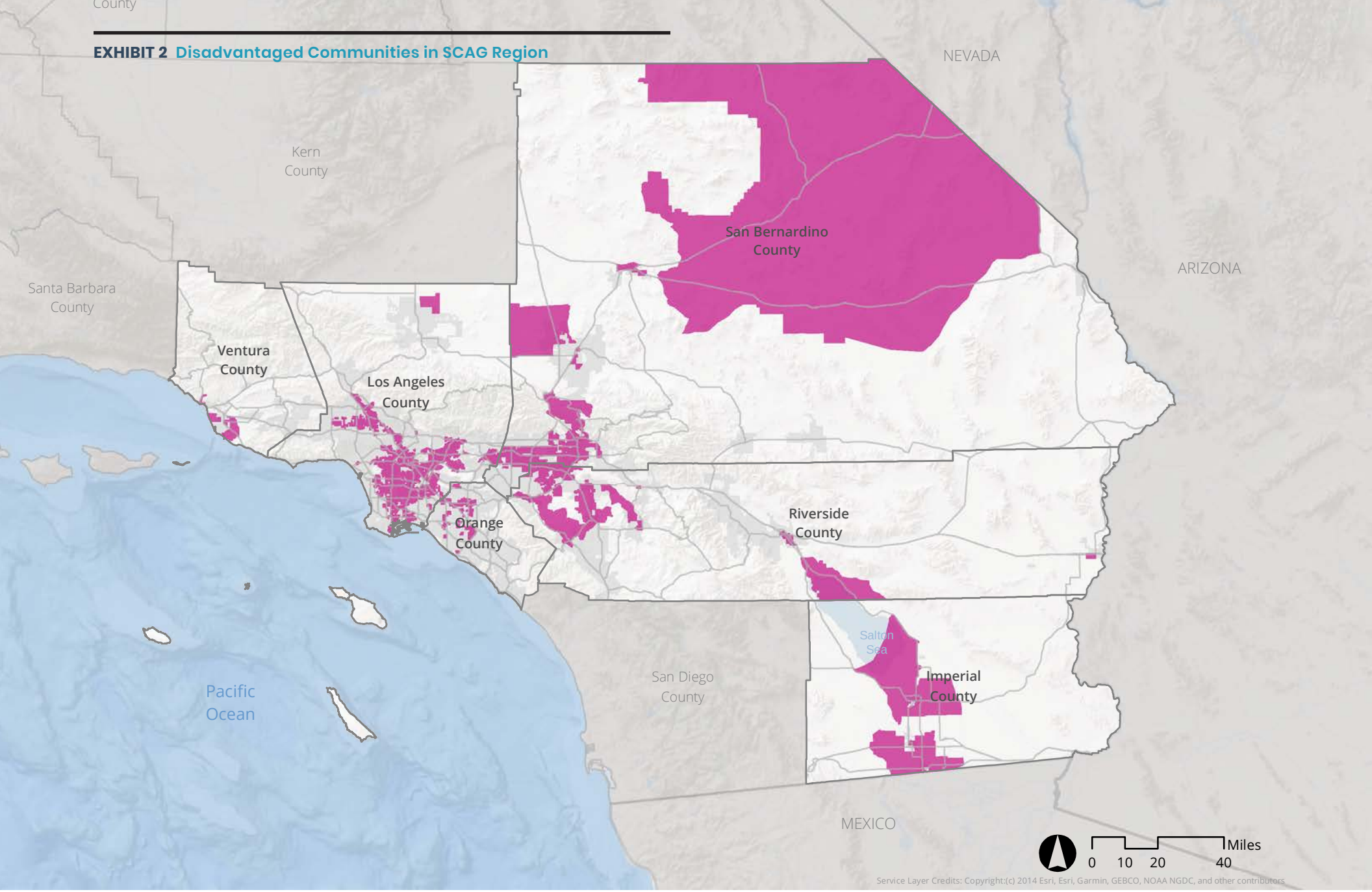
Potential impacts are determined if the Plan results in negative circumstances for these areas and if they have a greater concentration of EJ groups than is seen in the greater region.

EXHIBIT 1 Environmental Justice Area in SCAG Region



Source: Census PUMS, SCAG, 2019

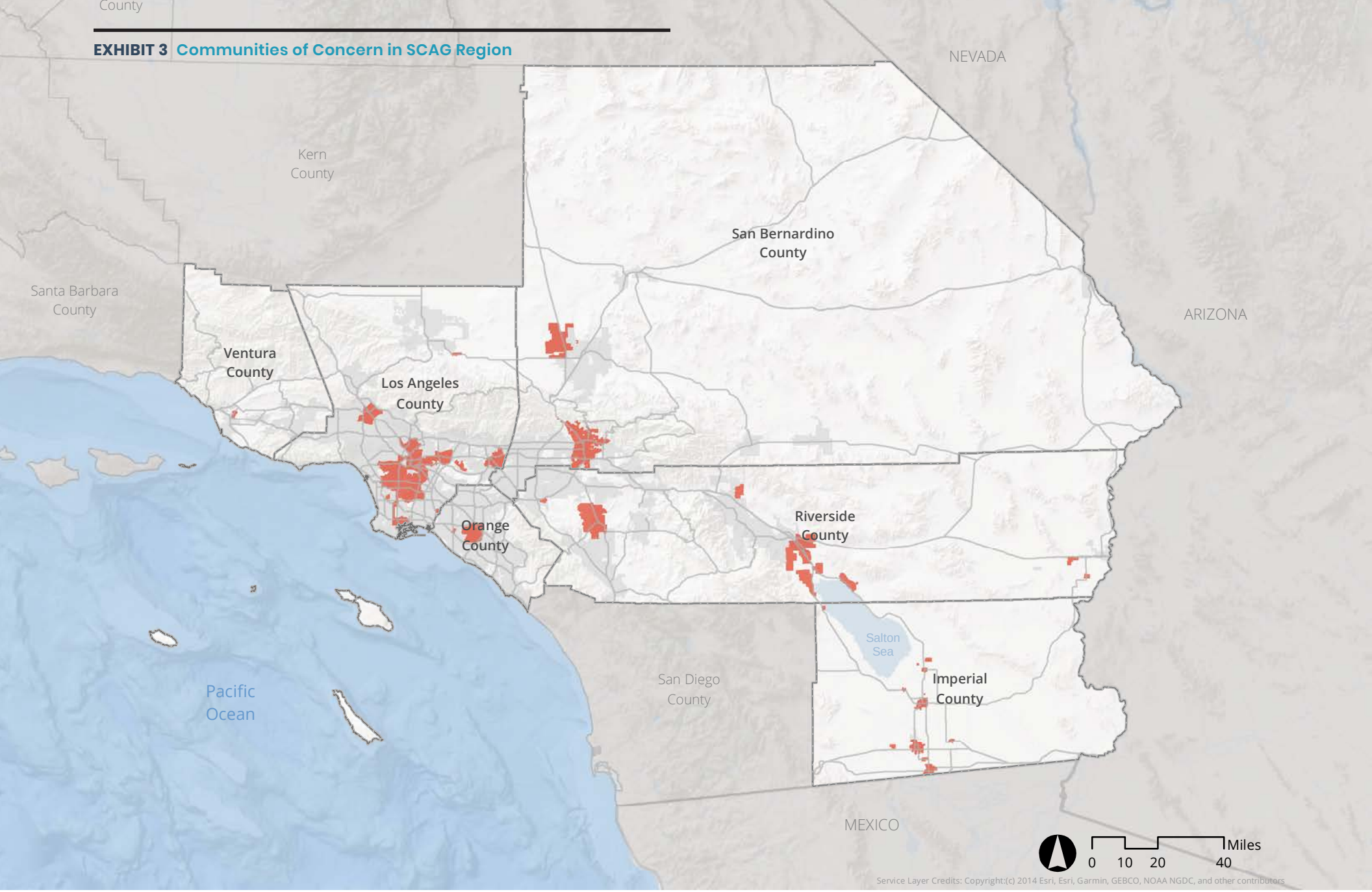
EXHIBIT 2 Disadvantaged Communities in SCAG Region



SB535 Disadvantaged Communities | County Boundaries | City Boundaries | Freeway

Source: OEHHA, CalEPA, CalEnviroScreen Ver. 3.0, SCAG, 2019

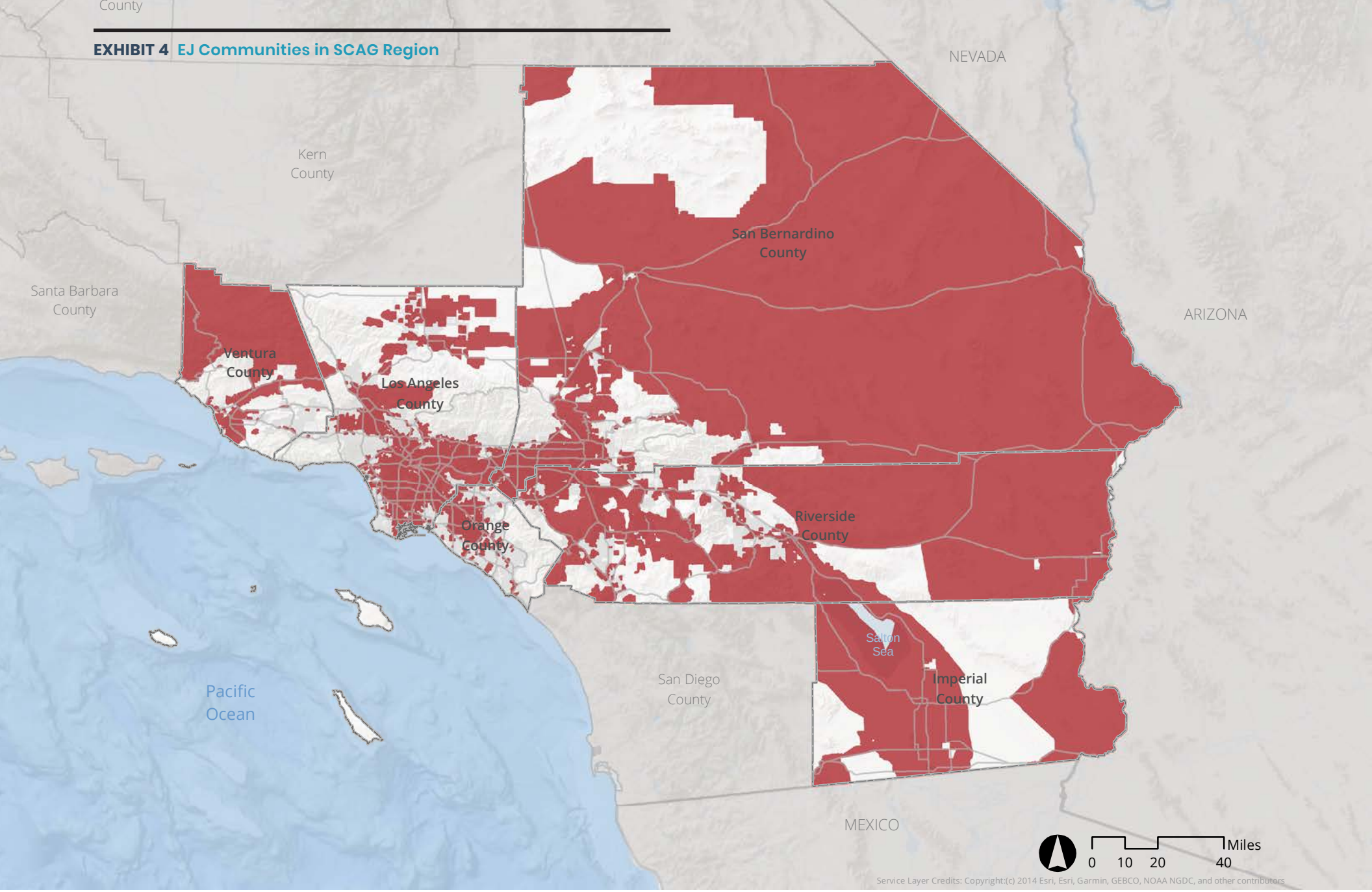
EXHIBIT 3 Communities of Concern in SCAG Region



Communities of Concern | County Boundaries | City Boundaries | Freeway

Source: 2013-2017 ACS 5 Year Estimates, City of Los Angeles Community Planning Area, SCAG, 2019

EXHIBIT 4 EJ Communities in SCAG Region



All Environmental Justice Communities (i.e. EJA, DAC, COC) | County Boundaries | City Boundaries | Freeway

Source: Census PUMS, OEHHA, CalEPA, CalEnviroScreen Ver. 3.0, 2013-2017 ACS 5 Year Estimates, City of Los Angeles Community Planning Area, SCAG, 2019

HOW WILL IMPACTS BE ANALYZED?

In the development of this report, SCAG identified 18 performance measures to analyze existing social and environmental equity in the region and to address the impacts of Connect SoCal on various EJ population groups. Detailed analysis is presented for the following 18 performance areas categorized into four distinct questions:

1. How Will This Impact Quality of Life?
2. How Will This Impact Health and Safety?
3. How Will This Impact the Commute?
4. How Will This Impact Transportation Costs?

The primary method for gauging impacts from Connect SoCal will be to compare the horizon year of the Plan, 2045, under two opposing paradigms. The first ("Plan") represents a future where the selected strategies contained in Connect SoCal have been implemented. The second ("Baseline") operates under the assumption that the Plan will not be implemented and represents the year 2045 under "business as usual" conditions, which includes the completion of transportation projects currently underway or for which funds are already committed, and assumes the continuation of current land use and growth trends.

In order to understand how projected population growth will impact the current transportation system, comparisons are also made to the Base Year of the Plan, which is 2016. In the upcoming analysis, it can sometimes be seen that the outcomes of the Baseline or Plan do not perform as well as current circumstances. It is important to note, however, that an additional 3.6 million people will be living in the SCAG region in 2045, which will put a tremendous strain on our current infrastructure if we do not plan for sustainable growth and change.

Several performance areas included in this report do not assess the impacts of the Plan, but rather examine historical EJ trends throughout the region. These items are included to provide useful information for stakeholders when making decisions that impact low-income and minority populations throughout the region and have helped to inform the measures listed in the EJ Toolbox Chapter of this report.

HISTORICAL DEMOGRAPHIC TRENDS

This section describes a variety of important demographic and socioeconomic trends in the region overall and for three key subsets of the region: identified EJ areas, Communities of Concern, and SB535-designated Disadvantaged Communities. It expands beyond the typical demographic variables used in analyzing population growth such as age and race/ethnicity to include data on nativity, poverty, vehicle ownership, and education. To provide historical context, we provide an analysis of 2000, 2010, and 2016, the base year for SCAG's 2020 RTP/SCS. SCAG's Activity-Based Transportation Model (ABM) also develops estimates of some of these variables for 2045 which are used to better estimate future travel demand. While the ABM does not provide a comprehensive validation of each variable as its main purpose is travel demand modeling, its outputs can facilitate a comparison of past trends versus a reasonable view of likely future trends.

The data used to approximate conditions in 2016 come from the Census Bureau's ACS, which samples one percent of the U.S. population each year and asks detailed questions about people and households. For the smaller spatial scales necessary to analyze EJ geographies, ACS data are collected over five-year periods. The most recent data available at the time of this writing are ACS 2013-2017 5-year estimates and are the most reflective data available to the 2016 base year of SCAG's 2020 RTP/SCS and thus are referred to as 2016 data. In some analyses of county and regional incomes, more recent ACS 2017 1-year estimates are available and represent more current information—these instances are noted. Since its objective is to provide historical comparison, 2016 data presented here may differ from totals found in the Demographics and Growth Forecast Technical Report.

REGIONAL DEMOGRAPHIC TRENDS

TABLE 5 Regional Trends and Demographic Change in the SCAG Region (2000 to 2045)

	2000	2010	2016**	2045	Past change (2000–2016)	Past change %	Future change (2016–2045)	Future change %
Total Population	**16,516,000**	**18,052,000**	**18,766,000**	**22,504,000**	**2,250,000**	**13.6%**	**3,738,000**	**19.9%**
Race/ethnicity:								
White, non-Hispanic	6,416,000	6,028,000	5,889,000	4,970,000	-527,000	-8.2%	-918,000	-15.8%
African American, non-Hispanic	1,205,000	1,179,000	1,176,000	1,200,000	-29,000	-2.4%	24,000	2.1%
Asian and other, non-Hispanic	2,193,000	2,675,000	2,980,000	4,617,000	787,000	35.9%	1,637,000	55.5%
Hispanic	6,701,000	8,169,000	8,720,000	11,716,000	2,019,000	30.1%	2,996,000	34.3%
Language and Immigration								
Foreign Born Population	5,112,000	5,524,000	5,638,000	-	525,000	10.3%		-
% non-English speaking*	4.5%	4.6%	3.9%	-	-0.6%	-12.9%		-
Age								
Median Age	32.3	34.7	35.6	39.7	3.3	10.2%	4.1	11.5%
Population < 18	4,716,000	4,617,000	4,432,000	4,717,000	-284,000	-6.0%	286,000	6.6%
Population > 65	1,641,000	1,970,000	2,375,000	4,640,000	734,000	44.7%	2,265,000	95.3%
Education*								
Percent w/o HS diploma	27.1%	22.1%	20.1%	-	-7.1%	-26.0%		-
Percent w/BA or above	24.3%	28.0%	30.1%	-	5.8%	24.0%		-
Total Households	**5,386,000**	**5,777,000**	**5,971,000**	**7,633,000**	**584,000**	**10.8%**	**1,663,000**	**27.9%**
Poverty								
Percent of population in poverty	13.1%	12.6%	14.6%	14.0%	1.6%	12.0%	-0.6%	-4.1%
Transportation								
Percent of households w/o vehicles	10.1%	7.4%	7.2%	8.4%	-2.8%	-28.2%	1.2%	16.4%
Percent of households w/3+ vehicles	17.9%	23.3%	24.1%	23.3%	6.2%	34.4%	-0.8%	-3.4%

** Non-English speaking population is measured for those aged 5 and above. Education rates are measured for those aged 25 and above*
***American Community Survey 2013-2017 5-year samples are used as an approximation of 2016 conditions. This data source is distinct from, and may differ from, values found in the Demographics and Growth Forecast Technical Report.*
Source: US Census Bureau, 2013-2017 American Community Survey, and SCAG. Values may not sum due to rounding. Data in this table is aggregated from tract-level information in order to facilitate comparison across specific variables and in EJ geographies. Regional totals may differ slightly from those found in the Demographics and Growth Forecast Technical Report.

Southern California continues to add substantial numbers of residents—over 2.2 million since the beginning of the century. However, the rate of growth is slowing in the region. While the region's population increased 13.6 percent over the fifteen years following 2000, growth over the next thirty years is anticipated to be 19.9 percent, meaning that annual growth will be roughly two-thirds of what it once was (**TABLE 5**).

The region is continuing to age, with median ages increasing from 32.3 in 2000 to 35.6 in 2016 and expected to rise sharply to 39.7 by 2045. The under eighteen population has actually decreased since 2000 while the senior (over 65) population has increased 44.7 percent. By 2045 it is anticipated that there will be a modest increase in under 18 population, but nearly a doubling in the population of seniors (a 95.3 percent increase).

The region's college education rate has risen by 5.8 percent since 2000; meanwhile the share of population without a high school diploma has decreased by 7.1 percent[2]. However, the share of households living in poverty has increased from 13.1 percent to 14.6 percent, though it is anticipated to drop modestly by 2045.

Immigration is a consistent driver of growth in the region and is expected to continue to be so for the foreseeable future. However, the growth rate in foreign-born population is lower than the total population, indicating a gradual decline in the share of the region's foreign-born population. Nonetheless, the SCAG region is a major immigrant gateway with approximately 30 percent of its population being born abroad behind Miami (41 percent) but on par with the San Jose–San Francisco area (32 percent) and New York (30 percent)[3].

The region continues to be exceptionally diverse; however, historical trends show slight decreases in the White, non-Hispanic and Black, non-Hispanic populations since 2000 against substantial increases in the Hispanic and Asian/Other populations. This trend continues overall with the largest percentage gains in the Asian/Other population category (55.5 percent by 2045). The Hispanic share of the population is the largest and continues to grow, increasing to over 11 million by 2045.

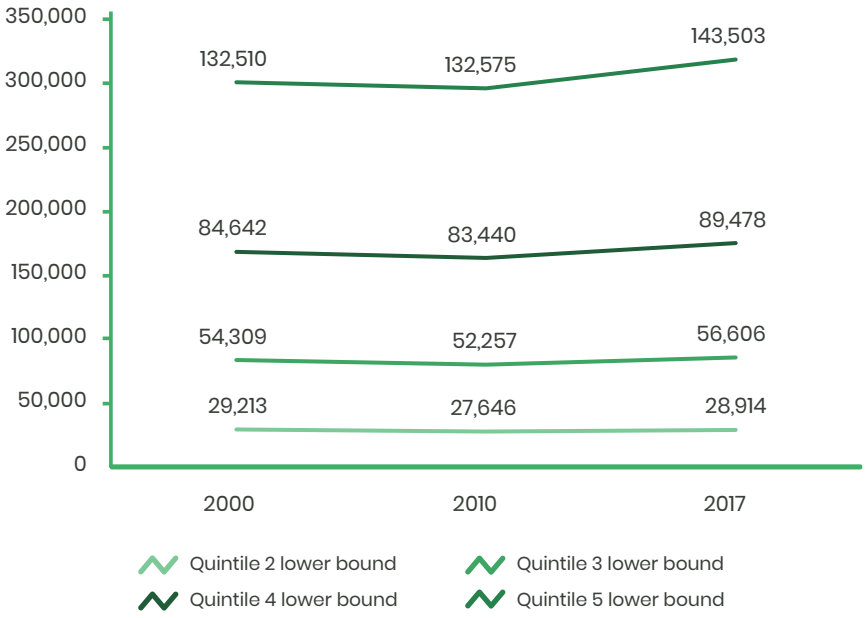
Vehicle ownership is a household characteristic that is important to monitor for SCAG's regional planning efforts. The share of households without a vehicle has gone down substantially since 2000, from 10.1 percent to 7.2 percent. Meanwhile, the share of households with more than three vehicles has increased from 17.9 percent to 24.1 percent since 2000[4]. By 2045, SCAG's travel demand model predicts an increase in the share of carless households and a slight decrease in the share of households with three or more vehicles.

2 The Demographics and Growth Forecast Technical Report contains a discussion of the education rates of in-migrants to the SCAG region versus out-migrants, indicating that the region is a net importer of highly educated population

3 Statistics use the Census Bureau's Consolidated Statistical Area (CSA) geography

4 See also, SCAG-UCLA report on declining transit ridership.

FIGURE 1 **Household Income Quintile Breakpoints, SCAG Region, 2019 Constant Dollars**



Source: US Census Bureau and 2017 American Community Survey

Trends in regional household incomes have suggested a gradual polarization toward upper- and lower-income classes. **FIGURE 1** shows the breakpoints in the region's income quintiles using inflation-adjusted 2019 constant dollars, each of which represent 20 percent of the household population. For example, in 2017, to be considered in the top 1/5 of households by income one would need to earn more than $143,503; in order to be in the middle 1/5 a household would need to earn between $56,606 and $89,478. However, in 2000, one would only need to earn $132,510 (inflation-adjusted) to be considered in the top 1/5, suggesting that it now takes substantially more to be considered "high-income."

TABLE 6 holds the income quintile breakpoints constant from the year 2000 to better visualize this evolution in what is referred to as a "constant quintile" approach. In 2000, 20 percent of the household are in each category, which are defined by quintile breakpoints in the year 2000. By 2010, the depths of the Great Recession, a higher share of households (21.8 percent) were in what was once considered the bottom quintile. Far fewer households (57.5 percent) were in the middle three quintiles, suggesting that fewer households were in these middle classes. However, despite the recession, the top quintile grew, with 20.7 percent of households in 2010 earning what would've put them in the top 20.0 percent in 2000.

By 2017, 20.5 percent of households were below the year 2000 threshold for the bottom quintile, suggesting that many households had made it out of this class since the Great Recession; however, there were still more households living below $29,213/year in 2017 than in 2000. Meanwhile, membership in the top quintile rose dramatically to 23.1 percent, suggesting that many more households were now in what was once considered the top 1/5th. By 2017 there were also far fewer households in the middle classes of quintiles 2 through 4—56.4 percent compared to 60.0 percent in 2000. The top 20 percent has done exceedingly well over this time period, and improvements between 2010 and 2017 suggest that income levels in the fourth and third quintiles have increased since 2000. However, while the region's economy may be robust, the failure of poverty rates to decline and the increasing polarization of rich and poor pose substantial concerns for social mobility in the future.

TABLE 6 Constant-Quintile Evolution of Household Incomes in the SCAG Region, 2000-2017*

Year	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Quintiles 2 through 4
2000	20.0%	20.0%	20.0%	20.0%	20.0%	60.0%
2010	21.8%	19.8%	18.9%	18.8%	20.7%	57.5%
2017	20.5%	18.3%	20.3%	17.8%	23.1%	56.4%

**Comparison of households versus income quintile breakpoints in 2000*
Source: US Census Bureau and 2017 American Community Survey

TABLE 7 Historic and Expected Future Changes of EJ-Related Variables by County (2000 to 2045)

	Total Population				Share of population < 18				Share of population > 65			
	2000	2010	2016**	2045	2000	2010	2016**	2045	2000	2010	2016**	2045
Imperial	142,000	175,000	180,000	281,000	31.4%	29.3%	28.7%	21.5%	10.0%	10.4%	12.1%	16.8%
Los Angeles	9,519,000	9,819,000	10,106,000	11,674,000	28.0%	24.5%	22.5%	19.7%	9.7%	10.9%	12.5%	21.1%
Orange	2,846,000	3,010,000	3,156,000	3,535,000	27.0%	24.5%	22.7%	20.5%	9.9%	11.6%	13.5%	21.5%
Riverside	1,545,000	2,190,000	2,355,000	3,252,000	30.3%	28.3%	26.1%	22.8%	12.7%	11.8%	13.5%	20.9%
San Bernardino	1,709,000	2,035,000	2,121,000	2,815,000	32.3%	29.2%	27.0%	24.3%	8.6%	8.9%	10.6%	17.1%
Ventura	753,000	823,000	848,000	947,000	28.4%	25.7%	23.9%	21.4%	10.2%	11.7%	14.1%	22.1%
SCAG Region	16,516,000	18,052,000	18,766,000	22,504,000	28.6%	25.6%	23.6%	21.0%	9.9%	10.9%	12.7%	20.6%

	Percent w/BA or above*			Percent w/o HS diploma*		
	2000	2010	2016**	2000	2010	2016**
Imperial	10.3%	12.2%	14.3%	41.0%	37.7%	31.6%
Los Angeles	24.9%	29.0%	31.2%	30.1%	24.1%	21.8%
Orange	30.8%	36.0%	39.1%	20.5%	16.7%	15.3%
Riverside	16.6%	20.5%	21.5%	25.0%	20.8%	18.9%
San Bernardino	15.9%	18.4%	19.8%	25.8%	22.5%	20.8%
Ventura	26.9%	30.8%	32.6%	19.9%	17.7%	16.0%
SCAG Region	24.3%	28.0%	30.1%	27.1%	22.1%	20.1%

**Education rates are measured for those aged 25 and above*
***American Community Survey 2013-2017 5-year samples are used as an approximation of 2016 conditions. This data source is distinct from, and may differ from, values found in the Demographics and Growth Forecast Technical Report.*
Source: US Census Bureau, 2013-2017 American Community Survey, and SCAG

TABLE 7 Historic and Expected Future Changes of EJ-Related Variables by County (2000 to 2045) - Continued

	Percent of households w/o vehicles				Percent of households w/3+ vehicles			
	2000	2010	2016**	2045	2000	2010	2016**	2045
Imperial	11.1%	10.3%	7.4%	9.4%	18.6%	23.8%	26.4%	24.2%
Los Angeles	12.6%	9.5%	9.2%	10.9%	16.0%	20.5%	21.1%	19.9%
Orange	5.8%	4.7%	4.6%	4.8%	20.5%	25.0%	26.3%	27.3%
Riverside	7.1%	4.6%	4.6%	6.2%	19.0%	26.2%	27.7%	25.3%
San Bernardino	8.0%	5.1%	5.3%	6.2%	20.9%	29.5%	29.1%	28.7%
Ventura	5.0%	4.1%	4.4%	5.3%	23.7%	29.2%	30.3%	30.9%
SCAG Region	10.1%	7.4%	7.2%	8.5%	17.9%	23.3%	24.1%	23.3%

**Education rates are measured for those aged 25 and above*
***American Community Survey 2013-2017 5-year samples are used as an approximation of 2016 conditions*
Source: US Census Bureau, 2013-2017 American Community Survey, and SCAG

DEMOGRAPHIC TRENDS IN EJ AREAS IN THE SCAG REGION

In 2016, 68.6 percent of the population in the SCAG region belonged to a racial or ethnic group other than White, non-Hispanic, while 14.6 percent of the population was in poverty. State and federal guidelines prescribe specific programs and policies to ensure that adverse impacts do not disproportionately impact currently or historically disadvantaged populations. EJ Areas (EJAs), therefore, consist of every Transportation Analysis Zone (TAZ) that has a higher concentration of minority population or households in poverty than is seen in the region as a whole. EJA boundaries are held constant through historic years to display trends since 2000.

TABLE 8 shows historic and expected future changes to several variables of significance in SCAG region EJAs and **TABLE 11** compares the past and future change in EJAs versus the region as a whole and other overlays.

Taken as a whole, EJAs represent 11.7 million people or 62.3 percent of the region's population—the largest overlay considered here. While EJA population grew 11.4 percent since 2000, this is below the regional growth rate of 13.6 percent. Within these areas, 82.3 percent of the population is minority and 19.1 percent of the households are living in poverty.

TABLE 8 Environmental Justice Areas (EJAs): Trends and Demographic Change in the SCAG Region (2000 to 2045)

	2000	2010	2016**	2045	Past change (2000-2016)	Past change %	Future change (2016-2045)	Future change %
Total Population	**10,492,000**	**11,283,000**	**11,685,000**	**14,601,000**	**1,192,000**	**11.4%**	**2,916,000**	**25.0%**
Race/ethnicity:								
White, non-Hispanic	2,465,000	2,114,000	2,063,000	1,736,000	-402,000	-16.3%	-328,000	-15.9%
African American, non-Hispanic	1,014,000	947,000	920,000	930,000	-93,000	-9.2%	10,000	1.1%
Asian and other, non-Hispanic	1,436,000	1,648,000	1,789,000	2,903,000	353,000	24.6%	1,114,000	62.3%
Hispanic	5,577,000	6,574,000	6,912,000	9,032,000	1,335,000	23.9%	2,119,000	30.7%
Language and Immigration								
Foreign Born Population	3,910,000	4,104,000	4,096,000	-	186,000	4.8%	-	-
% non-English speaking*	6.8%	6.7%	5.6%	-	-1.2%	-17.3%	-	-
Age								
Median Age	30	32.4	33.9	36.7	3.9	13.0%	2.7	8.0%
Population < 18	3,256,000	3,102,000	2,924,000	3,315,000	-332,000	-10.2%	391,000	13.4%
Population > 65	900,000	1,046,000	1,267,000	2,712,000	367,000	40.8%	1,445,000	114.1%
Education*								
Percent w/o HS diploma	37%	31%	28%	-	-9.7%	-26.0%	-	-
Percent w/BA or above	16%	19%	21%	-	5.4%	34.5%	-	-
Total Households	**3,120,000**	**3,325,000**	**3,433,000**	**4,631,000**	**314,000**	**10.1%**	**1,198,000**	**34.9%**
Poverty								
Percent of population in poverty	17.7%	16.7%	19.1%	18.3%	1.4%	7.8%	-0.8%	-4.3%
Transportation								
Percent of households w/o vehicles	13.6%	9.9%	9.4%	10.7%	-4.2%	-31.1%	1.3%	14.3%
Percent of households w/3+ vehicles	16.9%	22.6%	23.6%	22.9%	6.7%	39.9%	-0.8%	-3.2%

** Non-English speaking population is measured for those aged 5 and above. Education rates are measured for those aged 25 and above*
***American Community Survey 2013-2017 5-year samples are used as an approximation of 2016 conditions. This data source is distinct from, and may differ from, values found in the Demographics and Growth Forecast Technical Report.*
Source: US Census Bureau, 2013-2017 American Community Survey, and SCAG. Values may not sum due to rounding. Data in this table is aggregated from tract- or TAZ-level information in order to facilitate comparison across specific variables and in EJ geographies.

DEMOGRAPHIC TRENDS IN SB 535 DISADVANTAGED COMMUNITIES IN THE SCAG REGION

SB 535 Disadvantaged Communities (DACs) comprise a selection of census tracts where environmental exposure and sensitive populations are concentrated and show some of the highest vulnerabilities in the state as determined by CalEPA. Similar to EJAs, DAC boundaries are held constant through historic years to display trends since 2000.

TABLE 9 shows historic and expected future changes to several variables of significance in SCAG region DACs and **TABLE 11** compares the past and future change in DACs versus the region as a whole and other overlays.

Taken as a whole, DACs represent 6.4 million people – 34.2 percent of the total population in the region. While this is an increase of 7.7 percent since 2000, growth in DACs is well below the 13.6 percent increase in regional population since 2000. Within these areas, 88.3 percent of the population is minority and 23.3 percent of the population is in poverty.

The population age structure in DACs differs from the region as a whole. The median age in DACs in 2016 was 32.5 compared to 35.6 overall. While 12.6 percent of the region's residents are seniors over age 65 and 23.6 percent are youth under age 18, only 9.7 percent of the DAC population are seniors yet 26.3 percent are under 18. Household poverty rates are higher than the region but are not on a similarly increasing trajectory.

DEMOGRAPHIC TRENDS IN COMMUNITIES OF CONCERN IN THE SCAG REGION

Communities of Concern (COCs) include all Census Designated Places (CDPs) and City of Los Angeles Community Planning Areas (CPAs) that have the highest concentration of minority population and households in poverty throughout the entire region. Only communities that score in the highest one-third of all CDPs and DPAs in both criteria are included in SCAG's COC geography. Similar to EJAs and DACs, COC boundaries are held constant through historic years to display trends since 2000.

Taken as a whole, COCs represent 4.0 million people – 21.0 percent of the region's population. While COC population has grown 7.1 percent since 2000, COCs are slower growing than the region overall. Within these areas, 91.8 percent of the population is minority and 24.3 percent of households are living in poverty—both figures being substantially higher than the region.

As with EJAs and DACs, the population of COCs tends to be younger than the region, with a higher share of minors and a lower share of senior citizens. Despite growing more slowly than the region as a whole, most social indicators in COCs (as well as EJAs and DACs, generally speaking) show more rapid improvement than the region as a whole. Increases in college education rates since 2000 (43.3 percent) drastically outpace gains regionally (24.7 percent), while the poverty rate has increased more slowly than regionally since 2000. Vehicle ownership is often seen as a means to economic opportunity in the region—the share of households without vehicles in COCs has gone down by 6.2 percent compared to 3.1 regionally. While increases in vehicle ownership are associated with lower transit ridership, increased congestion, and increased Greenhouse Gas emissions, it usually represents an increase in mobility for previously disadvantaged populations as well.[5]

5 See, e.g., SCAG-UCLA study

TABLE 9 SB 535 Disadvantaged Areas (DACs): Trends and Demographic Change in the SCAG Region (2000 to 2045)

	2000	2010	2016**	2045	Past change (2000–2016)	Past change %	Future change (2016–2045)	Future change %
Total Population	**5,957,000**	**6,228,000**	**6,414,000**	**7,792,000**	**457,000**	**7.7%**	**1,378,000**	**21.5%**
Race/ethnicity:								
White, non-Hispanic	917,000	757,000	750,000	646,000	-167,000	-18.2%	-104,000	-13.9%
African American, non-Hispanic	704,000	615,000	589,000	537,000	-116,000	-16.4%	-51,000	-8.7%
Asian and other, non-Hispanic	591,000	626,000	682,000	1,285,000	90,000	15.3%	603,000	88.4%
Hispanic	3,744,000	4,230,000	4,393,000	5,324,000	649,000	17.3%	931,000	21.2%
Language and Immigration								
Foreign Born Population	2,419,000	2,447,000	2,409,000	-	-10,000	-0.4%	-	-
% non-English speaking*	8.2%	8.8%	7.0%	-	-1.2%	-14.5%	-	-
Age								
Median Age	28.1	30.7	32.5	36.6	4.4	15.6%	4.1	12.7%
Population < 18	1,982,000	1,814,000	1,687,000	1,844,000	-295,000	-14.90%	157,000	9.3%
Population > 65	443,000	513,000	624,000	1,364,000	181,000	40.70%	740,000	118.5%
Education*								
Percent w/o HS diploma	46.3%	38.2%	34.4%	-	-11.9%	-25.8%	-	-
Percent w/BA or above	10.3%	13.2%	15.3%	-	5.0%	49.2%	-	-
Total Households	**1,663,000**	**1,748,000**	**1,804,000**	**2,369,000**	**142,000**	**8.5%**	**564,000**	**31.3%**
Poverty								
Percent of population in poverty	22.0%	20.2%	22.5%	20.8%	0.5%	2.5%	-1.7%	-7.5%
Transportation								
Percent of households w/o vehicles	17.4%	12.4%	11.7%	12.5%	-5.7%	-32.8%	0.7%	6.2%
Percent of households w/3+ vehicles	15.2%	20.9%	22.2%	22.0%	7.0%	45.8%	-0.2%	-0.8%

** Non-English speaking population is measured for those aged 5 and above. Education rates are measured for those aged 25 and above*

***American Community Survey 2013-2017 5-year samples are used as an approximation of 2016 conditions. This data source is distinct from, and may differ from, values found in the Demographics and Growth Forecast Technical Report.*

Source: US Census Bureau, 2013-2017 American Community Survey, and SCAG. Values may not sum due to rounding. Data in this table is aggregated from tract- or TAZ-level information in order to facilitate comparison across specific variables and in EJ geographies.

TABLE 10 Communities of Concern (COCs): Trends and Demographic Change in the SCAG Region (2000 to 2045)

	2000	2010	2016**	2045	Past change (2000–2016)	Past change %	Future change (2016–2045)	Future change %
Total Population	**3,696,000**	**3,845,000**	**3,959,000**	**4,792,000**	**263,000**	**7.1%**	**914,434**	**21.0%**
Race/ethnicity:								
White, non-Hispanic	341,000	274,000	277,000	256,000	-64,000	-18.8%	57,693	-7.6%
African American, non-Hispanic	515,000	442,000	419,000	359,000	-96,000	-18.6%	-62,342	-14.3%
Asian and other, non-Hispanic	273,000	313,000	346,000	760,000	73,000	26.9%	372,625	119.6%
Hispanic	2,516,000	2,771,000	2,871,000	3,417,000	355,000	14.1%	592,195	19.0%
Language and Immigration								
Foreign Born Population	1,579,000	1,566,000	1,539,000	-	-40,000	-2.5%	-	-
% non-English speaking*	9.7%	9.7%	8.2%	-	-1.5%	-15.1%	-	-
Age								
Median Age	27.6	30.3	32.2	34.7	4.6	16.70%	2.0	7.60%
Population < 18	1,256,000	1,149,000	1,063,000	1,176,000	-193,000	-15.4%	114,000	10.7%
Population > 65	269,000	313,000	381,000	819,000	112,000	41.8%	438,000	114.8%
Education*								
Percent w/o HS diploma	51.3%	42.9%	38.9%	-	-12.5%	-24.3%	-	-
Percent w/BA or above	9.5%	11.8%	13.6%	-	4.1%	43.3%	-	-
Total Households	**975,000**	**1,031,000**	**1,059,000**	**1,384,000**	**85,000**	**8.7%**	**325,000**	**30.6%**
Poverty								
Percent of population in poverty	23.7%	21.9%	24.3%	22.0%	0.6%	2.7%	-2.0%	-8.4%
Transportation								
Percent of households w/o vehicles	18.4%	13.0%	12.1%	12.7%	-6.2%	-33.9%	0.6%	4.7%
Percent of households w/3+ vehicles	15.7%	21.3%	23.0%	22.9%	7.3%	46.9%	-0.1%	-0.6%

** Non-English speaking population is measured for those aged 5 and above. Education rates are measured for those aged 25 and above*
***American Community Survey 2013-2017 5-year samples are used as an approximation of 2016 conditions. This data source is distinct from, and may differ from, values found in the Demographics and Growth Forecast Technical Report.*
Source: US Census Bureau, 2013-2017 American Community Survey, and SCAG. Values may not sum due to rounding. Data in this table is aggregated from tract- or TAZ-level information in order to facilitate comparison across specific variables and in EJ geographies.

TABLE 11 Comparison of Past and Future Changes to Key Indicators by Geography (2000 to 2016** vs. 2016** to 2045)

	Region - Past change	Region - Future change	EJA - Past change	EJA - Future change	COC - Past change	COC - Future change	DAC - Past change	DAC - Future change
Total Population	**13.6%**	**19.9%**	**11.4%**	**25.0%**	**7.1%**	**21.0%**	**7.7%**	**21.5%**
Race/ethnicity:								
White, non-Hispanic	-8.2%	-15.6%	-16.3%	-15.9%	-18.8%	-7.6%	-18.2%	-13.9%
Black, non-Hispanic	-2.4%	2.0%	-9.2%	1.1%	-18.6%	-14.3%	-16.4%	-8.7%
Asian and other, non-Hispanic	35.9%	54.9%	24.6%	62.3%	26.9%	119.6%	15.3%	88.4%
Hispanic	30.1%	34.4%	23.9%	30.7%	14.1%	19.0%	17.3%	21.2%
Language and Immigration								
Foreign Born Population	10.3%	-	4.8%	-	-2.5%	-	-0.4%	-
% non-English speaking*	-12.9%	-	-17.3%	-	-15.1%	-	-14.5%	-
Age								
Median Age	10.2%	10.2%	13.0%	8.0%	16.7%	7.6%	15.6%	12.7%
Population < 18	-6.0%	6.4%	-10.2%	13.4%	-15.4%	10.7%	-14.9%	9.3%
Population > 65	44.7%	95.4%	40.8%	114.1%	41.8%	114.8%	40.7%	118.5%
Education*								
Percent w/o HS diploma	-26.0%	-	-26.0%	-	-24.3%	-	-25.8%	-
Percent w/BA or above	24.0%	-	34.5%	-	43.3%	-	49.2%	-
Poverty								
Percent of population in poverty	12.0%	-3.9%	7.8%	-4.3%	2.7%	-8.4%	2.5%	-7.5%
Total Households	**10.8%**	**27.8%**	**10.1%**	**34.9%**	**8.7%**	**30.6%**	**8.5%**	**31.3%**
Transportation								
Percent of households w/o vehicles	-28.2%	18.0%	-31.1%	14.3%	-33.9%	4.7%	-32.8%	6.2%
Percent of households w/3+ vehicles	34.4%	-3.4%	39.9%	-3.2%	46.9%	-0.6%	45.8%	-0.8%

** Non-English speaking population is measured for those aged 5 and above*
***American Community Survey 2013-2017 5-year samples are used as an approximation of 2016 conditions. This data source is distinct from, and may differ from, values found in the Demographics and Growth Forecast Technical Report.*
Education rates are measured for those aged 25 and above
Source: US Census Bureau, 2013-2017 American Community Survey, and SCAG. Values may not sum due to rounding. Data in this table is aggregated from tract- or TAZ-level information in order to facilitate comparison across specific variables and in EJ geographies.

EXPECTED FUTURE TRENDS IN EJ GEOGRAPHIES

TABLE 11 compares past versus future growth for selected variables in the region versus all three EJ Geographies. Population growth from now until 2045 in EJAs, COCs, and DACs is expected to outpace population and household growth in the region as a whole.

The rise in senior citizen population in EJAs, COCs, and DACs is also expected to outpace the ageing trends in the region, with the over 65 population more than doubling in each. The rate of Asian/other, non-Hispanic population growth is expected to outpace all other race/ethnicity groups, but this trend will be even more pronounced in EJAs, COCs, and DACs. In contrast to regional trends, COCs and DACs are anticipated to experience disproportionate increases in white, non-Hispanic population growth as well—a category which is expected to shrink faster regionwide than it is in these areas. While poverty rates are difficult to predict, SCAG's travel demand model does demonstrate more substantial drops in poverty rates in EJ Geographies, especially COCs and DACs.

Trends in vehicle ownership in EJAs, COCs, and DACs are expected to contrast with regional trends. Region-wide model results suggest a likely increase in the share of car-free households and a decrease in the share of households with three or more vehicles. However, in EJAs, COCs, and DACs, the increase in car-free households is more modest and the decrease in the share of households with three or more vehicles is more modest.

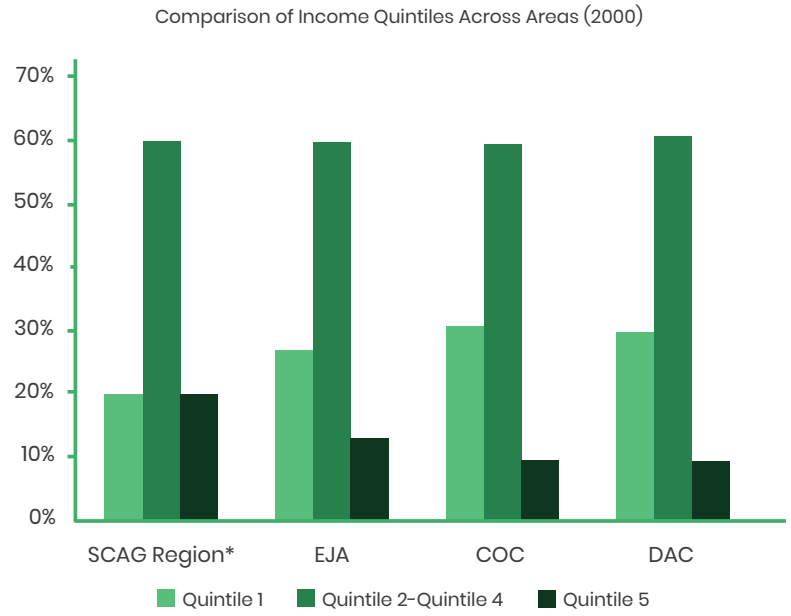
INCOME TRENDS IN THE SCAG REGION AND EJ GEOGRAPHIES

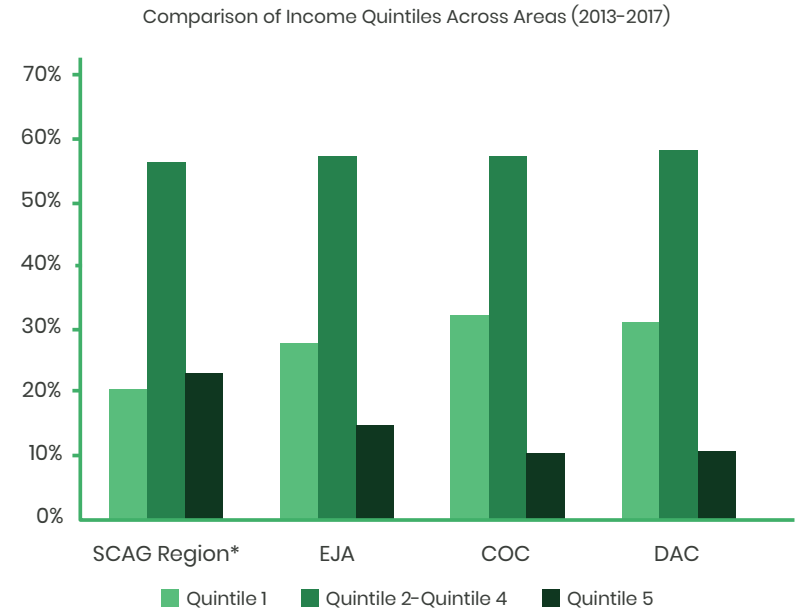
FIGURE 2 compares income quintiles between the region and various EJ geographies using year 2000 income quintiles. This approach allows comparison between the geographies, but also highlights their evolution over time. Comparisons are made against the region's income distribution in the year 2000, wherein 20 percent of the households were in the first quintile, 60 percent of households were in the middle three quintiles, and 20 percent of the households were in the fifth (top) quintile.

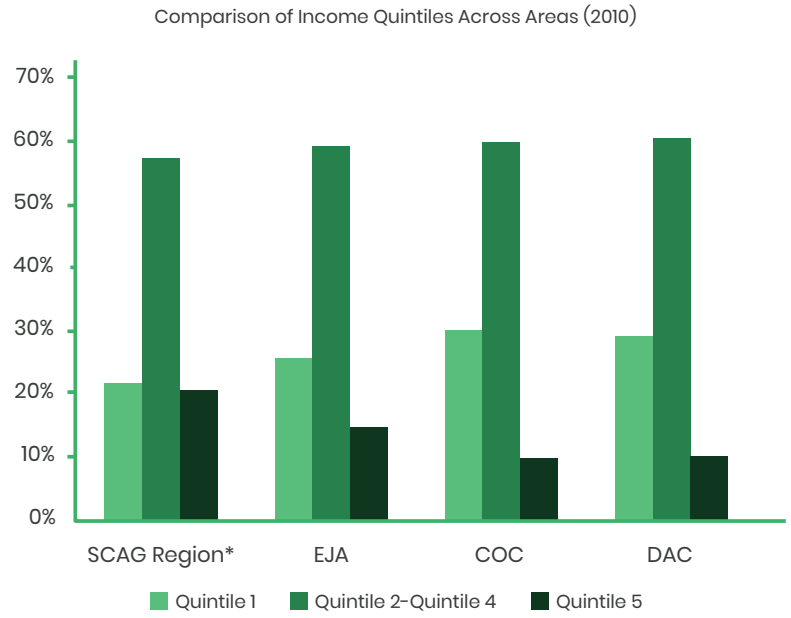
In 2000, EJAs, COCs, and DACs all had roughly 1.5 times the share of households in the lowest income quintile compared to the region as a whole (about 30 percent versus 20 percent). They had roughly half as many households in the wealthiest income quintile (about 10 percent versus 20 percent), while the middle portion of the income distribution remained relatively consistent with the region. Since EJAs cover more area than COCs and DACs, EJA income trends more closely mirror those of the region.

By 2010, the depths of the Great Recession, more of the region's households were in the wealthiest and poorest income quintiles, while fewer were in the middle three classes. Despite this, from 2000-2010 the distribution of income in EJAs, COCs, and DACs did not appreciably change. By 2017, the most notable regional trend was an increase in the wealthiest quintile at the expense of the middle three classes, which together had shrunk from 60 percent of households to 56 percent of households. However, by this time, EJAs, COCs, and DACs had gotten worse air quality, with an increase in the share of the lowest income quintiles in all three areas by 2 percentage points. For example, COCs in 2010 had 10 percent of their households in the top quintile, 60 percent in the middle quintiles, and 30 percent in the bottom quintile. In the several years that followed, the middle-income share of population dropped by 3 percent while the low income share of households increased by 2 percent. As this trend is similar across EJAs, COCs, and DACs, it is possible to conclude that lower income populations in these areas have been especially at risk during the recovery from the Great Recession.

FIGURE 2 **Constant-Quintile Comparison of the Income Distribution by Geography (2000-2017)**







Source: US Census Bureau and 2017 American Community Survey

EJ ANALYSIS BY PERFORMANCE AREAS

HOW WILL THIS IMPACT QUALITY OF LIFE?

JOBS-HOUSING IMBALANCE H LU

Jobs-housing balance has become a major issue in urban and transportation planning and public policy. Among planners and policymakers, the imbalance of jobs and housing is considered as one of the key contributors to traffic congestion and air pollution, and an impediment to EJ. From an economic point of view, transportation and driving are expensive; workers without a car or people who cannot afford a vehicle have to either live close to their jobs where they can have access to transit or can walk or bike. Moreover, since long-distance commuting is expensive, people do not do it unless they own a dependable vehicle, access is available to relatively fast and cheap transit, or they have a well-paying job. As a part of the jobs-housing imbalance/mismatch analysis for Connect SoCal, SCAG conducted the analyses of (1) median wages for inter-county and intra-county commuters, (2) median commute distance, (3) job-to-worker ratio by wage, and (4) jobs-housing ratio and low-wage jobs-housing fit (JHFIT). The research question of this study is whether there are significant differences in commute distance, job-to-worker ratio and jobs-housing ratio (1) between different income levels, (2) between coastal counties (Los Angeles and Orange Counties) and inland counties (Riverside and San Bernardino Counties), and (3) between temporal periods. The following section describes this effort's methodology and findings.

METHODOLOGY

SCAG examines the median wages for inter-county and intra-county commuters using the 2013-2017 American Community Survey (ACS) 5-year Public Use Microdata Samples (PUMS). **TABLE 12** identifies the median wages for inter-county and intra-county commuters using the most recent 2013-2017 ACS 5-Year Estimates. These statistics indicate that most inter-county commuters command much higher wages than those commuters who work and live in the same county. Those commuters also command wages higher than workers who work and reside in their destination work counties.

TABLE 12 Median Wage for Workers by Place of Residence and Place of Work, 2017 Dollars

Place of Residence	Place of Work						
	Imperial	Los Angeles	Orange	Riverside	San Bernardino	Ventura	San Diego
Imperial	25,834	-	-	26,936	-	-	25,731
Los Angeles	36,403	30,336	36,582	33,446	30,878	39,368	42,479
Orange	-	56,284	32,936	45,504	47,789	51,799	60,621
Riverside	41,808	52,260	43,898	25,487	37,169	35,224	53,099
San Bernardino	-	42,479	42,479	34,987	26,130	15,168	45,504
Ventura	-	60,671	92,633	58,531	53,099	29,008	82,879
San Diego	55,580	51,571	63,757	41,808	56,979	62,159	34,583

Note: CPI adjusted to $ in 2017; '-' indicates sample size is too small for the analysis.
Sources: 2013-2017 American Community Survey (ACS) 5-year Public Use Microdata Samples (PUMS)

SCAG examined the historical trend in median commute distance by wage, using the Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES). The LODES files are organized into three types: Origin-Destination (OD), Residence Area Characteristics (RAC), and Workplace Area Characteristics (WAC), all at census block geographic detail. SCAG used the LODES 7.4 Origin-Destination data file for the years 2002-2016. SCAG staff aggregated LODES' block-level statistics to the census tract level in order to estimate the median commute distance between origin and destination tracts by wage in each county the SCAG region. The distance measured is the Euclidean distance, straight-line distance, or distance measured "as the crow flies" between the centroid of an origin tract and the centroid of a destination tract, and is therefore shorter than the actual commute distance incurred by travelers.

TABLE 13 identifies the median commute distance by wage ('Low Wage' = jobs with earnings $1250/month or less; 'Med. Wage' = jobs with earnings $1251/month to $3333/month; 'High Wage' = jobs with earnings greater than $3333/month) for counties in the SCAG region for the years 2002, 2012 and 2016. **FIGURE 3** shows historical trends in the median commute distance between 2002 and 2016 for counties in the SCAG region. **EXHIBIT 5** and **EXHIBIT 6** depict the median commute distance by census tract for all jobs and low-wage jobs in the SCAG region respectively.

TABLE 13 Median Commute Distance (in Miles) by Wage in the SCAG Region, 2002–2016

2016					
Origin	Destination	All Jobs	Low Wage	Med. Wage	High Wage
SCAG Region	SCAG	10.0	9.0	9.5	11.1
Imperial	SCAG	8.4	6.7	8.4	10.0
Los Angeles	SCAG	9.1	8.2	8.7	10.0
Orange	SCAG	9.6	8.8	8.8	10.5
Riverside	SCAG	15.8	14.0	14.0	18.3
San Bernardino	SCAG	15.4	14.0	14.2	17.4
Ventura	SCAG	11.1	11.6	10.0	11.8
2012					
Origin	Destination	All Jobs	Low Wage	Med. Wage	High Wage
SCAG Region	SCAG	10.1	9.0	9.7	11.3
Imperial	SCAG	8.5	6.3	9.1	9.6
Los Angeles	SCAG	9.1	8.1	8.9	10.1
Orange	SCAG	9.8	8.9	8.9	10.8
Riverside	SCAG	16.6	14.8	14.9	19.3
San Bernardino	SCAG	16.2	14.7	15.1	18.2
Ventura	SCAG	11.2	11.7	10.0	12.0
2002					
Origin	Destination	All Jobs	Low Wage	Med. Wage	High Wage
SCAG Region	SCAG	9.4	8.6	8.8	11.0
Imperial	SCAG	7.5	8.1	7.2	5.7
Los Angeles	SCAG	8.8	8.2	8.4	10.2
Orange	SCAG	9.0	8.0	8.1	10.6
Riverside	SCAG	13.4	11.8	12.2	17.6
San Bernardino	SCAG	13.3	12.1	12.4	16.0
Ventura	SCAG	9.4	8.6	8.4	11.5

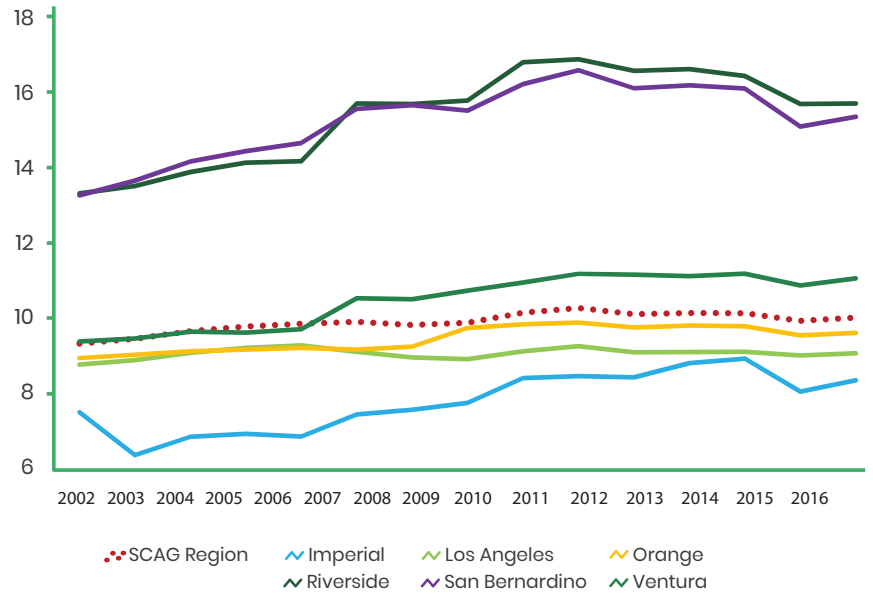
Note: 'Low Wage' = Jobs with earnings $1250/month or less ; 'Med. Wage' = Jobs with earnings $1251/month to $3333/month; 'High Wage' = Jobs with earnings greater than $3333/month

Source: U.S. Census Bureau, 2019. LEHD Origin-Destination Employment Statistics (LODES) 7.4

SCAG examined the job-to-worker ratio by wage, using the LODES 7.4 for the year 2016. Job data was obtained from the LODES Workplace Area Characteristics (WAC) Primary Jobs data files and worker data were obtained from the LODES Residence Area Characteristics (RAC) Primary Jobs data files. Given individual census tracts are often relatively too small to represent proper commute distance, SCAG developed a reasonable commute distance buffers around census tracts. Since this analysis is focusing on whether jobs and workers are relatively balanced at the neighborhood level, SCAG used a 2.5-mile buffer—the approximate average of walk- and bike-commute distances—from the centroids of the census tracts and counted jobs and workers within the buffer distance.

TABLE 14 identifies the job-to-worker ratio by wage for counties in the SCAG region for the year 2016. A higher job-to-worker ratio means more jobs, while a lower job-to-worker ratio means more workers. **EXHIBIT 7** and **EXHIBIT 8** depict the job-to-worker ratio for all jobs and low-wage jobs in the SCAG region, respectively.

FIGURE 3 Median Commute Distance (in Miles) by County in the SCAG Region, 2002-2016



Source: U.S. Census Bureau, 2019. LEHD Origin-Destination Employment Statistics (LODES) 7.4

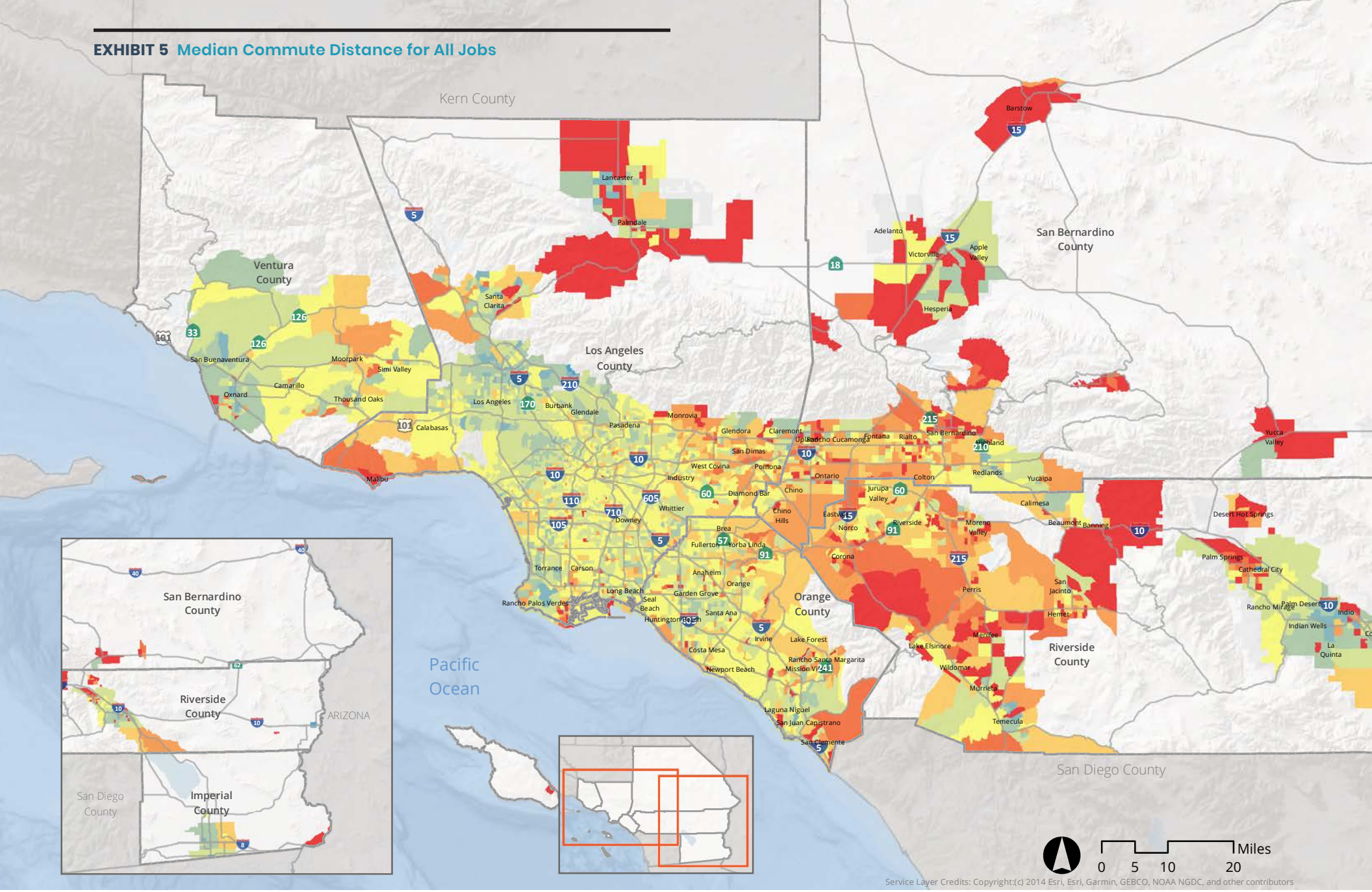
TABLE 14 Job-to-Worker Ratio by Wage in the SCAG Region, 2016

County	All Jobs	Low Wage	Med. Wage	High Wage
Imperial	0.85	0.87	0.79	0.91
Los Angeles	1.05	1.04	1.02	1.09
Orange	1.12	1.13	1.19	1.07
Riverside	0.77	0.83	0.82	0.70
San Bernardino	0.87	0.89	0.90	0.84
Ventura	0.81	0.84	0.89	0.74

Note: 'Low Wage' = Jobs with earnings $1250/month or less ; 'Med. Wage' = Jobs with earnings $1251/ month to $3333/month; 'High Wage' = Jobs with earnings greater than $3333/month

Source: U.S. Census Bureau, 2019. LEHD Origin-Destination Employment Statistics (LODES) 7.4

EXHIBIT 5 Median Commute Distance for All Jobs

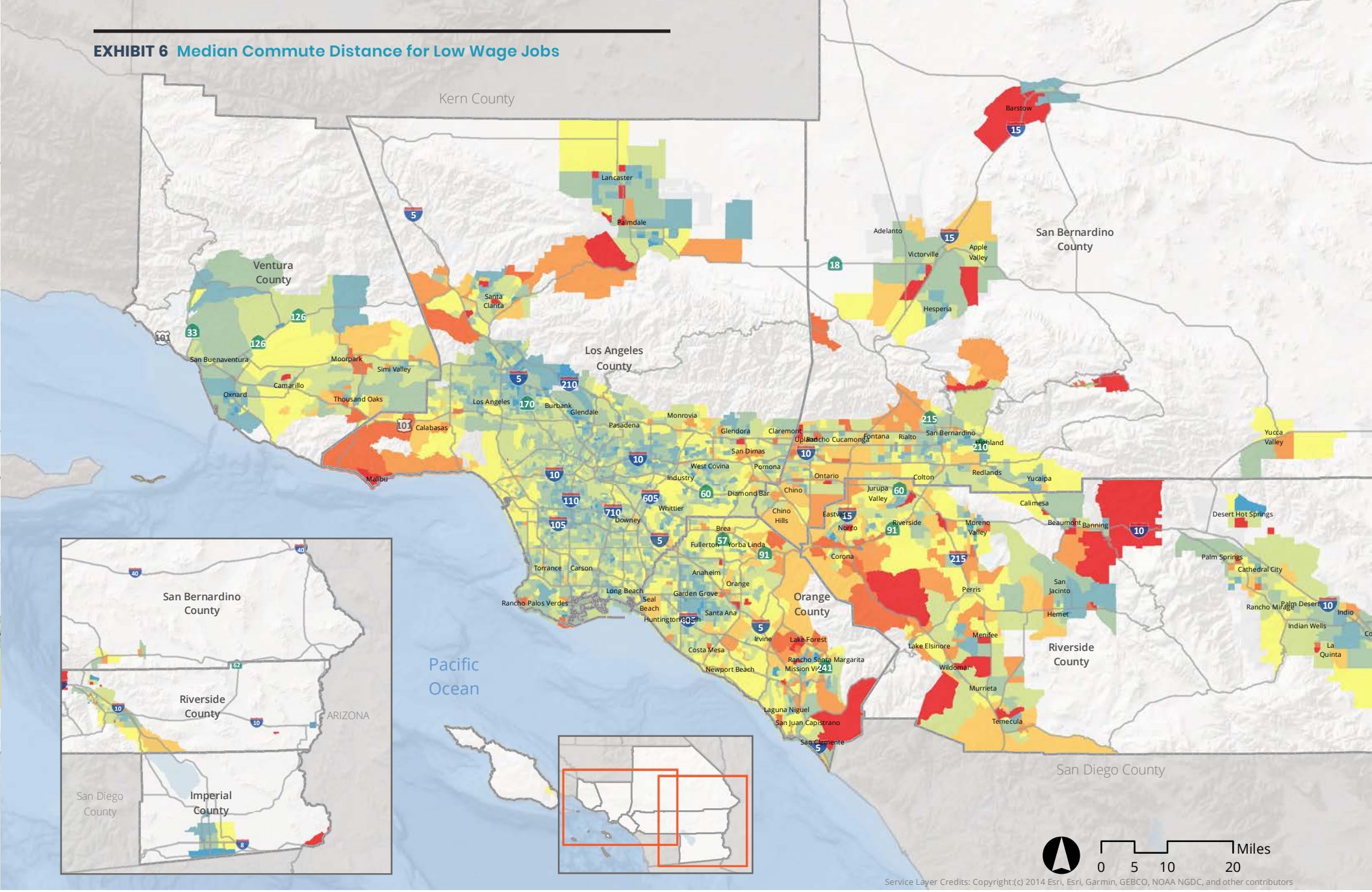


Median Commute Distance of All Jobs (in Miles) for Census Tracts, 2016

2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0

(Note: 'Low Wage' = Jobs with earnings $1250/month or less ; 'Med. Wage' = Jobs with earnings $1251/month to $3333/month; 'High Wage' = Jobs with earnings greater than $3333/month)
Source: U.S. Census Bureau, 2019. LEHD Origin-Destination Employment Statistics (LODES 7.4) Origin-Destination (OD) data file for year 2016

EXHIBIT 6 Median Commute Distance for Low Wage Jobs

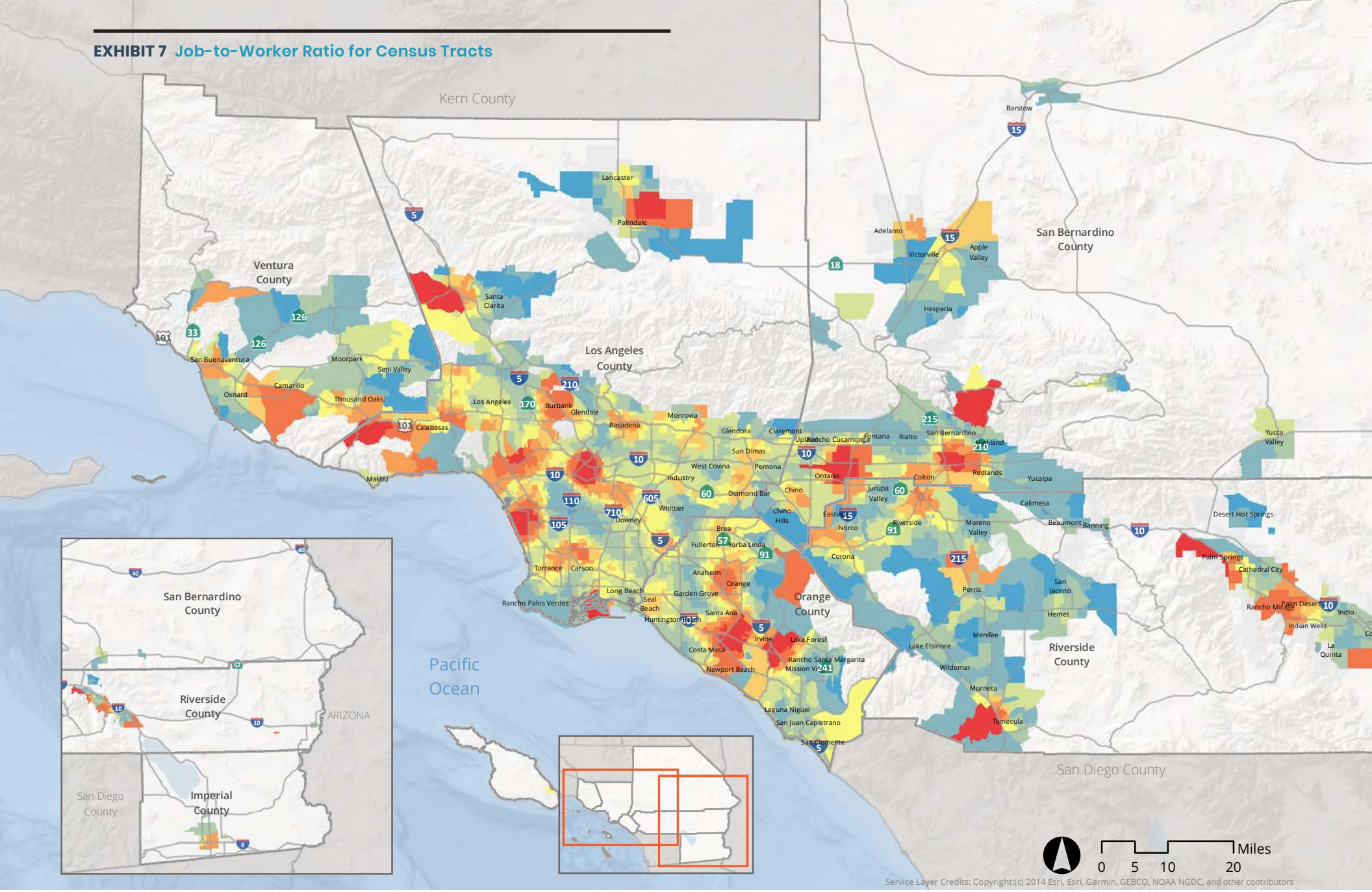


Median Commute Distance of Low Wage Jobs (in Miles) for Census Tracts, 2016

2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0

(Note: 'Low Wage' = Jobs with earnings $1250/month or less ; 'Med. Wage' = Jobs with earnings $1251/month to $3333/month; 'High Wage' = Jobs with earnings greater than $3333/month)
Source: U.S. Census Bureau, 2019. LEHD Origin-Destination Employment Statistics (LODES 7.4) Origin-Destination (OD) data file for year 2016

EXHIBIT 7 Job-to-Worker Ratio for Census Tracts



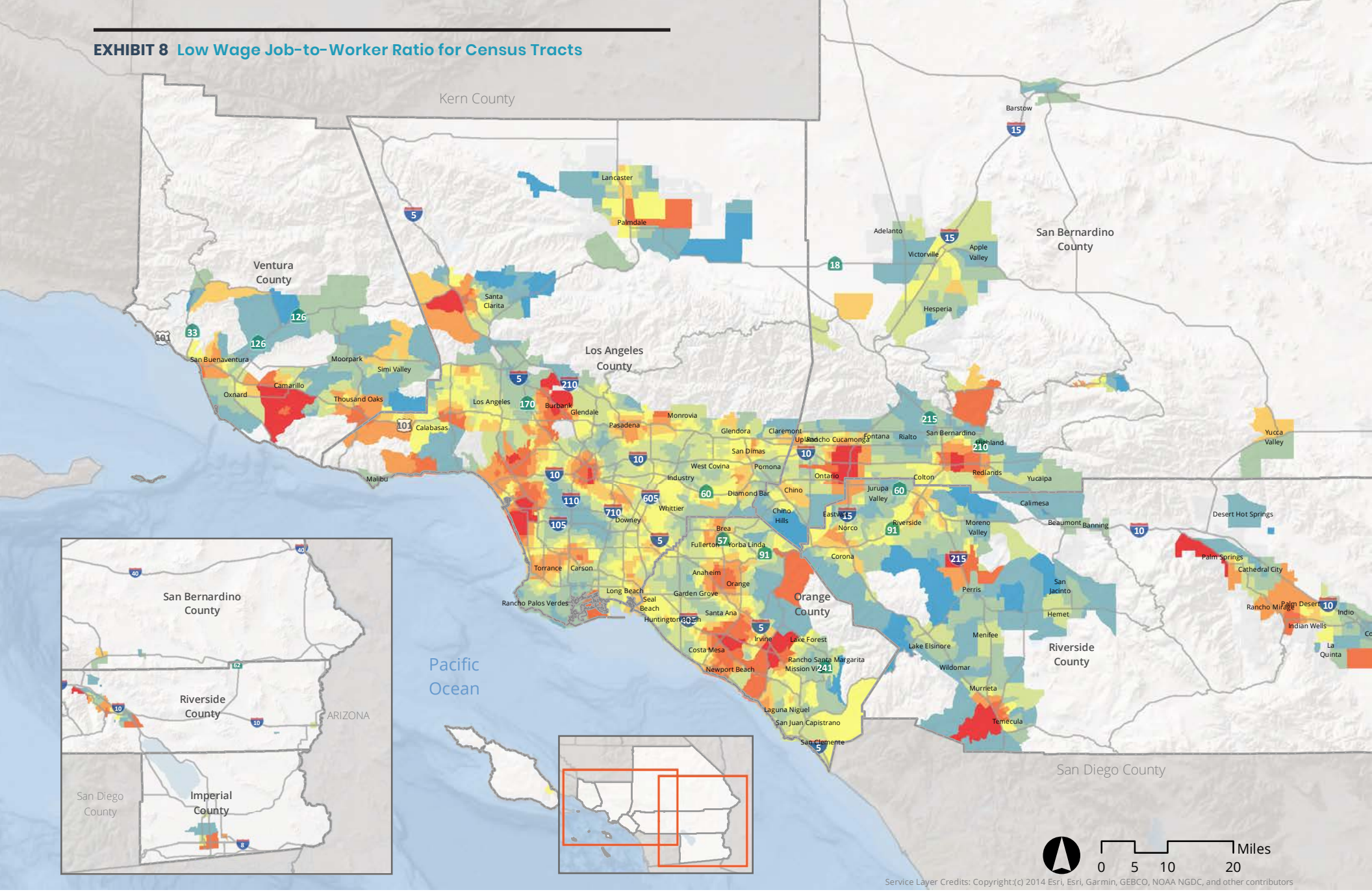
Ratio of Jobs to Workers for Census Tracts, 2016

More Workers — More Jobs

0.25 0.5 0.75 1.0 1.25 1.5 2.0 3.0

(Note: 'Low Wage' = Jobs with earnings $1250/month or less ; 'Med. Wage' = Jobs with earnings $1251/month to $3333/month; 'High Wage' = Jobs with earnings greater than $3333/month)
Source: Job and worker data were obtained from U.S. Census Bureau, LEHD Origin-Destination Employment Statistics (LODES 7.4) Workplace Area Characteristics (WAC) Primary Jobs data file and Residence Area Characteristics (RAC) Primary Jobs data file for year 2016.

EXHIBIT 8 Low Wage Job-to-Worker Ratio for Census Tracts



Ratio of Low-Wage Jobs to Low-Wage Workers for Census Tracts, 2016

More Workers — More Jobs

0.25 0.5 0.75 1.0 1.25 1.5 2.0 3.0

(Note: 'Low Wage' = Jobs with earnings $1250/month or less ; 'Med. Wage' = Jobs with earnings $1251/month to $3333/month; 'High Wage' = Jobs with earnings greater than $3333/month)
Source: Job and worker data were obtained from U.S. Census Bureau, LEHD Origin-Destination Employment Statistics (LODES 7.4) Workplace Area Characteristics (WAC) Primary Jobs data file and Residence Area Characteristics (RAC) Primary Jobs data file for year 2016.

A proper balance of housing and jobs can help people to live close to their workplace, thus reducing overall congestion, Vehicle Miles Traveled (VMT), and greenhouse gas (GHG) emissions. In addition to the traditional measure of jobs-housing balance, it is important to examine the Jobs-Housing Fit (JHFIT) between available housing types and the income level of residents. From an equity perspective, it is important to ensure low-wage jobs-housing fit because of ongoing difficulties with affordable housing provision. In addition to regional equity, ensuring a low-wage jobs-housing fit can contribute to environmental benefits and GHG emission reduction, given low income households on average drive older and less fuel-efficient cars. As a part of the jobs-housing imbalance/mismatch analysis for the 2016-2040 RTP/SCS, SCAG conducted the JHFIT analysis for cities in the SCAG region based on the JHFIT methodology developed by UC Davis Center for Regional Change.[6] For Connect SoCal, SCAG applied an updated JHFIT methodology that characterizes low-wage jobs-housing fit at both a jurisdiction and the census tract scale (roughly equivalent to a neighborhood), by examining a ratio between the total number of low-wage jobs and the total number of affordable rental units. In contrast to overall jobs-housing balance, the low-wage fit analysis is helpful to highlight those jurisdictions and neighborhoods where there is a substantial shortage of affordable housing in relation to the number of low-wage jobs.

To conduct the JHFIT analysis for cities and census tracts, SCAG employed publicly available data on job numbers from the LODES and housing numbers from the ACS. Job data was obtained from the LODES Workplace Area Characteristics (WAC) Primary Jobs data files for the years 2010 and 2016. Staff extracted the low-wage job numbers with earnings $1,250/month or less which is equivalent of $15,000/year for someone working for 12 full months. Based on 2016 LODES data, the low-wage category accounted for 18 percent of total jobs in the SCAG region, and can be considered truly the lowest-wage jobs in the region. It should be noted that, although the LEHD covers most public- and private-sector employment, it does not include the self-employed individuals, the military and some federal agencies. Also, the workplace location reported by the employer may not be the physical location to which employee commutes. Housing data was obtained from Census Bureau's 2008-2012 ACS 5-Year Estimates and 2013-2017 ACS 5-Year Estimates. In this study, SCAG used the counts of rental units with both contract rent (renter-occupied units) and rent asked (vacant-for-rent units) for affordable rental unit estimates. To estimate affordable rentals, SCAG used the regional median household income—the midpoint of an income distribution in the SCAG region—as Area Median Income (AMI) limit and assumed that a housing unit is affordable if a household whose income is at or below 80 percent of the AMI can live there without spending more than 30 percent of their income on rental units. SCAG assumed that spending 30 percent of total household income on housing costs is reasonable as the 30 percent threshold is widely accepted among affordable housing developers and advocates and it the threshold above which the U.S. Department of Housing and Urban Development considers a household to be cost-burdened. As is the case in job-to-worker ratio analysis, SCAG used a 2.5-mile buffer from the centroids of the census tracts and counted jobs and housing within the buffer distance to estimate the jobs-housing ratio and the low-wage jobs-housing fit at the neighborhood level.

TABLE 15 shows jobs-housing ratio and low-wage JHFIT in the SCAG region for the years 2010 (using 2010 LODES and 2008-2012 ACS 5-Year Estimates) and 2016 (using 2016 LODES and 2013-2017 ACS 5-Year Estimates). As shown in the table, while the ratio of jobs to housing increased from 1.10 to 1.19, the ratio of low wage jobs to affordable rental units decreased from 0.94 to 0.89 during the period.

EXHIBIT 9 - **EXHIBIT 12** depict the ratio of jobs to housing units—all jobs to all housing units—and the ratio of low wage jobs to affordable rental units at both cities and census tracts scale, respectively. These maps show that there are more cities and neighborhoods in coastal counties—especially, in Orange and Ventura Counties—that have relatively higher concentration of low-wage jobs but lack an adequate number of affordable rentals for people who are employed in those jobs. On the other hand, there are more cities and neighborhoods in inland counties and central Los Angeles that have relatively higher concentration of affordable housing units but have less low-wage jobs.

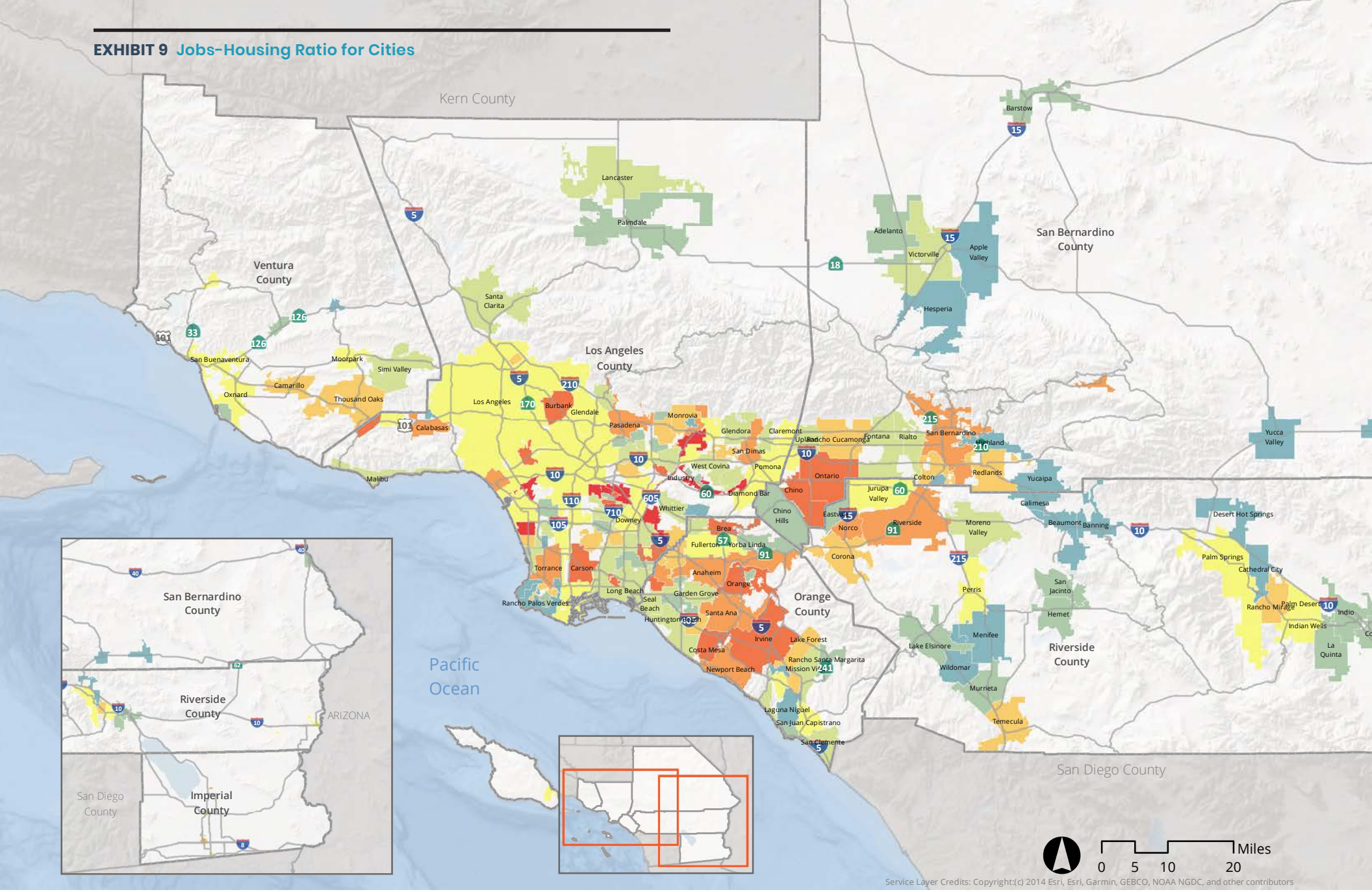
6 Chris Benner & Alex Karner (2016): Low-wage jobs-housing fit: identifying locations of affordable housing shortages, Urban Geography.

TABLE 15 Jobs-Housing Ratio and Low-Wage Jobs-Housing Fit in the SCAG Region

County	2012 ACS 5 YEAR & 2010 LODES			2017 ACS 5 YEAR & 2015 LODES		
	Jobs-Housing Ratio	Low-Wage Jobs-Housing Fit	Difference	Jobs-Housing Ratio	Low-Wage Jobs-Housing Fit	Difference
Imperial	1.13	0.84	0.29	1.16	0.81	0.35
Los Angeles	1.15	0.79	0.35	1.22	0.77	0.46
Orange	1.33	2.10	-0.78	1.44	2.16	-0.72
Riverside	0.77	0.90	-0.14	0.88	0.81	0.07
San Bernardino	0.95	0.84	0.11	1.04	0.72	0.32
Ventura	0.98	1.59	-0.60	1.03	1.62	-0.59
SCAG Region	**1.10**	**0.94**	**0.17**	**1.19**	**0.89**	**0.30**

Sources:
1. Jobs and housing projections for years 2020 and 2030 are based on SCAG growth forecast projections for the Connect SoCal, the 2020 RTP/SCS
2. Job estimates are based on U.S. Census Burea's LEHD Origin-Destination Employment Statistics Data (LODES version 7.4) Workplace Area Characteristics (WAC) Primary Jobs data files for years 2010 and 2016.
3. Housing unit estimates are based on U.S. Census Bureau's 2008-2012 American Community Survey 5-Year Estimates and 2013-2017 American Community Survey 5-Year Estimates.

EXHIBIT 9 Jobs-Housing Ratio for Cities



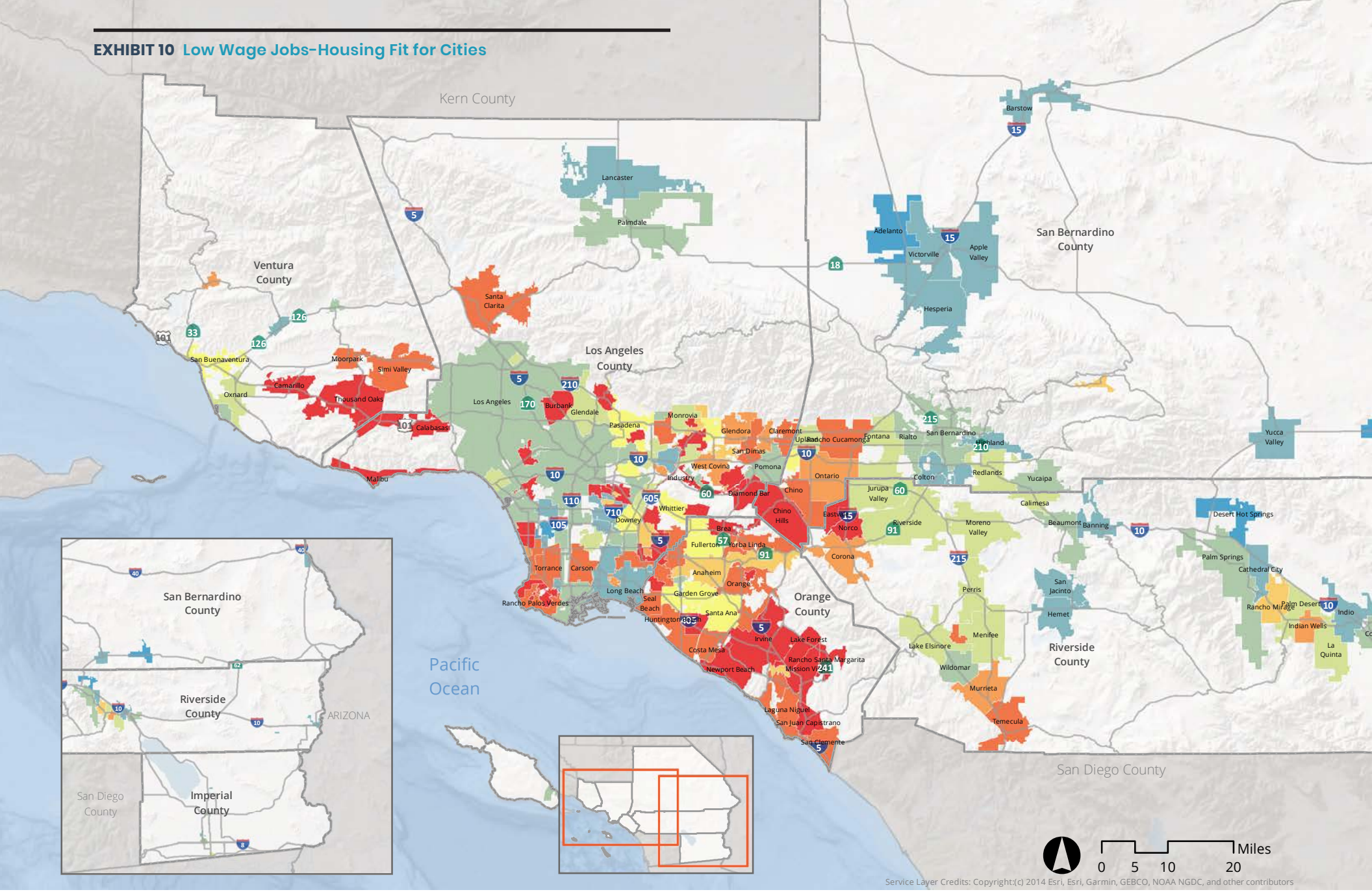
Ratio of Jobs to Housing Units for Cities, 2016

More Housing — More Jobs

0.25 0.5 0.75 1.0 1.25 1.5 2.0 4.0

(Note: 'Low Wage' = Jobs with earnings $1250/month or less ; 'Med. Wage' = Jobs with earnings $1251/month to $3333/month; 'High Wage' = Jobs with earnings greater than $3333/month)
Source: Job data was obtained from U.S. Census Bureau, LEHD Origin-Destination Employment Statistics (LODES 7.4) Workplace Area Characteristics (WAC) Primary Jobs data file for year 2016 and housing data was obtained from U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates.

EXHIBIT 10 Low Wage Jobs-Housing Fit for Cities



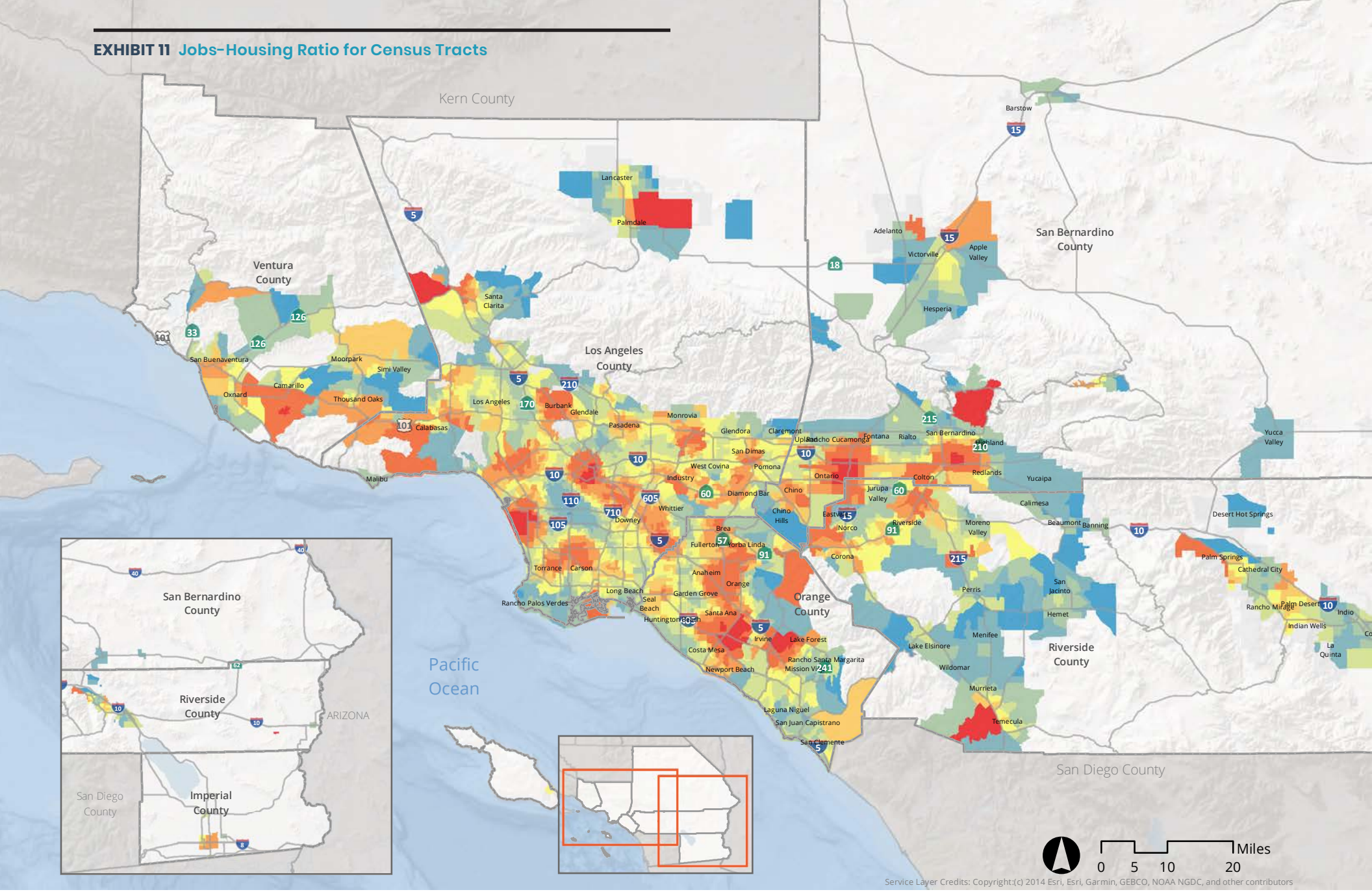
Ratio of Low-Wage Jobs to Affordable Rental Units for Cities, 2016

More Housing — More Jobs

0.25 0.5 0.75 1.0 1.25 1.5 2.0 4.0

(Note: 'Low Wage' = Jobs with earnings $1250/month or less ; 'Med. Wage' = Jobs with earnings $1251/month to $3333/month; 'High Wage' = Jobs with earnings greater than $3333/month)
Source: Job data was obtained from U.S. Census Bureau, LEHD Origin-Destination Employment Statistics (LODES 7.4) Workplace Area Characteristics (WAC) Primary Jobs data file for year 2016 and housing data was obtained from U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates.

EXHIBIT 11 Jobs-Housing Ratio for Census Tracts



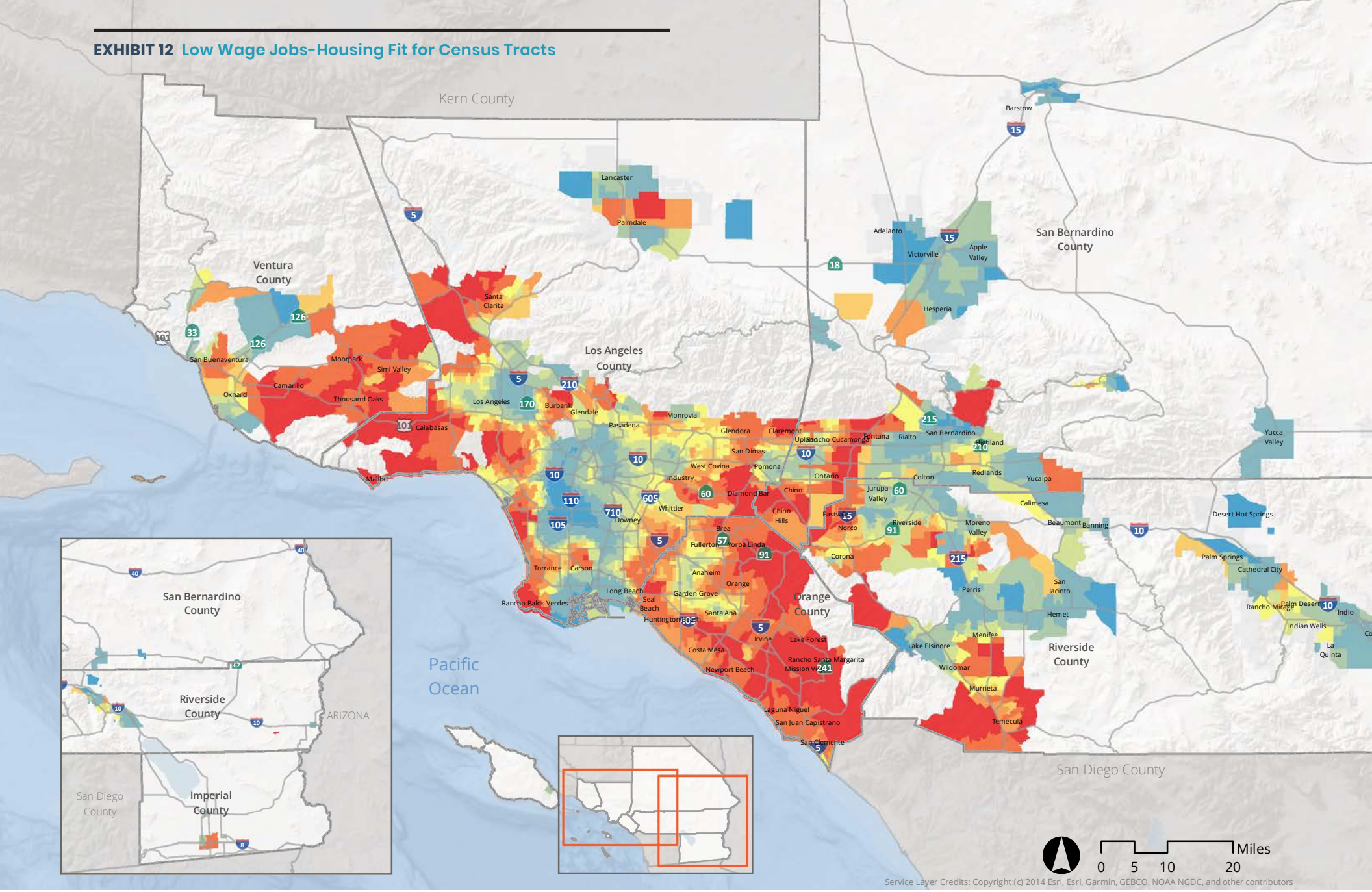
Ratio of Jobs to Housing Units for Census Tracts, 2016

More Housing — More Jobs

0.25 0.5 0.75 1.0 1.25 1.5 2.0 4.0

(Note: 'Low Wage' = Jobs with earnings $1250/month or less ; 'Med. Wage' = Jobs with earnings $1251/month to $3333/month; 'High Wage' = Jobs with earnings greater than $3333/month)
Source: Job data was obtained from U.S. Census Bureau, LEHD Origin-Destination Employment Statistics (LODES 7.4) Workplace Area Characteristics (WAC) Primary Jobs data file for year 2016 and housing data was obtained from U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates.

EXHIBIT 12 Low Wage Jobs-Housing Fit for Census Tracts



Ratio of Low-Wage Jobs to Affordable Rental Units for Census Tracts, 2016

More Housing — More Jobs

0.25 0.5 0.75 1.0 1.25 1.5 2.0 4.0

(Note: 'Low Wage' = Jobs with earnings $1250/month or less ; 'Med. Wage' = Jobs with earnings $1251/month to $3333/month; 'High Wage' = Jobs with earnings greater than $3333/month)
Source: Job data was obtained from U.S. Census Bureau, LEHD Origin-Destination Employment Statistics (LODES 7.4) Workplace Area Characteristics (WAC) Primary Jobs data file for year 2016 and housing data was obtained from U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates.

RESULTS

These statistics indicate that, given that commuting is expensive, higher wage workers can afford it and will commute longer for higher pay. On the other hand, lower wage workers tend to live closer to jobs. Overall, commute distance grew from 2002 to 2016 for all wage levels, while it slightly decreased from 2012 to 2016. The median commute distance for low-wage workers and high-wage workers were 8.6 miles and 11.0 miles in 2002, respectively, while they increased to 9.0 miles and 11.1 miles in 2016. Although the commute distance grew in all six counties between 2002 and 2016, it is observed that the commuting distance of workers in inland counties grew more rapidly than workers in coastal counties, especially for low-wage workers in inland counties. The growing commute distance can influence a range of economic, social, transportation and environmental outcomes, particularly to low-income and minority workers given the constraints they face, such as declines in job proximity and limited transportation options. Additionally, comparing the median commute distance and overall job-to-worker ratio between coastal counties and inland counties, counties with lower job-to-worker ratio generate more long-distance commuters. This indicates the need for more job growth in inland counties, while coastal counties need more housing growth.

Although the descriptive analysis of the commuting distance of workers by income may indicate something of a spatial mismatch between low-income workers and jobs in the SCAG region, this condition is projected to improve in the future (see Growth Trends section of the Demographic Technical Report). Population in inland counties suburbanized faster than jobs in the past, and as a result the population-employment (P-E) ratio was high for these areas. The Plan foresees that the P-E ratio will be lower in the future, because employment growth will be faster than population growth in inland counties. As the region is projected to experience faster employment growth in inland counties, where an abundant labor force is available, job-housing balance will likely improve and may result in the reduction of transportation congestion and related air quality problems. The spatial mismatch issue of low-income workers and jobs also may be less in the future than was observed from the recent data.

Highlights from this analysis include:

- Higher wage workers tend to commute longer distances than lower wage workers;
- The commute distance grew in all six counties between 2002 and 2016, while it slightly decreased between 2012 and 2016;
- The commute distance of workers in inland counties grew more rapidly than in coastal counties, especially in low wage workers in inland counties;
- Inland counties show a lower job-to-worker ratio than coastal counties, which indicates there are more long-distance commuters in inland counties;
- Jobs-housing ratio increased between 2010 and 2016, while low wage jobs-housing fit decreased during the same period;
- Coastal counties have a substantial concentration of low-wage jobs, but lack an adequate number of affordable rental units, while Inland counties have a substantial concentration of affordable rental units and workers, relative to the number of low-wage jobs that match their skills; and,
- Job-housing balance in the SCAG region may be improved due to the faster growth of employment over population in the Inland Counties through 2045. Improvements in job-housing balance may result in a reduction of transportation congestion and related air quality problems.

NEIGHBORHOOD CHANGE AND DISPLACEMENT H N

Public investments including transportation infrastructure development can revitalize or change neighborhoods. While public investments are designated to increase the investment potential of a neighborhood, there can also be unintended effects for vulnerable groups. Such investments can reduce the number of affordable housing units in neighborhoods and eventually create conflicts and inequality concerns. Therefore, understanding how much public investments can cause or intensify neighborhood change is important.

Investments can bring positive changes by enhancing the aesthetics of a neighborhood. However, public investments leading neighborhood advancement can be a mixed blessing for residents previously residing in the area. Positively, they would be able to enjoy public service upgrades and new commercial venues as long as they can afford it. However negatively, involuntary residential displacement could result from upward pressure on housing rents and property values. Therefore, planners and policy makers must be prepared to address the potential negative consequences associated with transit investment and expansion. Gentrification is defined as the transformation that takes place when a neighborhood moves from low value to high value. In this report, we use 'neighborhood change' interchangeably with 'gentrification.'

Connect SoCal aims to balance future mobility and housing needs with economic, environmental and public health goals. The Plan's future investments will not only stimulate efficient networks and environmentally friendly transportation systems, but they will also bring sustainable prosperity to the region by enhancing the movement of goods and people, accessibility to housing, transit and other amenities in Southern California. Planners, policymakers and transportation scholars have agreed that public transportation investment has continuously and significantly changed its surrounding neighborhoods. Achieving equity against adverse effects on low income and minority due to likely outcome of neighborhood change and displacement is a significant issue in the Southern California region.

Employing the 1980, 1990, 2000 Census and 2008-2012, and 2013-2017 American Community Survey (ACS), this analysis observes the patterns of change in demographic and socioeconomic data in the region. Through this analysis, as well as the implementation of 2020 Connect SoCal, we expect our future land use strategy and transportation plans to become more equitable for every person in the region.

Neighborhood change can both help and harm residents. There is a sense of concern about patterns of neighborhood change that reduces the racial and economic diversity. Neighborhood change is focused in larger cities with changing economies, but also occurs in smaller cities where it often impacts areas with the most amenities near central business districts. Although gentrification increases the value of property in areas that suffer from disinvestment, it can also result in rent increases. Displacement happens when current residents are involuntarily forced to move out of their homes because they cannot afford to stay in their neighborhood anymore due to rising rents or property taxes.

The forces that trigger these neighborhood changes in the real-estate market come from both outside and inside the neighborhood, including physical, social, and economic changes in the neighborhood, as well as citywide, regional, and global market and economic forces. Today, demand for communities with a mix of housing, shopping, and other uses have impacted urban and suburban communities differently, with some urban neighborhoods bringing in different demographics. Several studies have been done to observe the impacts of neighborhood change and displacement.

Pollack et al. (2010) analyzed 42 neighborhoods in 12 metropolitan areas in the U.S. between 1990 and 2000. For each of the 42 neighborhoods analyzed, they studied changes in population, racial and ethnic composition, migration, number of housing units, tenure, housing value and rents and household income. They found that neighborhoods with a large number of renters are more susceptible to gentrification. Nowlin et al. (2016) used five variables that indicate neighborhood changes in the Indianapolis region. The five variables include changes in average family income, population, young adult (age 20-34) share of the population, share of white population, and percent of the population with bachelor's degree. They found that neighborhoods with higher public and private investment experienced more gentrification.

Chapple et al. (2017) developed a method for analyzing potential gentrification. To identify gentrified census tracts, they used variables of education, racial and ethnic composition, household income, and gross rent from 1990, 2000 Census and 2013 American Community Survey (5-year). In Los Angeles County, they identified 81 tracts which gentrified between 1990 and 2000 and 82 tracts which gentrified between 2000 and 2013. Aron-Dine and Bunten (2019) introduced a metric of gentrification based on price-to-income ratios by applying data of housing price, Census, Internal Revenue Service and consumer credit in the U.S.

They found that households in neighborhoods that begin gentrifying experience 3.9 percent higher move-out rates. The Institute on Metropolitan Opportunity (2019) analyzed neighborhood change between 2000 and 2016 at the census tract and metropolitan level in the U.S. The study used data from the 2000 Census and the 2016 American Community Survey (5-year) and found that, in general, central city areas in the U.S. have experienced displacement of low-income households.

Various community groups and academics study gentrification and displacement including the Urban Displacement Project and the Anti-Eviction Mapping Project. The Urban Displacement Project is a research and action initiative that conducts community-centered, data-driven applied research to understand and described the nature of gentrification through interactive maps. These maps define displacement/gentrification census tract types for each region, and any expand on existing tenant protection policies or promote their development. The Anti-Eviction Mapping Project is a data-visualization, data analysis, and storytelling collective that documents the dispossession/resistance upon gentrifying landscapes. Volunteers produce digital maps, oral history work, film, and murals to monitor the conditions of displacement and illustrate the impacts of gentrification and displacement to encourage action and policy.

Neighborhoods are rarely completely stable and often change in their socioeconomic and built environment characteristics over a long-time horizon. While this is an immutable fact about urban life, planners need to be especially cognizant of the equity and justice implications of neighborhood change.

Displacement is a key concern when longstanding residents—typically renters—are no longer able to afford to live in a neighborhood experiencing rent increases and are forced to move out. There are additional adverse impacts of increased rents and cost of living at the neighborhood scale, such as household overcrowding, overpayment, or needing to consume fewer non-housing goods. Researchers have also noted that social or cultural changes or dispossession can also be an adverse impact on high-risk communities, whether or not true physical displacement occurs (Rayle 2015).

METHODOLOGY

NEIGHBORHOOD CHANGE

To identify changed neighborhood, we applied the following four criteria (Chapple et al. 2017). A tract is defined as gentrified if it meets all four criteria:

- Change in percent of college educated > county (percentage points)
- Change in percent of non-Hispanic white > county (percentage points)
- Change in median household income > county (absolute value)
- Change in Median Gross Rent > Change County Median Gross Rent (absolute value)

TABLE 16 shows the criteria for neighborhood changes for the counties in SCAG region. To convert census tract boundaries before 2010 to 2010 boundary, Longitudinal Tract Data Base (LTDB) was applied (Logan et al. 2014).

DISPLACEMENT AND DETERMINANTS OF MOVES

Analyzing displacement, even in the context of neighborhood change, requires understanding mobility and moving. For this, we rely on ACS PUMS 2013-2017 data. 12.3 percent of the SCAG region population changes residence each year. Most of these moves – 9.9 percent of the population – occur within the region, and 8.4 percent of them are within the same county (see **TABLE 19**). While these data indicate whether or not people moved, and if they moved across county lines, specific data on where short-distance movers go is far less available.

Researchers have noted there is a wide range of reasons people move. Aging and changing life stages are a top driver of moves, e.g. young adults forming a household or retirees downsizing. Relocation for a job is another key driver of mobility and tends to be more closely associated with longer-distance moves. Increasingly, movers out of the region are citing housing costs (see Demographics and Growth Forecast Technical Report). **TABLE 19** also shows the region's top inter-county migration flow. Those moving from Los Angeles to Orange County, has a slightly higher proportion of above moderate income

TABLE 16 Criteria for Neighborhood Changes in Counties in the SCAG Region

	1980	1990	2000	2012	2017	Δ1980-1990	Δ1990-2000	Δ2000-2012	Δ2012-2017
Imperial									
% College Educated	26%	33%	37%	42%	45%	7%	4%	5%	3%
% Non-Hispanic White	38%	29%	20%	14%	11%	-9%	-9%	-6%	-2%
Median Household Income	$46,302	$42,956	$47,017	$44,167	$44,779	-$3,346	$4,061	-$2,850	$612
Median Gross Rent	$691	$718	$719	$776	$805	$27	$1	$57	$29
Los Angeles									
% College Educated	40%	49%	51%	56%	57%	10%	2%	5%	2%
% Non-Hispanic White	53%	41%	31%	28%	26%	-12%	-10%	-3%	-1%
Median Household Income	$55,384	$66,927	$62,240	$60,211	$61,015	$11,543	-$4,687	-$2,029	$804
Median Gross Rent	$874	$1,141	$1,005	$1,271	$1,322	$267	-$136	$266	$51
Orange									
% College Educated	48%	61%	62%	66%	67%	13%	1%	4%	2%
% Non-Hispanic White	78%	64%	51%	44%	41%	-14%	-13%	-7%	-3%
Median Household Income	$71,181	$87,899	$86,776	$80,900	$81,851	$16,718	-$1,123	-$5,876	$951
Median Gross Rent	$1,130	$1,440	$1,318	$1,587	$1,693	$310	-$122	$269	$106
Riverside									
% College Educated	34%	48%	50%	54%	55%	13%	3%	4%	1%
% Non-Hispanic White	74%	64%	51%	40%	37%	-9%	-13%	-11%	-3%
Median Household Income	$50,606	$63,320	$63,270	$61,126	$60,807	$12,714	-$50	-$2,144	-$319
Median Gross Rent	$852	$1,043	$942	$1,245	$1,251	$191	-$101	$303	$6
San Bernardino									
% College Educated	35%	48%	49%	52%	53%	13%	1%	3%	1%
% Non-Hispanic White	73%	61%	44%	33%	30%	-12%	-17%	-11%	-3%
Median Household Income	$55,106	$64,013	$62,059	$58,614	$57,156	$8,907	-$1,954	-$3,445	-$1,458
Median Gross Rent	$820	$1,014	$925	$1,177	$1,182	$194	-$89	$252	$5
Ventura									
% College Educated	42%	57%	60%	64%	65%	15%	3%	3%	1%
% Non-Hispanic White	72%	66%	57%	49%	46%	-7%	-9%	-8%	-3%
Median Household Income	$67,012	$87,306	$88,024	$81,881	$81,972	$20,294	$718	-$6,143	$91
Median Gross Rent	$1,000	$1,375	$1,273	$1,549	$1,643	$375	-$102	$276	$94

Source: 1980, 1990, 2000 Decennial Census, 2008-2012, 2013-2017 5 year ACS

households than the region as whole. This was also the case for movers from Orange to Riverside counties. Conversely, three migration flows have a substantially lower share of above moderate income residents: movers from Los Angeles to Riverside County, movers from Riverside to San Bernardino County, and movers from San Bernardino to Los Angeles County. While it is not possible to explain the specific mechanisms of each of these moves without a more detailed analysis, these figures illustrate, in general, that certain locations of moves may be experienced by different subsets of the population.

Recently, USC researchers conducted an extensive study on move dynamics in Los Angeles County using fine-grained neighborhood level data, allowing for a more detailed analysis than at the county scale (Rodnyansky 2018, Boarnet et al. 2017, Boarnet et al. 2017). Specifically, they analyzed the magnitude and characteristics of those who moved to or from neighborhoods with recent transit expansions, controlling for numerous other factors which affect moving.

Using franchise tax board data on the specific location of moves, they found that renters and lower-income households are much more likely to move. Since neighborhoods near LA Metro rail service have substantially higher proportions of renters, fundamentally they are at a higher risk of displacement. The research also finds that the opening and the continued presence of rail transit stations increases neighborhood outflow rates by up to 10 percent annually above baseline levels. While this differs based on many factors, rail effects increase mobility rates for middle- and upper-income groups (>80 percent AMI) most often, whereas only limited evidence in two corridors is found that rail station openings increase move rates for below 50% AMI households. This research can be summarized by the statement that there are "islands of displacement in seas of gentrification and oceans of mobility." This research indicates that displacement is not experienced wholesale in changing neighborhoods, thus specific attention should be given on a case-by-case basis to ensure equitable access to the benefits of improved infrastructure. Furthermore, other evidence such as overcrowding, overpayment, or non-physical displacement, should also be considered.

Further insight can be gained by looking at the move destination of those who leave transit accessible neighborhoods (see **FIGURE 4**). On the whole, Rodnyansky finds that move distances are fairly short with a median distance of 3.5 miles, that more people tend to move out of transit accessible areas than in to transit accessible areas, and that the strongest predictor of living near rail is whether you've already lived near rail. In other words, it is likely that displaced residents may seek another neighborhood which is also transit accessible. In addition, these findings reflect longstanding trends regarding the suburbanization of minority and environmental justice populations, whereby transit access is not seen as needed or desirable compared to a private automobile.

While the above studies are informative, they apply only to rail in Los Angeles County and does not comment on the experience in region's other five counties. However, as this analysis also shows, the vast majority of perpetually changing neighborhoods and rail stations are in Los Angeles County.

RESULTS

Using the definition in table 16, we find that in SCAG region, 430 tracts changed between 1980 and 1990, 819 tracts changed between 1990 and 2000, 456 tracts changed between 2000 and 2012, 349 tracts changed between 2012 and 2017. **TABLE 17** shows the number of changed neighborhood for counties in SCAG region.

In order to isolate areas which are persistently changing and thus may be most reflective of gentrification processes, **TABLE 18** shows the summary of the census tracts that changed in three or more time periods. There are 30 census tracts in Los Angeles County, 8 census tracts in Orange County, 1 census tract in Riverside County, and 1 census tract in San Bernardino County that experienced neighborhood change in three or more periods between 1980 and 2017.

The tract changes are displayed in **EXHIBITS 13** to **16** by overlaying the HQTAs, Communities of Concern, Disadvantaged Communities, and Environmental Justice Areas in the SCAG region. Of the region's 40 persistently changing tracts, 11 tracts are within HQTAs (28 percent), 1 tract is within Communities of Concern (3 percent), 4 tracts are within Disadvantaged areas (10 percent), and 1 tract is within Environmental Justice areas (3 percent). As the share of the region's population in each of these areas is higher than these percentages and more of the persistently changing tracts are located outside of HQTAs, Communities of Concern, Disadvantaged Communities, and Environmental Justice Areas, the results do not suggest that persistently changing tracts are disproportionately located in such areas.

TABLE 17 Number of Changed Neighborhoods in SCAG Region

County	1980-1990		1990-2000		2000-2012		2012-2017	
	# of Census Tract	% Out of Total Census Tract	# of Census Tract	% Out of Total Census Tract	# of Census Tract	% Out of Total Census Tract	# of Census Tract	% Out of Total
Imperial	4	12.9%	2	6.5%	2	6.5%	1	3.2%
Los Angeles	288	12.3%	469	20.0%	293	12.5%	231	9.8%
Orange	85	14.6%	139	23.8%	29	5.0%	41	7.0%
Riverside	2	0.4%	110	24.3%	54	11.9%	28	6.2%
San Bernardino	34	9.2%	59	16.0%	59	16.0%	31	8.4%
Ventura	17	9.8%	40	23.0%	19	10.9%	17	9.8%
SCAG Region	430	10.9%	819	20.7%	456	11.5%	349	8.8%

Source: US Census Bureau, American Community Survey, and SCAG

TABLE 18 Summary of Census Tracts that Persistently Changing (Changed in Three or More Time Periods), 1980 - Present

	# of Census Tract		1980	1990	2000	2012	2017	Δ1980-1990	Δ1990-2000	Δ2000-2012	Δ2012-2017
Los Angeles	30	% College Educated	52%	67%	75%	82%	85%	15%	8%	7%	3%
		% Non-Hispanic White	71%	68.0%	64%	62.0%	63%	-3.0%	-4%	-2%	1%
		Median Household Income	$70,299	$93,801	$98,631	$98,990	$109,357	$23,502	$4,829	$359	$10,367
		Median Gross Rent	$1,052	$1,498	$1,508	$1,696	$2,080	$446	$10	$188	$384
Orange	8	% College Educated	54%	72.0%	77%	80.0%	81%	18.0%	5%	3%	2%
		% Non-Hispanic White	87%	82.0%	76%	66.0%	66%	-4.0%	-7%	-10%	-1%
		Median Household Income	$64,513	$110,941	$115,238	$103,008	$108,876	$46,427	$4,297	-$12,230	$5,868
		Median Gross Rent	$1,078	$1,726	$1,920	$1,896	$2,573	$648	$194	-$24	$677
Riverside	1	% College Educated	38%	52%	55%	52%	65%	14%	3%	-3%	13%
		% Non-Hispanic White	86%	79%	74%	59%	68%	-7%	-5%	-15%	8%
		Median Household Income	$76,203	$93,050	$116,091	$86,897	$103,641	$16,847	$23,041	-$29,194	$16,744
		Median Gross Rent	$1,270	$1,539	$1,585	$2,143	$2,105	$269	$47	$558	-$38
San Bernardino	1	% College Educated	28%	47%	61%	68%	71%	19%	14%	8%	3%
		% Non-Hispanic White	81%	81%	78%	77%	64%	1%	-3%	-1%	-13%
		Median Household Income	$46,912	$62,226	$64,987	$70,489	$72,832	$15,314	$2,761	$5,502	$2,343
		Median Gross Rent	$608	$942	$1,068	$1,498	$1,191	$333	$126	$430	-$307

Source: US Census Bureau, American Community Survey, and SCAG

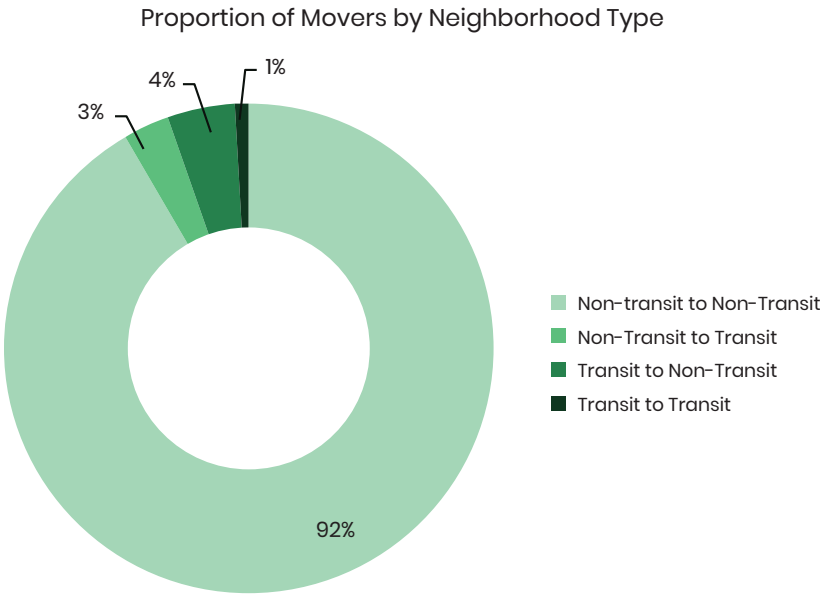
TABLE 19 Characteristics of Movers in SCAG Region

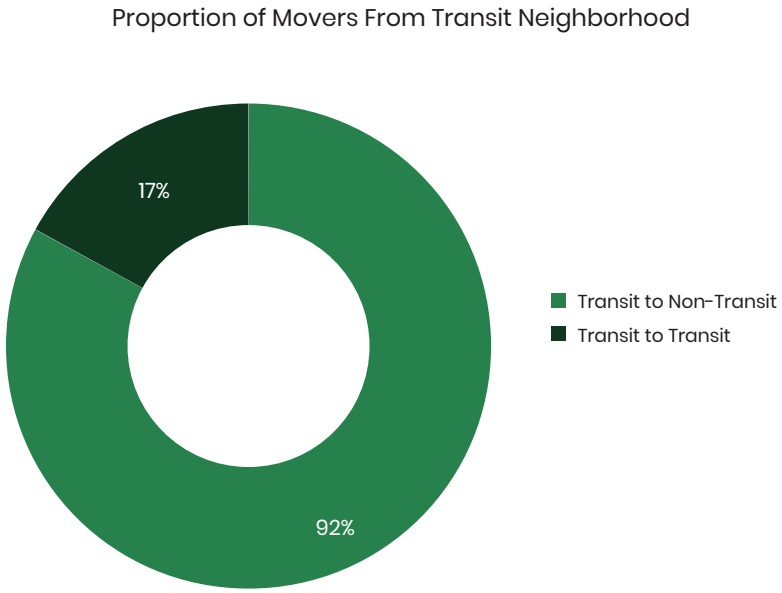
Income Category	SCAG Region	Within-Region Movers	Regional In-Migrants	Regional Out-Migrants
AMI	46.1%	46.0%	37.5%	38.3%
MI	9.5%	9.7%	8.1%	9.1%
LI	9.9%	9.8%	8.7%	9.7%
VLI	8.9%	8.9%	7.6%	8.5%
ELI	25.6%	25.6%	38.1%	34.4%

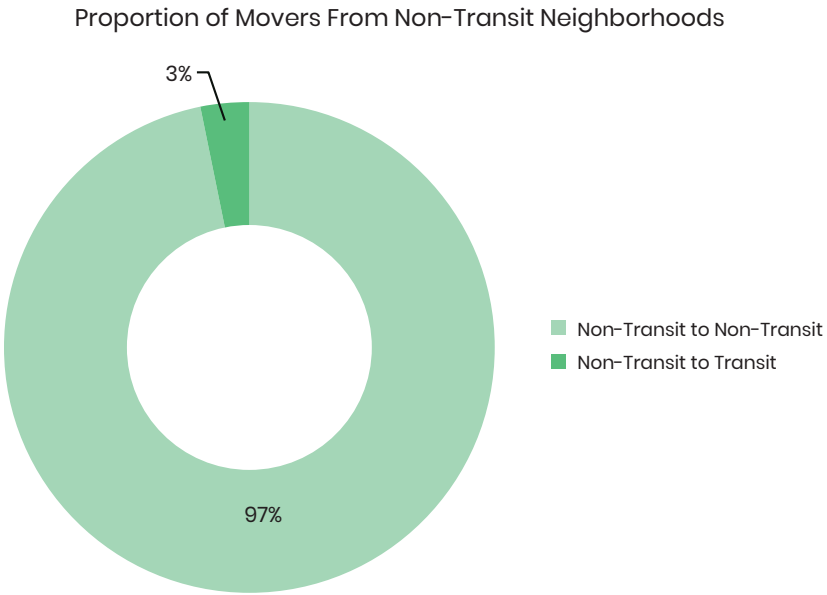
	Top County to County Flows								
	From ⇣ To	Los Angeles ⇣ Orange	Los Angeles ⇣ San Bernardino	Orange ⇣ Los Angeles	Los Angeles ⇣ Riverside	San Bernardino ⇣ Riverside	Riverside ⇣ San Bernardino	Orange ⇣ Riverside	San Bernardino ⇣ Los Angeles
	Count	39,755	39,248	27,696	21,815	20,809	20,017	19,851	18,980
COUNT*	AMI	19,671	16,887	12,558	9,055	9,254	8,204	9,924	7,804
	MI	4,297	3,823	3,044	1,993	2,016	1,778	1,820	2,140
	LI	2,950	3,638	2,600	2,173	1,978	1,617	1,868	1,787
	VLI	2,206	3,316	1,853	1,635	1,773	1,601	1,432	1,686
	ELI	10,631	11,584	7,641	6,959	5,788	6,817	4,807	5,563
PERCENT*	AMI	50%	43%	45%	42%	45%	41%	50%	41%
	MI	11%	10%	11%	9%	10%	9%	9%	11%
	LI	7%	9%	9%	10%	10%	8%	9%	9%
	VLI	6%	8%	7%	8%	9%	8%	7%	9%
	ELI	27%	30%	28%	32%	28%	34%	24%	29%

**Income categories are Above-moderate (AMI), Moderate (MI), Low (LI), Very Low (VLI), and Extremely Low (ELI)*
Source: US Census Bureau, American Community Survey, and SCAG

FIGURE 4 Mover Types by Transit and Non - Transit Neighborhood



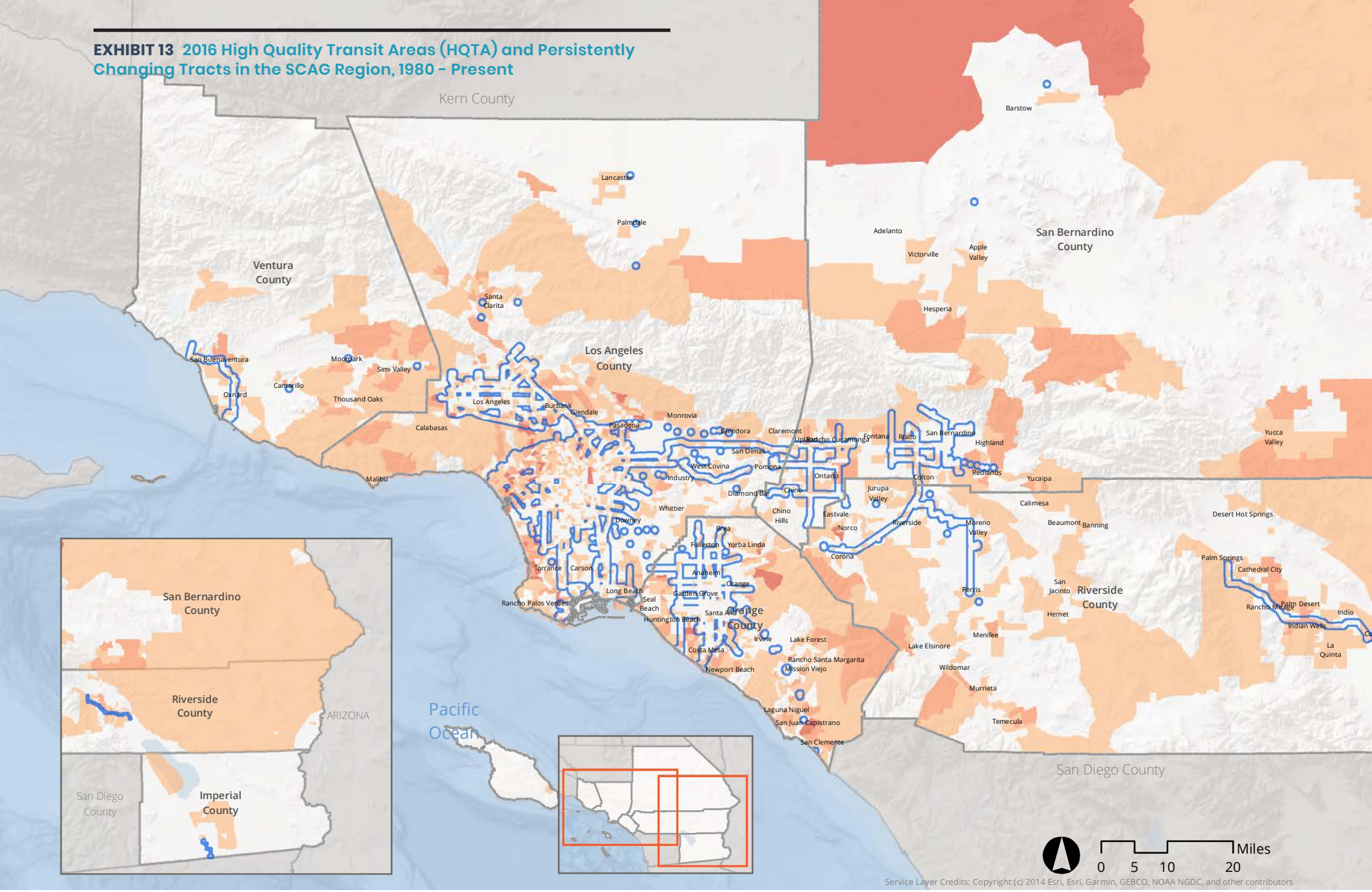




Note: Transit neighborhood is defined as a half mile area from an open L.A. Metro station at the time of measurement. This excludes bus and future rail stations. Franchise tax board data for all residents in Los Angeles County from 1993 to 2013 are used to calculate the proportions of movers

Source: Rodnyansky (2018)

EXHIBIT 13 2016 High Quality Transit Areas (HQTA) and Persistently Changing Tracts in the SCAG Region, 1980 - Present

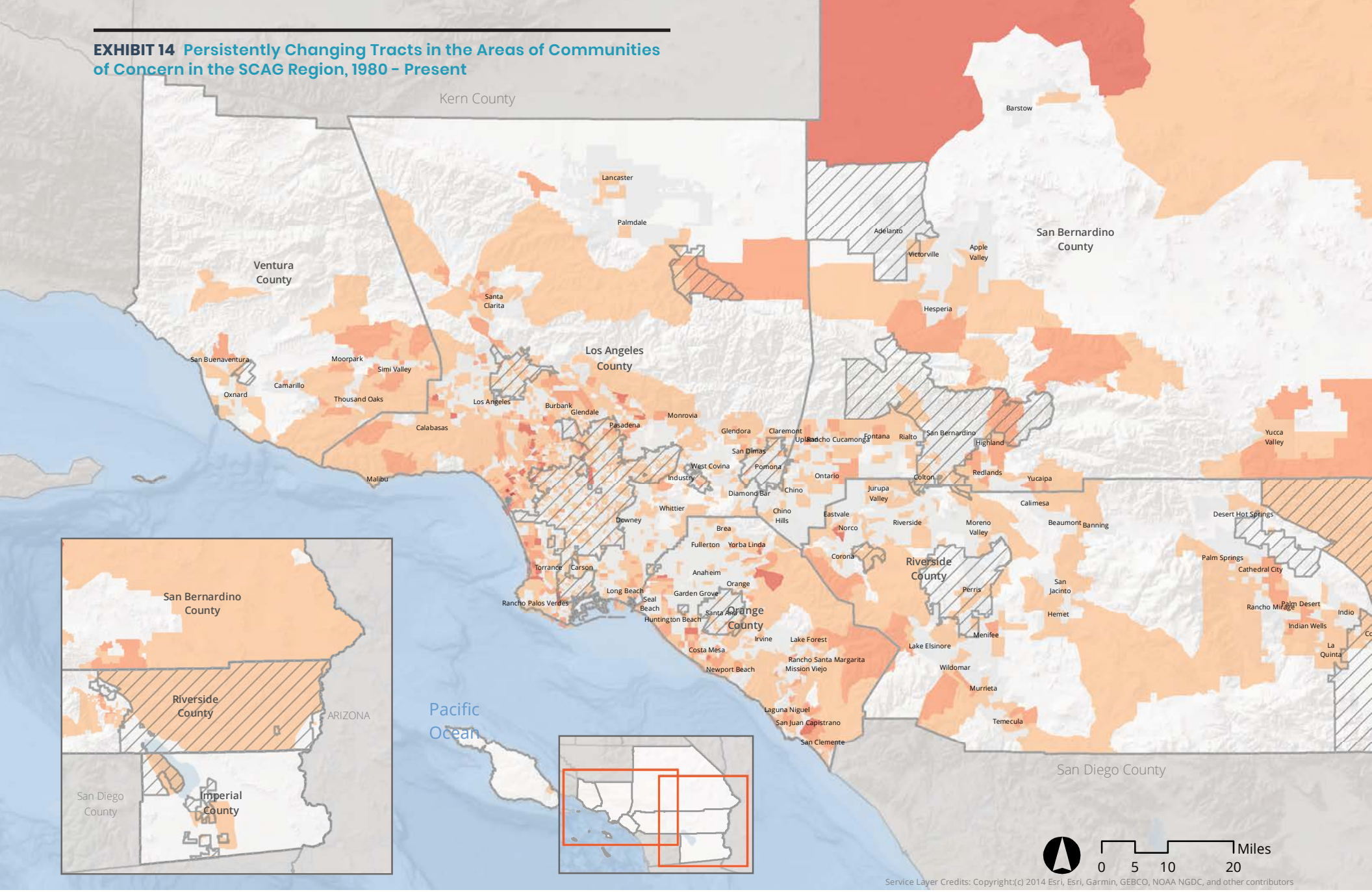


2016 High Quality Transit Areas
County Boundaries
Freeway
1 Decade of Change
2 Decades of Change
3 Decades of Change
4 Decades of Change

Decades of Change	HQTA Tracts with Change	Total Tracts	% Tracts with Change
1	353	1358	26%
2	65	287	23%
3	9	38	24%
4	2	2	100%

Source: SCAG 2019, Census 1980-2000, ACS 2012 5 years, ACS 2017 5 years

EXHIBIT 14 Persistently Changing Tracts in the Areas of Communities of Concern in the SCAG Region, 1980 - Present



Communities of Concern Boundaries | County Boundaries | City Boundaries

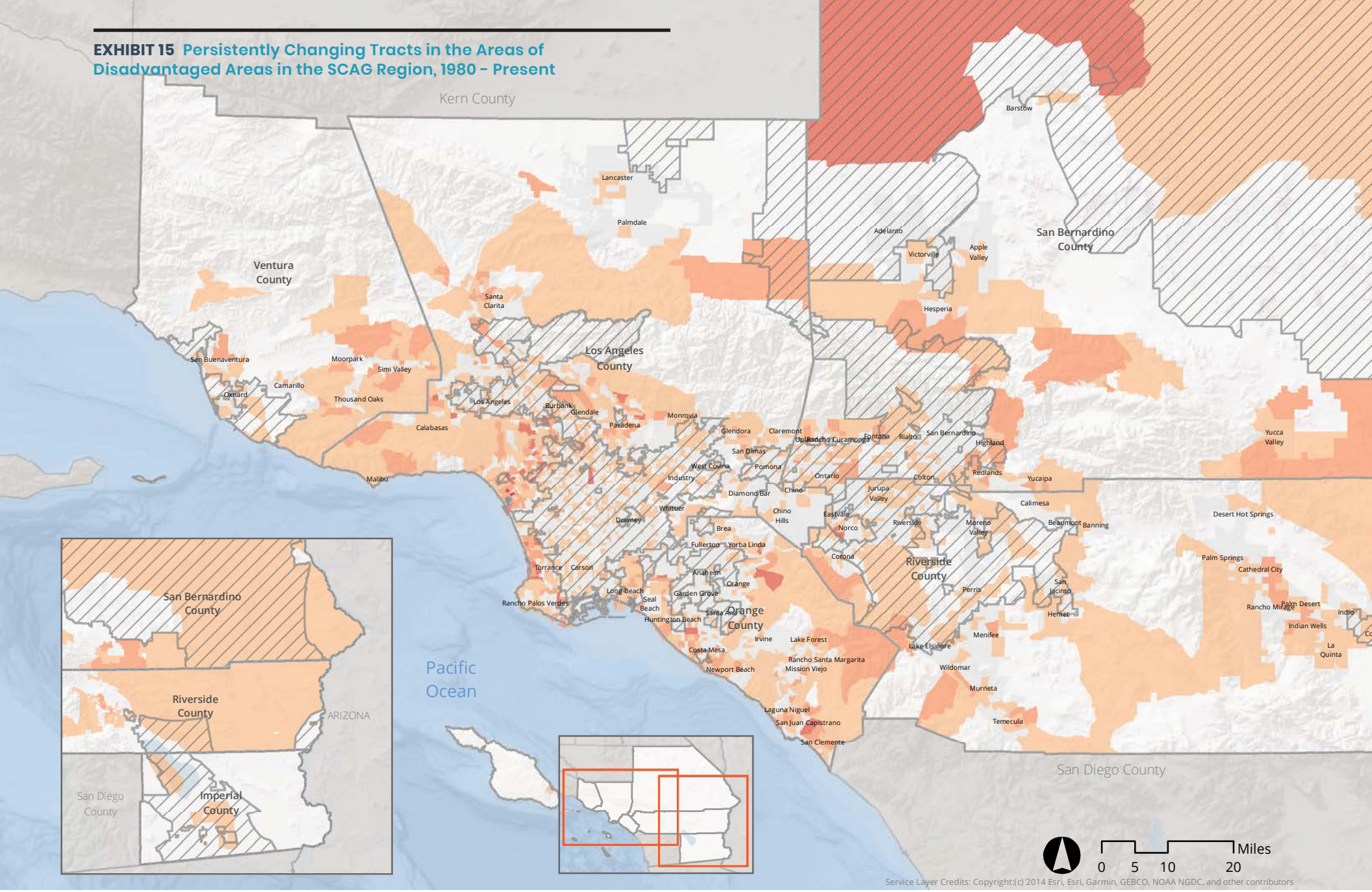
1 Decade of Change | 3 Decades of Change

2 Decades of Change | 4 Decades of Change

Decades of Change	COC Tracts with Change	Total Tracts	% Tracts with Change
1	279	1358	21%
2	30	287	10%
3	1	38	3%
4	0	2	0%

Source: SCAG 2019, Census 1980-2000, ACS 2012 5 years, ACS 2017 5 years

EXHIBIT 15 Persistently Changing Tracts in the Areas of Disadvantaged Areas in the SCAG Region, 1980 - Present

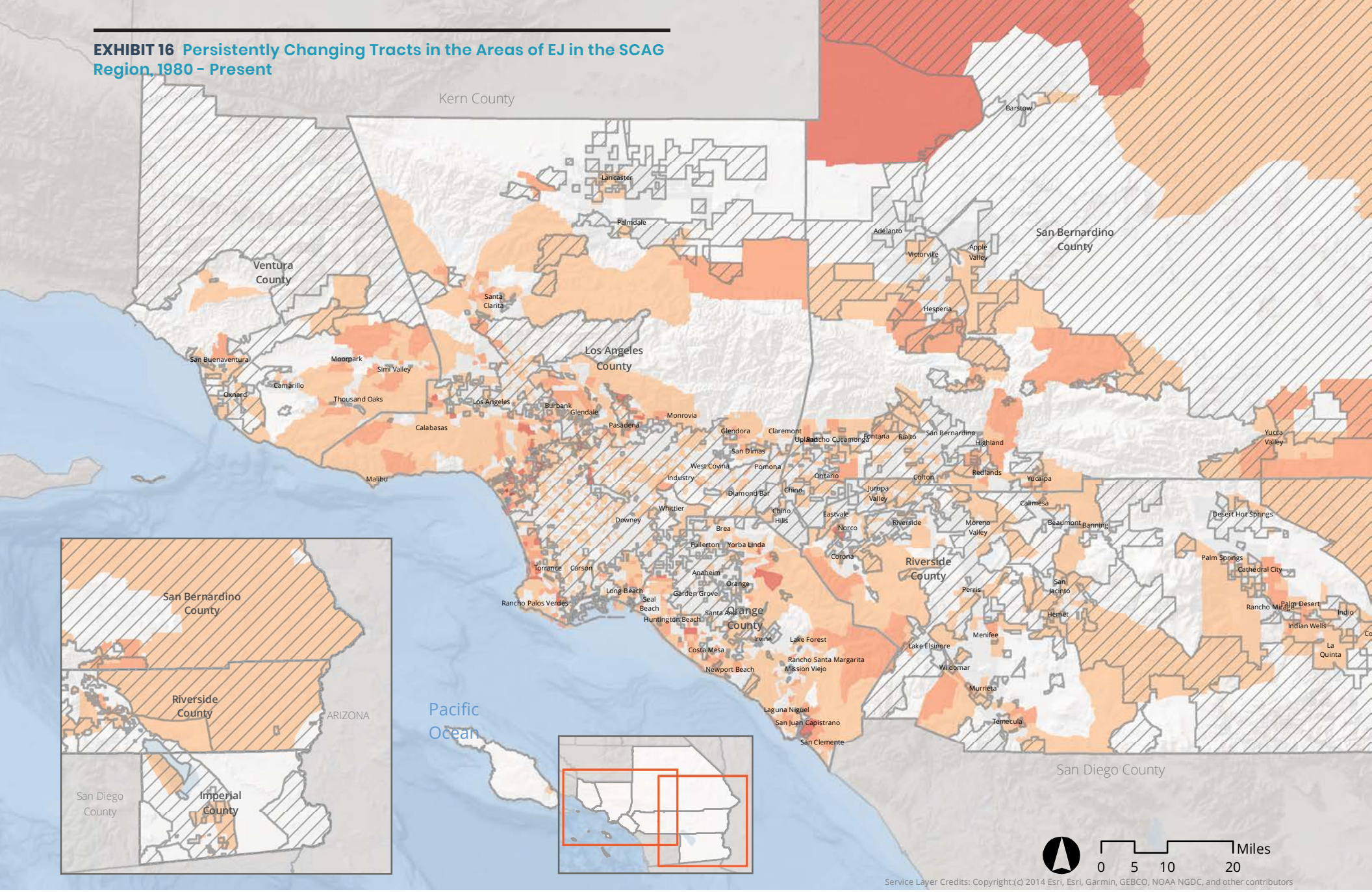


Disadvantaged Community Boundaries
County Boundaries
City Boundaries
1 Decade of Change
2 Decades of Change
3 Decades of Change
4 Decades of Change

Source: SCAG 2019, Census 1980-2000, ACS 2012 5 years, ACS 2017 5 years

Decades of Change	DAC Tracts with Change	Total Tracts	% Tracts with Change
1	490	1358	36%
2	44	287	15%
3	4	38	11%
4	0	2	0%

EXHIBIT 16 **Persistently Changing Tracts in the Areas of EJ in the SCAG Region, 1980 - Present**



Environmental Justice Area Boundaries | County Boundaries | City Boundaries

1 Decade of Change | 3 Decades of Change

2 Decades of Change | 4 Decades of Change

Decades of Change	EJA Tracts with Change	Total Tracts	% Tracts with Change
1	482	1358	35%
2	42	287	15%
3	1	38	3%
4	0	2	0%

Source: SCAG 2019, Census 1980-2000, ACS 2012 5 years, ACS 2017 5 years

As shown above, there are areas that have experienced significant neighborhood changes. SCAG recognizes the risk of undesirable community transformations that transit investments are capable of stimulating. Therefore, the call is made for additional focus of local jurisdictions and implementation agencies when transportation investments are being planned. SCAG will continue to monitor the trends of the aforementioned indicators in the areas that have experienced neighborhood change.

ACCESSIBILITY TO EMPLOYMENT AND SERVICES CI LU

TIME-BASED JOB AND SHOPPING ACCESSIBILITY

It is widely understood that transportation and land use decisions determine access to opportunities and have far-reaching effects on social justice and equity. Transportation links people to places, allowing them to move between home, work, play and community services. Land use patterns or the distribution of activities within the urban landscape describe the spatial dispersion of these destinations, and together transportation and land use influence the ability of households to meet their daily needs. As such, accessibility to destinations is a foundation for social and economic interactions. As an indicator, accessibility is measured by the spatial distribution of potential destinations, the ease of reaching each destination, and the magnitude, quality, and character of activities at potential destination sites. Travel costs are central: the lower the costs of travel in terms of time and money, the more places that can be reached within a certain budget and, thus, the greater the level of accessibility for residents of a particular neighborhood. Destination choice is equally crucial: a higher number of destinations and a greater level of variation in destinations equals a higher level of accessibility for a given locale.

METHODOLOGY

The goal of this analysis is to measure how Connect SoCal impacts accessibility to important destinations such as employment, shopping, parks and schools for EJ population groups throughout the region, and specifically for areas that have a high concentration of minority and low-income residents. This section will examine accessibility both in the realm of travel time and seeks to answer the following question: Can residents reach more destinations by auto and transit within a reasonable travel time as a result of the Plan?

First, in reviewing accessibility in the context of travel time for employment and shopping, this analysis measured the share of regional destinations that are reachable between work and home or between retail stores and home within 30 minutes of travel by automobile, and 45 minutes of travel by transit during the evening peak period (5pm to 7pm). Travel time by transit took into account factors incurred by riders that impact total travel time, such as the accumulation of initial wait time, transfer wait time, access walk time, egress walk time, transfer walk time, and in-vehicle time. In addition, accessibility is measured for all transit (bus and rail included) and exclusively for bus service. Results from the Plan are compared against the Baseline to gauge the improvements from Connect SoCal on the EJ population groups throughout the region. Existing conditions for the Base Year are also presented to provide a context of accessibility as it stands in 2016.

The general procedures for generating job and shopping accessibility are described as the following:

- Using SCAG's Travel Demand Model, develop a TAZ-to-TAZ travel time matrix by mode as auto, local bus, and all transit.
- Identify total employment and retail destinations from SCAG's Business and Employment Database.
- For each TAZ, select all of the accessible employment and shopping destinations within the given travel time constraints.
- Summarize total jobs and shopping destinations reachable for each TAZ and calculate overall accessibility for each EJ group.

Note that the analysis of employment does not examine the different levels of accessibility to higher income jobs and treats each job equally. For information on the availability of higher earning employment opportunities in relation

to affordable housing, please refer to the previous section on jobs-housing balance. SCAG's robust model has been peer-reviewed by transportation professionals. To learn more about SCAG's transportation model, please visit SCAG webpage.

RESULTS

TABLE 20 and **TABLE 21** present the share of the region's total employment and shopping destinations that are accessible to each EJ group within 30 minutes of travel by auto, or 45 minutes on transit under the BY, BL and PL scenarios. Results also show this same metric for the population within EJA, DAC, and COC Areas. **FIGURE 5** - **FIGURE 10** illustrates these results graphically.

The overall trend shows that job and shopping accessibility will improve for all EJ groups as a result of the Plan (when compared to the Baseline). This is true for auto travel as well as travel by transit and is also seen in the region's areas of concern (EJA, DAC, COC). When comparing these results to the Base Year, however, job and shopping accessibility generally decreases. This result indicates that the Plan scenario is beneficial to the region because it helps to accommodate population growth from 2016 to 2045 in a manner that is more efficient and equitable than the Baseline. **TABLE 22** and **TABLE 24** specifically compare the difference between the Plan and the Baseline for these same variables. Indeed, there are positive improvements for accessibility across the board for all population groups, for all subareas, and for both automobile and transit modes.

TABLE 20 Average Weighted Job Accessibility by Different Transportation Modes

Average Weighted Job Accessibility by Auto within 30 Minutes (Measured as the Percent of Regional Employment Accessible for Each Cohort)												
	SCAG Region (BY)	SCAG (BL)	SCAG (PL)	EJA (BY)	EJA (BL)	EJA (PL)	DAC (BY)	DAC (BL)	DAC (PL)	COC (BY)	COC (BL)	COC (PL)
Seniors	11.5%	10.9%	14.4%	12.9%	13.1%	13.5%	13.0%	13.2%	13.6%	13.0%	13.2%	13.6%
Disabled	11.1%	10.4%	13.8%	12.3%	12.4%	12.8%	12.8%	13.1%	13.5%	12.9%	13.1%	13.5%
Poverty 1	12.6%	11.6%	15.2%	13.6%	13.5%	13.9%	12.9%	13.1%	13.5%	12.9%	13.1%	13.5%
Hispanic	12.1%	10.8%	14.5%	13.0%	12.6%	12.0%	12.4%	13.1%	13.6%	12.8%	13.2%	13.7%
White	10.1%	9.8%	12.4%	10.8%	11.4%	11.5%	11.2%	13.6%	13.7%	12.9%	13.5%	13.6%
African American	12.8%	10.3%	14.2%	13.9%	12.1%	12.6%	11.9%	12.6%	13.1%	12.6%	12.5%	13.1%
Native American	9.6%	9.0%	11.5%	10.3%	10.4%	10.2%	10.3%	13.3%	13.0%	13.3%	13.0%	12.8%
Asian	13.9%	12.8%	17.4%	15.2%	15.4%	15.9%	15.1%	13.4%	13.9%	13.6%	13.5%	14.0%
Other Race	11.2%	10.6%	13.8%	12.2%	12.5%	12.7%	12.3%	13.2%	13.4%	13.0%	13.2%	13.4%
Income 1	12.6%	11.4%	15.3%	13.5%	13.4%	13.1%	13.2%	13.1%	13.7%	12.9%	13.2%	13.8%
Income 2	12.0%	11.0%	14.7%	13.1%	12.8%	13.5%	12.8%	13.1%	13.6%	12.9%	13.2%	13.7%
Income 3	11.7%	10.7%	14.3%	12.8%	12.7%	13.1%	12.6%	13.2%	13.6%	13.0%	13.3%	13.7%
Income 4	11.5%	10.7%	14.0%	12.8%	12.8%	12.9%	12.6%	13.3%	13.5%	13.0%	13.3%	13.5%
Income 5	11.3%	10.7%	13.9%	12.9%	13.0%	13.3%	12.9%	13.4%	13.7%	12.8%	13.3%	13.5%
Average	11.7%	10.8%	14.2%	12.8%	12.7%	12.9%	12.6%	13.2%	13.5%	13.0%	13.2%	13.5%

TABLE 20 Average Weighted Job Accessibility by Different Transportation Modes - Continued

Average Weighted Job Accessibility by All Transit within 45 Minutes (Measured as the Percent of Regional Employment Accessible for Each Cohort)												
	SCAG Region (BY)	SCAG (BL)	SCAG (PL)	EJA (BY)	EJA (BL)	EJA (PL)	DAC (BY)	DAC (BL)	DAC (PL)	COC (BY)	COC (BL)	COC (PL)
Seniors	2.3%	1.6%	2.0%	2.8%	2.7%	2.0%	3.0%	2.8%	2.8%	3.7%	3.6%	3.6%
Disabled	2.3%	1.4%	1.7%	2.7%	2.5%	1.7%	2.9%	2.7%	2.7%	3.6%	3.1%	3.5%
Poverty 1	2.8%	1.6%	1.9%	3.1%	2.6%	1.9%	3.3%	2.8%	2.7%	4.0%	3.8%	3.9%
Hispanic	1.8%	1.3%	1.5%	2.9%	2.2%	1.5%	3.0%	2.5%	2.4%	3.8%	3.1%	3.7%
White	1.4%	1.9%	2.4%	2.3%	3.2%	2.4%	3.0%	3.2%	3.4%	2.9%	3.7%	3.8%
African American	2.1%	1.6%	1.9%	3.4%	2.7%	1.9%	2.9%	2.9%	2.8%	4.6%	3.6%	3.8%
Native American	1.3%	1.9%	2.4%	2.1%	3.1%	2.4%	3.0%	3.3%	3.4%	3.3%	3.9%	3.5%
Asian	1.9%	1.8%	2.2%	3.0%	2.9%	2.2%	3.0%	3.1%	3.1%	3.5%	3.7%	4.0%
Other Race	1.6%	1.7%	2.0%	2.7%	2.8%	2.0%	3.0%	2.8%	2.9%	3.6%	3.5%	3.7%
Income 1	2.0%	1.6%	1.9%	3.2%	2.7%	1.9%	3.0%	2.7%	2.7%	4.1%	3.4%	3.9%
Income 2	1.8%	1.6%	1.9%	3.0%	2.8%	1.9%	3.0%	2.9%	2.9%	3.9%	3.5%	3.8%
Income 3	1.7%	1.7%	2.0%	2.8%	2.8%	2.0%	3.0%	2.8%	2.9%	3.6%	3.5%	3.8%
Income 4	1.6%	1.6%	1.9%	2.7%	2.7%	1.9%	3.0%	2.7%	2.7%	3.5%	3.4%	3.7%
Income 5	1.6%	1.6%	1.9%	2.8%	2.8%	1.9%	3.0%	2.9%	2.9%	3.6%	3.5%	3.8%
Average	1.9%	1.6%	2.0%	2.8%	2.7%	2.0%	3.0%	2.9%	2.9%	3.7%	3.5%	3.7%

TABLE 20 Average Weighted Job Accessibility by Different Transportation Modes - Continued

Average Weighted Job Accessibility by Local Bus within 45 Minutes (Measured as the Percent of Regional Employment Accessible for Each Cohort)												
	SCAG Region (BY)	SCAG (BL)	SCAG (PL)	EJA (BY)	EJA (BL)	EJA (PL)	DAC (BY)	DAC (BL)	DAC (PL)	COC (BY)	COC (BL)	COC (PL)
Seniors	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.5%
Disabled	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%
Poverty 1	0.3%	0.3%	0.3%	0.4%	0.4%	0.3%	0.4%	0.4%	0.3%	0.5%	0.5%	0.5%
Hispanic	0.8%	0.7%	0.8%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%
White	0.5%	0.5%	0.6%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%
African American	0.9%	0.6%	0.8%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.5%	0.4%	0.5%
Native American	0.5%	0.5%	0.6%	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%	0.4%	0.3%	0.4%
Asian	0.8%	0.8%	1.1%	0.3%	0.3%	0.3%	0.3%	0.4%	0.3%	0.4%	0.4%	0.5%
Other Race	0.6%	0.6%	0.7%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%
Income 1	1.0%	0.9%	1.2%	0.4%	0.4%	0.3%	0.3%	0.4%	0.3%	0.5%	0.5%	0.5%
Income 2	0.8%	0.8%	1.0%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.5%
Income 3	0.7%	0.7%	0.8%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%
Income 4	0.6%	0.6%	0.7%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%
Income 5	0.6%	0.6%	0.7%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.5%
Average	0.6%	0.6%	0.7%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%

Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

TABLE 21 Average Weighted Shopping Accessibility by Different Transportation Modes

Average Weighted Shopping Accessibility by Auto within 30 Minutes (Measured as the Percent of Regional Shopping Destinations Accessible for Each Cohort)												
	SCAG Region (BY)	SCAG (BL)	SCAG (PL)	EJA (BY)	EJA (BL)	EJA (PL)	DAC (BY)	DAC (BL)	DAC (PL)	COC (BY)	COC (BL)	COC (PL)
Seniors	16.0%	13.8%	16.8%	18.1%	15.4%	18.6%	15.3%	16.2%	19.7%	20.5%	17.2%	20.5%
Disabled	15.6%	13.3%	16.2%	17.3%	14.7%	17.9%	15.1%	15.7%	19.0%	20.0%	16.7%	20.5%
Poverty 1	17.0%	14.1%	17.0%	18.2%	15.2%	18.3%	15.2%	16.2%	19.5%	21.2%	17.4%	20.3%
Hispanic	17.4%	14.1%	17.4%	18.5%	15.2%	18.8%	15.1%	16.1%	19.9%	20.7%	17.0%	20.2%
White	13.6%	11.9%	14.3%	14.9%	13.1%	15.7%	12.9%	14.6%	17.5%	17.5%	15.6%	17.5%
African American	17.7%	13.3%	16.1%	18.9%	14.4%	17.3%	14.2%	15.3%	18.3%	22.2%	17.4%	18.7%
Native American	13.6%	11.7%	13.7%	14.7%	12.5%	14.7%	12.5%	14.5%	17.0%	18.7%	15.3%	17.5%
Asian	19.2%	16.1%	19.9%	21.1%	17.7%	21.9%	17.7%	18.2%	22.4%	22.5%	18.8%	22.5%
Other Race	15.2%	13.1%	15.8%	16.9%	14.5%	17.3%	14.3%	15.5%	18.5%	19.6%	16.8%	18.7%
Income 1	16.8%	13.9%	17.0%	18.2%	15.1%	18.4%	14.9%	16.1%	19.7%	21.4%	17.4%	19.9%
Income 2	16.5%	13.8%	16.8%	18.1%	15.1%	18.4%	14.9%	16.0%	19.6%	21.0%	17.2%	19.8%
Income 3	16.2%	13.6%	16.6%	17.9%	15.0%	18.3%	14.8%	15.8%	19.3%	20.2%	16.8%	19.6%
Income 4	15.9%	13.5%	16.5%	18.0%	15.1%	18.4%	15.0%	15.9%	19.3%	20.0%	16.7%	19.7%
Income 5	15.3%	13.2%	16.2%	18.1%	15.3%	18.6%	15.1%	15.9%	19.5%	19.9%	16.7%	19.7%
Average	16.1%	13.5%	16.5%	17.8%	14.9%	18.0%	14.8%	15.9%	19.2%	20.4%	16.9%	19.7%

TABLE 21 Average Weighted Shopping Accessibility by Different Transportation Modes - Continued

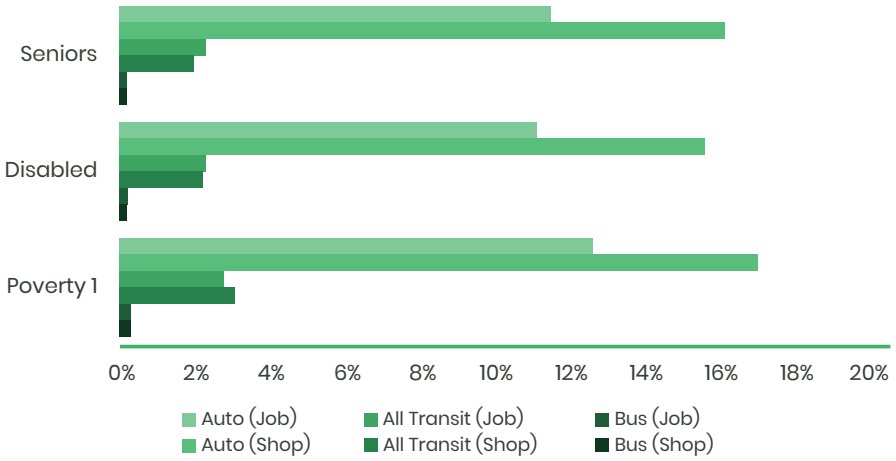
Average Weighted Shopping Accessibility by All Transit within 45 Minutes (Measured as the Percent of Regional Shopping Destinations Accessible for Each Cohort)												
	SCAG Region (BY)	SCAG (BL)	SCAG (PL)	EJA (BY)	EJA (BL)	EJA (PL)	DAC (BY)	DAC (BL)	DAC (PL)	COC (BY)	COC (BL)	COC (PL)
Seniors	2.0%	2.2%	2.3%	2.7%	3.0%	3.0%	2.9%	3.3%	3.2%	3.7%	4.0%	3.9%
Disabled	2.2%	2.2%	2.2%	2.8%	2.8%	2.8%	3.0%	3.1%	3.0%	3.9%	3.9%	3.8%
Poverty 1	3.1%	3.0%	3.0%	3.7%	3.3%	3.6%	4.0%	3.5%	3.8%	4.9%	4.7%	4.6%
Hispanic	6.3%	5.1%	5.5%	3.0%	2.8%	2.8%	3.0%	3.1%	3.0%	4.3%	4.0%	3.9%
White	3.6%	3.5%	3.6%	2.1%	2.3%	2.3%	3.4%	2.8%	2.5%	2.8%	3.2%	3.7%
African American	6.4%	4.4%	4.7%	3.0%	2.3%	2.4%	2.9%	2.5%	2.5%	4.2%	3.8%	4.2%
Native American	4.1%	3.7%	3.7%	2.2%	2.1%	2.1%	3.2%	2.5%	2.4%	3.5%	3.5%	3.6%
Asian	5.9%	5.5%	6.7%	3.0%	3.4%	3.7%	3.2%	3.2%	4.1%	3.8%	4.1%	4.5%
Other Race	4.6%	4.3%	4.3%	2.5%	2.8%	2.5%	3.2%	3.0%	2.7%	3.5%	3.9%	3.8%
Income 1	7.3%	6.3%	7.3%	3.6%	3.2%	3.8%	3.1%	3.5%	4.1%	4.9%	4.0%	4.2%
Income 2	6.2%	5.5%	6.0%	3.2%	3.3%	3.2%	3.1%	3.5%	3.4%	4.3%	4.0%	4.0%
Income 3	5.3%	4.8%	5.2%	2.8%	3.0%	2.8%	3.1%	3.1%	3.0%	3.7%	3.9%	3.8%
Income 4	4.7%	4.3%	4.4%	2.5%	2.8%	2.5%	3.2%	2.9%	2.6%	3.4%	3.6%	3.7%
Income 5	3.9%	3.9%	4.2%	2.4%	2.8%	2.7%	3.3%	3.0%	2.9%	3.1%	3.6%	4.0%
Average	4.7%	4.2%	4.5%	2.8%	2.9%	2.9%	3.2%	3.1%	3.1%	3.9%	3.9%	4.0%

TABLE 21 Average Weighted Shopping Accessibility by Different Transportation Modes - Continued

Average Weighted Shopping Accessibility by Local Bus within 45 Minutes (Measured as the Percent of Regional Shopping Destinations Accessible for Each Cohort)												
	SCAG Region (BY)	SCAG (BL)	SCAG (PL)	EJA (BY)	EJA (BL)	EJA (PL)	DAC (BY)	DAC (BL)	DAC (PL)	COC (BY)	COC (BL)	COC (PL)
Seniors	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%	0.5%
Disabled	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%	0.5%
Poverty 1	0.3%	0.3%	0.3%	0.4%	0.4%	0.3%	0.4%	0.4%	0.4%	0.5%	0.5%	0.5%
Hispanic	0.7%	0.5%	0.7%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.5%	0.4%	0.5%
White	0.4%	0.4%	0.4%	0.2%	0.3%	0.3%	0.4%	0.3%	0.4%	0.3%	0.3%	0.4%
African American	0.8%	0.5%	0.6%	0.4%	0.3%	0.3%	0.3%	0.3%	0.4%	0.5%	0.4%	0.5%
Native American	0.5%	0.4%	0.4%	0.2%	0.2%	0.3%	0.4%	0.3%	0.4%	0.4%	0.3%	0.4%
Asian	0.7%	0.6%	0.8%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%	0.5%
Other Race	0.5%	0.4%	0.5%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%
Income 1	0.8%	0.6%	0.9%	0.4%	0.4%	0.3%	0.3%	0.4%	0.4%	0.5%	0.5%	0.5%
Income 2	0.7%	0.6%	0.7%	0.4%	0.3%	0.3%	0.3%	0.4%	0.4%	0.5%	0.4%	0.5%
Income 3	0.6%	0.5%	0.6%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%	0.5%
Income 4	0.5%	0.4%	0.5%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%
Income 5	0.4%	0.4%	0.5%	0.3%	0.3%	0.3%	0.4%	0.3%	0.4%	0.3%	0.4%	0.5%
Average	0.5%	0.4%	0.5%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%	0.5%

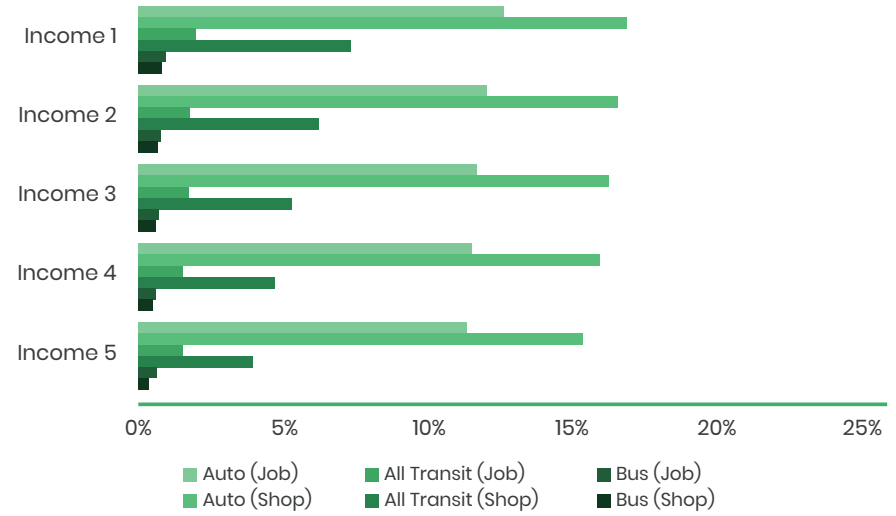
Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

FIGURE 5 Total Job and Shopping Accessibility by Mode: Population in Need



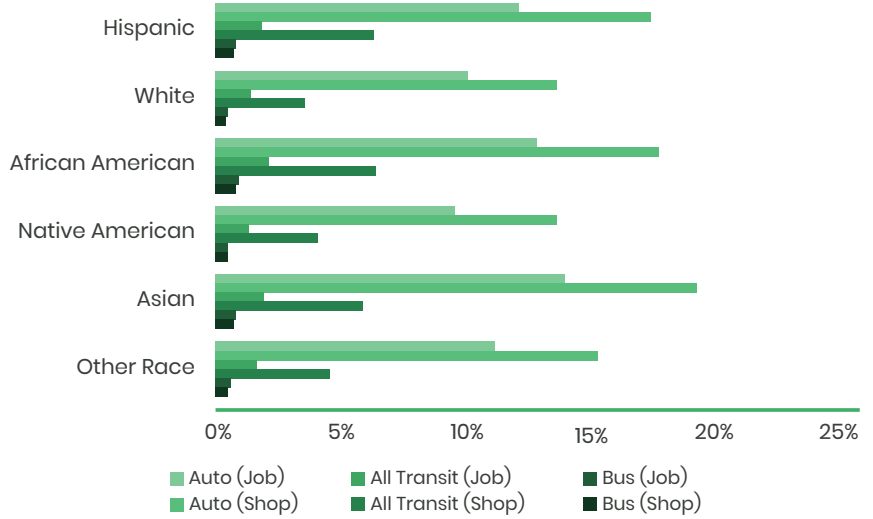
Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

FIGURE 6 Total Job and Shopping Accessibility by Mode: Income



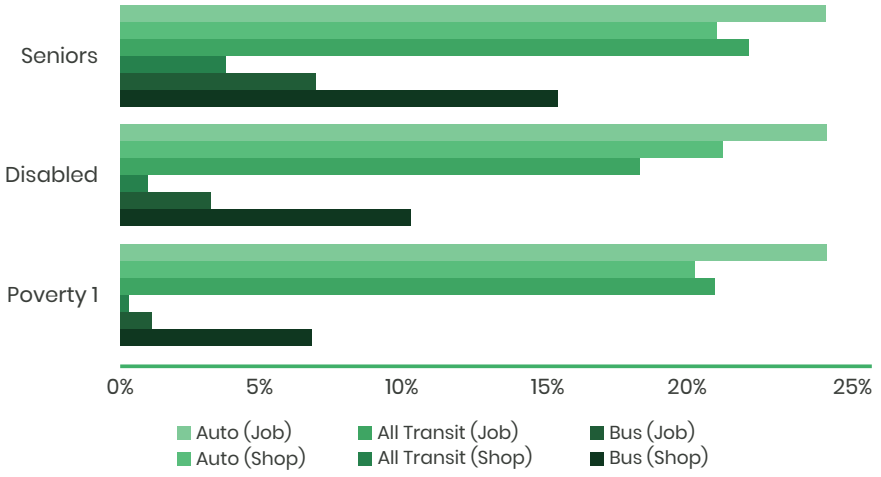
Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

FIGURE 7 Total Job and Shopping Accessibility by Mode: Ethnicity



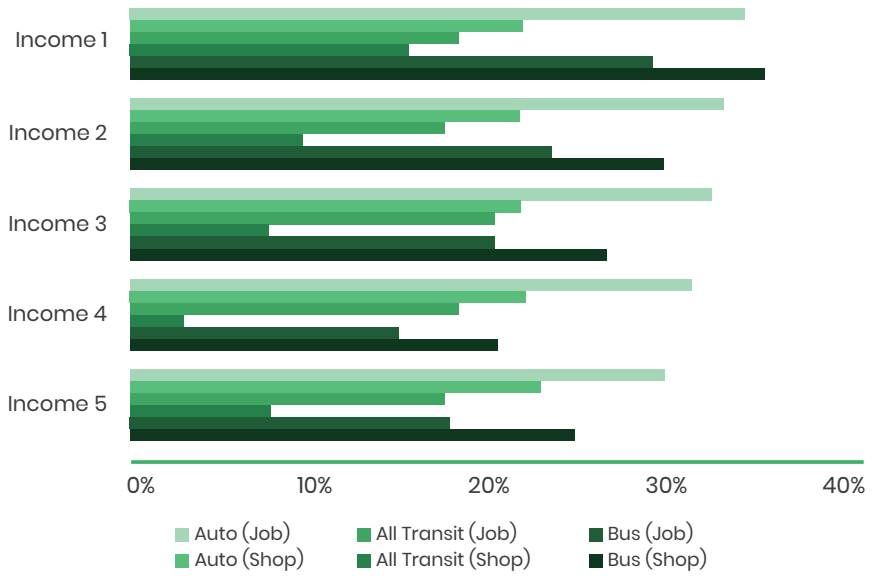
Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

FIGURE 8 Connect SoCal Impacts on Job and Shopping Accessibility: Population in Need



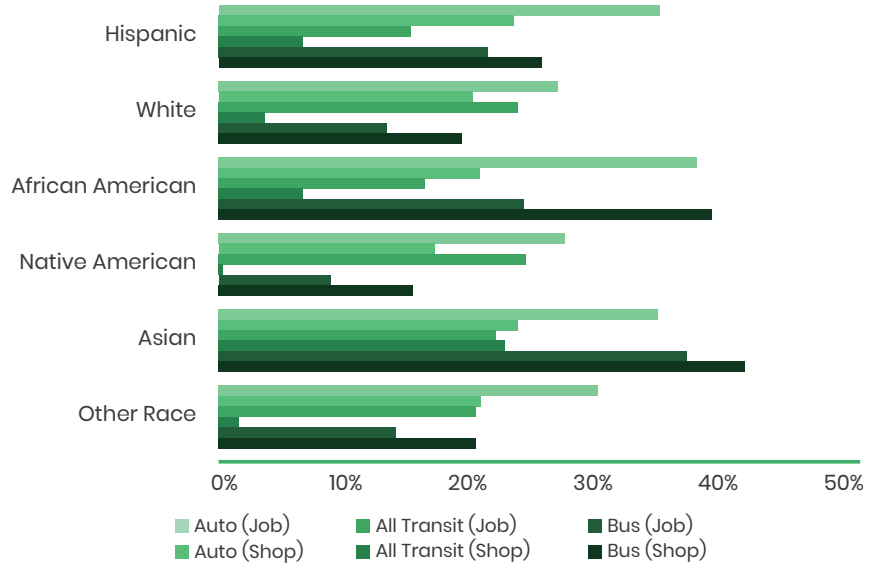
Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

FIGURE 9 Connect SoCal Impacts on Job and Shopping Accessibility: Income



Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

FIGURE 10 Connect SoCal Impacts on Job and Shopping Accessibility: Ethnicity



Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

TABLE 22 Comparison of Job and Shopping Accessibility by Auto within 30 Minute Drive

Average Weighted Job Accessibility by Auto within 30 Minutes (Measured as the Percent of Regional Employment Accessible for Each Cohort)								
	2045 Base Line - 2016 Base year				2045 Plan - 2045 Base Line			
	SCAG Region	EJA	DAC	COC	SCAG Region	EJA	DAC	COC
Seniors	-5.6%	1.3%	1.9%	1.4%	32.4%	0.4%	2.9%	2.9%
Disabled	-6.3%	0.6%	2.1%	1.5%	33.0%	0.4%	2.9%	2.9%
Poverty 1	-8.6%	-0.3%	1.7%	1.4%	31.6%	0.4%	2.9%	2.9%
Hispanic	-11.5%	-2.7%	5.8%	3.2%	35.1%	-0.6%	3.4%	3.4%
White	-3.6%	5.2%	21.0%	4.4%	27.0%	0.1%	0.8%	0.8%
African American	-20.0%	-12.7%	5.5%	-0.7%	38.1%	0.5%	4.1%	4.1%
Native American	-5.7%	1.6%	28.8%	-2.0%	27.6%	-0.2%	-1.8%	-1.8%
Asian	-7.7%	1.2%	-11.4%	-0.9%	35.0%	0.6%	3.9%	3.9%
Other Race	-5.4%	2.0%	7.1%	1.6%	30.2%	0.2%	1.4%	1.4%
Income 1	-9.3%	-0.8%	-0.8%	2.3%	34.6%	-0.4%	4.8%	4.8%
Income 2	-8.5%	-2.8%	2.2%	2.6%	33.4%	0.7%	3.4%	3.4%
Income 3	-7.8%	-0.4%	5.3%	1.9%	32.7%	0.4%	2.7%	2.7%
Income 4	-6.9%	0.1%	6.2%	2.7%	31.6%	0.2%	1.4%	1.4%
Income 5	-5.5%	0.6%	3.9%	3.6%	30.1%	0.3%	2.1%	2.1%
Average	-8.0%	-0.5%	5.7%	1.6%	32.3%	0.2%	2.5%	2.5%

TABLE 22 Comparison of Job and Shopping Accessibility By Auto Within 30 Minute Drive - Continued

Average Weighted Shopping Accessibility by Auto within 30 Minutes (Measured as the Percent of Regional Shopping Destinations Accessible for Each Cohort)								
	2045 Base Line - 2016 Base year				2045 Plan - 2045 Base Line			
	SCAG Region	EJA	DAC	COC	SCAG Region	EJA	DAC	COC
Seniors	-13.6%	-15.2%	6.3%	-16.1%	21.2%	21.0%	21.2%	19.3%
Disabled	-14.2%	-14.9%	3.8%	-16.4%	21.4%	21.6%	21.5%	22.4%
Poverty 1	-16.7%	-16.5%	6.6%	-17.8%	20.4%	20.6%	20.4%	16.4%
Hispanic	-19.0%	-17.9%	6.6%	-17.9%	23.5%	23.8%	23.8%	18.8%
White	-12.5%	-11.9%	12.7%	-11.0%	20.2%	19.2%	19.7%	12.4%
African American	-24.6%	-23.8%	8.0%	-22.0%	20.8%	19.9%	19.6%	7.7%
Native American	-14.0%	-14.5%	16.6%	-17.8%	17.2%	17.2%	17.1%	13.8%
Asian	-16.0%	-16.0%	3.1%	-16.1%	23.8%	23.7%	22.9%	19.6%
Other Race	-13.9%	-14.2%	8.1%	-14.5%	20.9%	19.4%	19.5%	11.2%
Income 1	-17.3%	-17.2%	8.4%	-18.7%	22.1%	22.2%	22.0%	14.8%
Income 2	-16.7%	-16.8%	7.4%	-17.9%	21.9%	21.9%	21.9%	15.5%
Income 3	-15.8%	-16.3%	6.6%	-16.8%	22.0%	21.9%	22.1%	16.8%
Income 4	-15.0%	-16.0%	6.2%	-16.7%	22.3%	21.9%	21.7%	17.7%
Income 5	-13.7%	-15.9%	5.7%	-16.0%	23.1%	22.1%	22.3%	17.9%
Average	-15.9%	-16.2%	7.6%	-16.8%	21.5%	21.2%	21.1%	16.0%

Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

TABLE 23 Comparison of Job and Shopping Accessibility by All Transit Within 45 Minute Ride

Average Weighted Job Accessibility by All Transit within 45 Minutes (Measured as the Percent of Regional Employment Accessible for Each Cohort)								
	2045 Base Line - 2016 Base year				2045 Plan - 2045 Base Line			
	SCAG Region	EJA	DAC	COC	SCAG Region	EJA	DAC	COC
Seniors	-29.40%	-3.50%	-5.00%	-2.50%	22.30%	34.00%	0.90%	1.30%
Disabled	-38.60%	-7.90%	-5.80%	-14.10%	18.40%	48.40%	0.30%	13.40%
Poverty 1	-43.40%	-16.40%	-17.00%	-6.40%	21.10%	35.20%	-1.70%	3.00%
Hispanic	-29.60%	-24.30%	-16.50%	-18.10%	15.30%	47.20%	-4.80%	17.60%
White	42.60%	37.20%	7.40%	29.40%	23.80%	31.50%	4.80%	0.40%
African American	-24.40%	-19.10%	-3.10%	-22.20%	16.40%	45.80%	-2.40%	5.70%
Native American	49.40%	45.70%	10.80%	19.30%	24.50%	29.10%	4.60%	-11.20%
Asian	-4.70%	-1.00%	2.40%	4.50%	22.10%	34.60%	2.30%	7.30%
Other Race	4.60%	4.10%	-3.90%	-3.00%	20.50%	37.90%	1.10%	5.40%
Income 1	-19.70%	-15.00%	-8.00%	-17.20%	18.50%	43.30%	-0.80%	16.00%
Income 2	-13.30%	-5.90%	-4.10%	-11.20%	17.70%	50.70%	-0.30%	9.70%
Income 3	-1.50%	-0.90%	-4.20%	-3.60%	20.50%	37.90%	1.10%	7.80%
Income 4	-1.60%	-1.20%	-7.10%	-3.50%	18.50%	43.30%	-0.80%	8.90%
Income 5	1.20%	1.00%	-4.80%	-2.90%	17.70%	50.70%	-0.30%	10.10%
Average	-7.70%	-0.50%	-4.20%	-3.70%	19.80%	40.70%	0.30%	6.80%

TABLE 23 Comparison of Job and Shopping Accessibility By All Transit Within 45 Minute Ride - Continued

Average Weighted Shopping Accessibility by All Transit Within 45 Minute Ride (Measured as the Percent of Regional Shopping Destinations Accessible for Each Cohort)								
	2045 Base Line - 2016 Base year				2045 Plan - 2045 Base Line			
	SCAG Region	EJA	DAC	COC	SCAG Region	EJA	DAC	COC
Seniors	8.10%	10.00%	11.60%	7.20%	3.80%	0.20%	-2.10%	-2.10%
Disabled	1.60%	1.70%	3.10%	-1.00%	1.00%	0.30%	-2.10%	-2.10%
Poverty 1	-3.50%	-10.30%	-11.00%	-5.20%	0.30%	9.80%	9.00%	-2.10%
Hispanic	-19.30%	-7.30%	1.40%	-7.20%	6.70%	0.60%	-3.20%	-3.20%
White	-2.80%	9.80%	-17.00%	17.60%	3.70%	0.70%	-9.50%	14.70%
African American	-31.70%	-23.20%	-14.80%	-10.00%	6.70%	1.40%	1.40%	12.70%
Native American	-10.60%	-2.60%	-23.30%	-0.80%	0.30%	-3.00%	-4.20%	4.30%
Asian	-7.10%	12.40%	2.80%	6.40%	22.80%	8.90%	25.70%	8.90%
Other Race	-6.70%	10.80%	-5.80%	9.40%	1.60%	-9.80%	-9.80%	-2.30%
Income 1	-13.40%	-12.00%	13.20%	-17.30%	15.70%	19.80%	16.70%	4.80%
Income 2	-11.80%	2.50%	11.60%	-6.90%	9.70%	-1.20%	-1.20%	-1.20%
Income 3	-9.00%	8.20%	0.20%	6.10%	7.80%	-5.20%	-5.20%	-1.00%
Income 4	-7.50%	9.30%	-7.70%	5.60%	3.00%	-9.10%	-9.10%	1.90%
Income 5	0.00%	16.00%	-8.90%	12.90%	7.90%	-3.40%	-3.40%	12.90%
Average	-8.10%	1.80%	-3.20%	1.20%	6.50%	0.70%	0.20%	3.30%

Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

TABLE 24 Comparison of Job and Shopping Accessibility by Local Bus within 45 Minute Ride

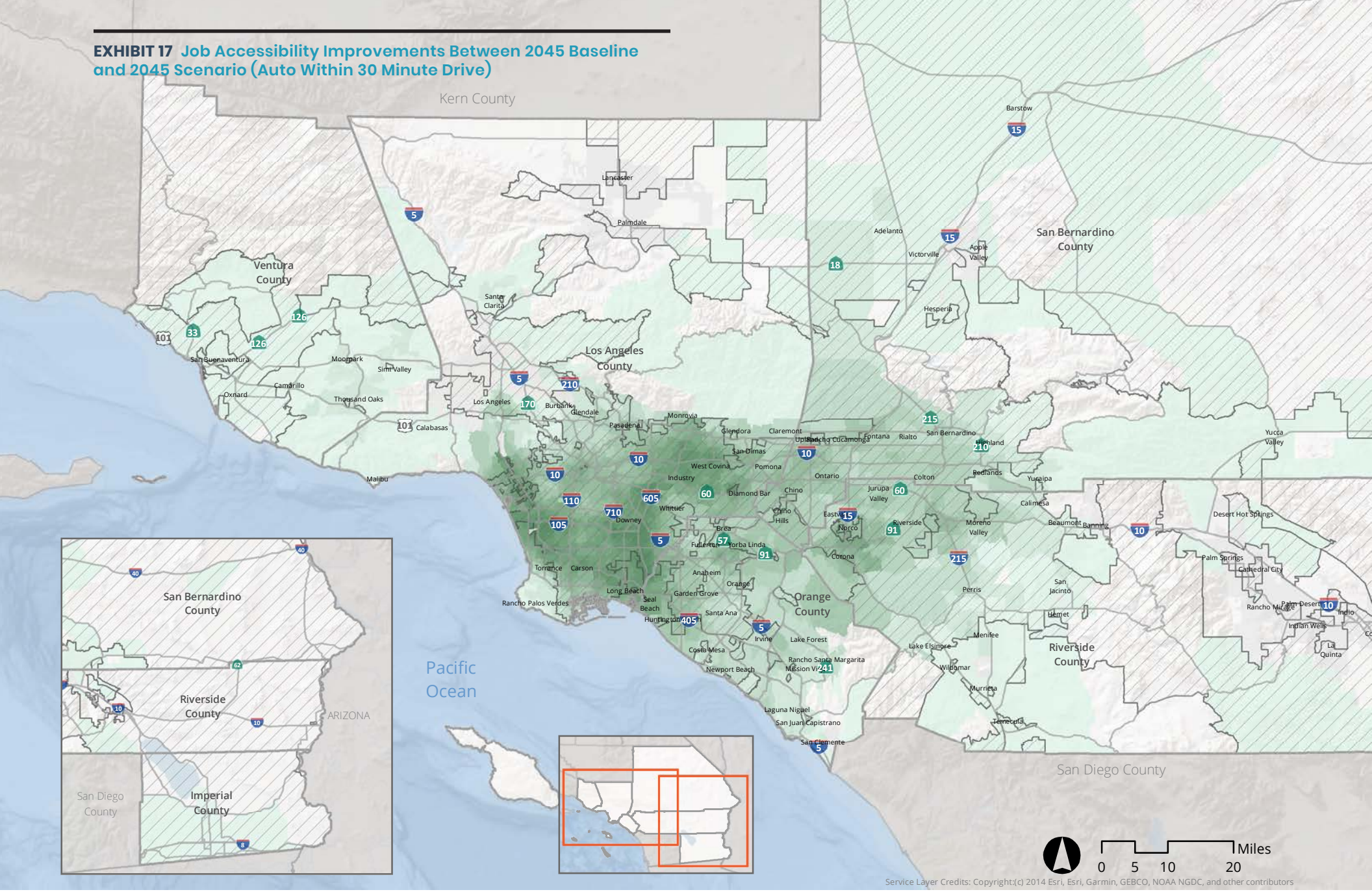
Average Weighted Job Accessibility by Local Bus within 45 Minutes (Measured as the Percent of Regional Employment Accessible for Each Cohort)								
	2045 Base Line - 2016 Base year				2045 Plan - 2045 Base Line			
	SCAG Region	EJA	DAC	COC	SCAG Region	EJA	DAC	COC
Seniors	8.2%	1.4%	-0.3%	-3.2%	7.0%	13.7%	14.7%	21.3%
Disabled	4.6%	-1.2%	-3.0%	-6.7%	3.2%	18.1%	18.0%	16.9%
Poverty 1	-0.1%	-3.6%	-4.4%	-6.5%	1.2%	-11.4%	-11.6%	12.0%
Hispanic	-14.2%	-7.9%	-8.4%	-9.5%	21.4%	20.3%	19.8%	14.4%
White	3.1%	11.0%	-21.3%	8.3%	13.4%	26.6%	30.2%	33.3%
African American	-28.2%	-23.6%	-12.5%	-18.5%	24.3%	30.5%	28.8%	22.8%
Native American	-1.8%	3.4%	-21.0%	-8.0%	8.9%	44.6%	32.8%	21.6%
Asian	-3.8%	1.8%	14.3%	-0.8%	37.3%	-4.1%	-6.8%	19.1%
Other Race	-2.2%	2.4%	-7.5%	-0.4%	14.1%	15.7%	15.9%	11.5%
Income 1	-9.9%	-6.0%	20.4%	-9.2%	29.4%	-10.6%	-11.0%	3.3%
Income 2	-6.8%	-3.0%	5.5%	-7.1%	23.7%	1.8%	2.2%	10.9%
Income 3	-4.2%	0.0%	-6.7%	-3.0%	20.5%	13.5%	15.3%	20.5%
Income 4	-2.6%	2.0%	-14.5%	-1.9%	15.1%	21.8%	25.6%	22.9%
Income 5	3.3%	8.6%	-12.7%	4.3%	18.0%	15.2%	19.3%	31.2%
Average	-3.9%	-1.0%	-5.1%	-4.5%	17.0%	14.0%	13.8%	18.7%

TABLE 24 Comparison of Job and Shopping Accessibility By Local Bus Within 45 Minute Ride - Continued

Average Weighted Shopping Accessibility by Local Bus Within 45 Minute Ride (Measured as the Percent of Regional Shopping Destinations Accessible for Each Cohort)								
	2045 Base Line - 2016 Base year				2045 Plan - 2045 Base Line			
	SCAG Region	EJA	DAC	COC	SCAG Region	EJA	DAC	COC
Seniors	2.5%	0.2%	-0.7%	-3.9%	15.5%	14.7%	15.4%	17.9%
Disabled	-1.0%	-1.8%	-2.8%	-6.7%	10.3%	16.7%	16.9%	12.4%
Poverty 1	-5.3%	-4.1%	-4.6%	-6.7%	6.8%	-9.9%	-10.5%	6.8%
Hispanic	-26.2%	-8.4%	-4.0%	-9.6%	25.7%	13.3%	14.0%	8.1%
White	-10.1%	10.8%	-25.2%	10.1%	19.4%	38.4%	36.2%	31.1%
African American	-40.4%	-26.3%	-16.1%	-23.2%	39.3%	34.1%	34.5%	44.7%
Native American	-16.1%	1.2%	-21.3%	-9.1%	15.5%	44.5%	33.0%	23.9%
Asian	-15.4%	3.0%	10.2%	2.6%	41.9%	-0.4%	-3.8%	19.0%
Other Race	-15.0%	2.0%	-12.1%	-0.6%	20.5%	23.0%	21.1%	15.1%
Income 1	-22.4%	-6.5%	17.7%	-9.3%	35.7%	-7.8%	-8.8%	3.5%
Income 2	-20.3%	-4.3%	4.4%	-8.0%	30.0%	3.2%	3.4%	9.0%
Income 3	-17.1%	-0.8%	-8.3%	-3.6%	26.8%	15.7%	17.2%	17.9%
Income 4	-15.3%	1.1%	-15.2%	-3.0%	20.7%	24.0%	26.0%	20.1%
Income 5	-8.5%	8.8%	-14.9%	3.6%	25.0%	20.9%	22.1%	30.7%
Average	-15.0%	-1.8%	-6.6%	-4.8%	23.8%	16.5%	15.5%	18.6%

Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

EXHIBIT 17 Job Accessibility Improvements Between 2045 Baseline and 2045 Scenario (Auto Within 30 Minute Drive)



County Boundaries City Boundaries Freeway

Less Improvements to Employment Accessibility

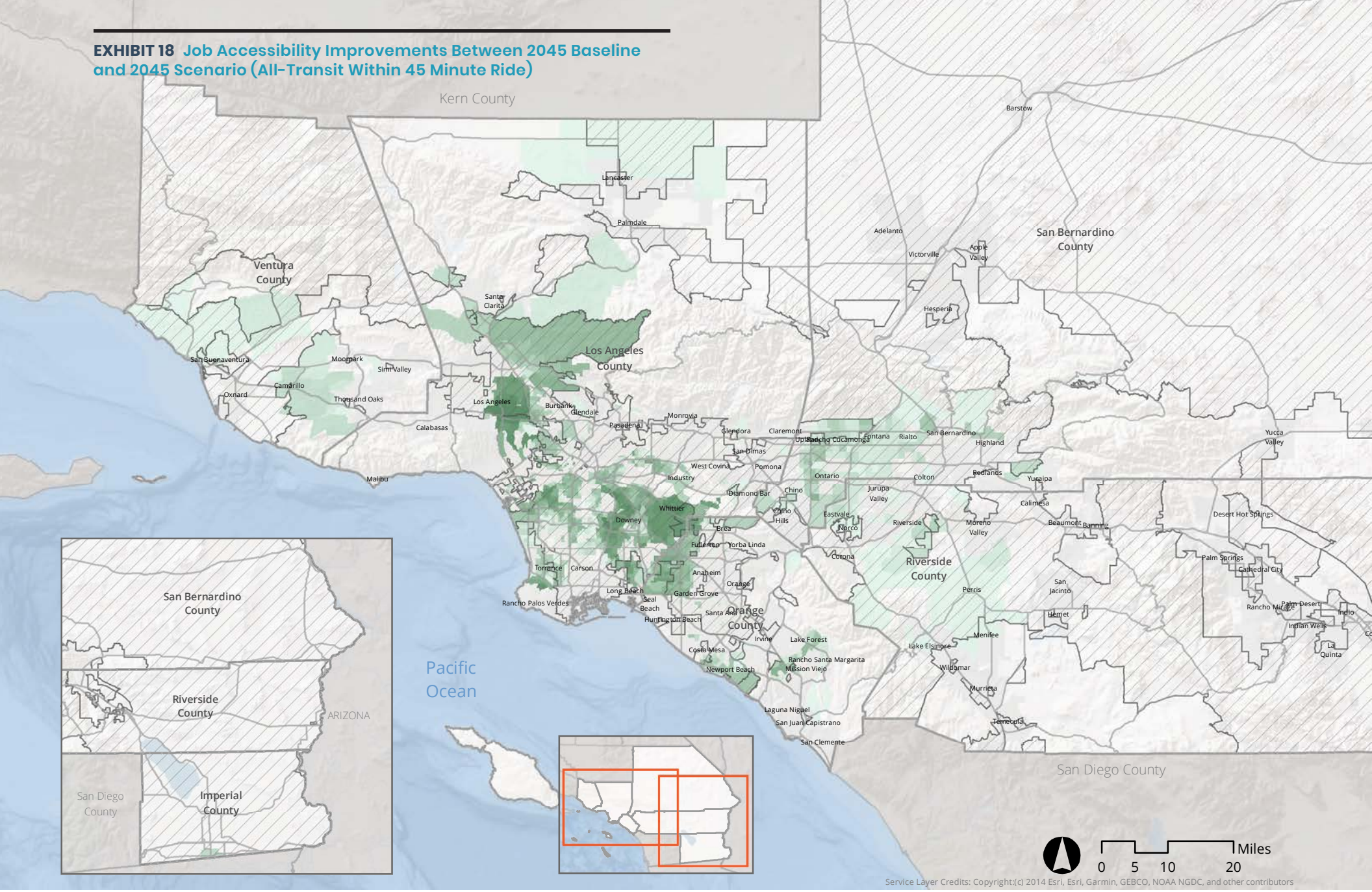
Greatest Improvements to Employment Accessibility

Source: SCAG, 2020

* Includes Environmental Justice Areas, SB535 Disadvantaged Communities, and Communities of Concern.

** Change in Job Accessibility by Auto within a 30 minute drive between 2045 Baseline and Plan.

EXHIBIT 18 Job Accessibility Improvements Between 2045 Baseline and 2045 Scenario (All-Transit Within 45 Minute Ride)



EJ Cohort Boundary* | County Boundaries | City Boundaries | Freeway

Less Improvements to Employment Accessibility

Greatest Improvements to Employment Accessibility

Source: SCAG, 2020

* Includes Environmental Justice Areas, SB535 Disadvantaged Communities, and Communities of Concern.

** Change in Job Accessibility by all transit within a 45 minute ride between 2045 Baseline and Plan.

ACCESSIBILITY TO PARKS AND EDUCATION FACILITIES CI CO LU OS

Local parks and other natural lands are important amenities for residents' quality of life. Residents who live near parks have easier access to recreation and other outdoor activities (e.g. walking, biking, hiking, etc.). The SCAG region is diverse in its open space resources and offers a wide variety of public parks as well as national parks, state parks, and numerous county parks. Not all parks are created equal, however, and many neighborhoods do not have access to a variety of public resources (**EXHIBIT 19** and **EXHIBIT 20**). For instance, some neighborhoods have more natural lands, some parks are better maintained, some are built so that those with disabilities can enjoy them, and some parks are safer. SCAG conducted additional analysis on accessibility to parks for Connect SoCal to gauge how the Plan improves residents' ability to reach parks within a given travel time and within short distances.

METHODOLOGY

Two types of parks were considered for this analysis: 1) local parks and 2) state and national parks. To begin, the acreage of parks was identified for each TAZ using available land use data from SCAG's Existing Land Use Dataset and the California Protected Areas Database (CPAD). Similar to the method for measuring job accessibility, the underlying assumption in this exercise is that the more acreage of parks that can be reached within a certain travel time and cost, the greater the park accessibility is within a community. Park accessibility is therefore defined as the percentage of regional park acreage reachable within three (3) transportation options: 30 minutes by auto, 45 minutes by local bus and 45 minutes for all transit modes. SCAG's existing typical weekday travel assumptions were used for the analysis, as there is currently no weekend transportation model for the region. Park accessibility is further calculated for each area of concern, including the greater SCAG region, EJA, DAC, and COC by using Geographic Information System (GIS) and Statistical Analysis Software (SAS).

RESULTS

TABLE 25 and **TABLE 26** show that the overall accessibility to parks and natural lands will improve as a result of the Plan, both for the region as a whole and also for our areas of concern. **TABLE 27** - **TABLE 29** show the rate of improvement between the Base Year, Baseline, and Plan for each cohort and across geographies.

When looking at various travel modes, results show that local parks and other natural lands are less accessible by public transportation than by automobile. When considering just natural lands, there is very limited access to national and state parks via transit modes. This observation is consistent with the conclusions of Connect SoCal EJ Technical Report that there is a near complete lack of public transportation services into, in particular, the National Forests. To further analyze the opportunity for residents to access natural lands via transit modes, SCAG staff performed an analysis to investigate the accessibility to the San Gabriel National Monument via public transportation. With the implementation of the Plan, fortunately, accessibility to local parks and other natural lands will increase more for public transit modes than for automobiles at all levels of analysis.

FIGURE 11 - **FIGURE 16** detail the improvements to park accessibility resulting from Connect SoCal, and show that disabled people and households in poverty will have some of the highest improvements in terms of park accessibility. When looking at race/ethnicity, African Americans, Native Americans, and Hispanics generally have slightly higher improvements in local park accessibility when comparing the impacts of the Plan to the Baseline. Asians, Native Americans and those identifying as "Other Race" generally have the next highest level of improvements.

PROXIMITY TO PARKS AND SCHOOLS

In the 2016 RTP/SCS, SCAG examined the proportions of populations within one and two miles of local parks and other natural lands areas. In that analysis, data on local parks was obtained from SCAG's Existing Land Use Database and the California Protected Area Database (CPAD). CPAD was also

used for geographic data on "other natural lands," which consists of parks that are maintained by state and federal authorities.

Key findings from that analysis suggests that proportions of the households in income Quintile 5 and Quintile 4 had a slightly higher share within the study areas than other household income quintiles. Moreover, Asian, White and Hispanic populations had higher shares than other population groups. Disabled and elderly populations have also yielded higher share than other populations in need. The analysis also tested how the implementation of the plan would impact the environmental justice populations when compared to the Base year and Baseline trends. The analysis from the 2016 RTP/SCS suggested that the implementation of the plan would warrant positive changes to nearly all the environmental justice populations.

Proximity to Educational facilities was also evaluated in the 2016 RTP/SCS analysis. The proportions of environmental justice populations were calculated within one-mile and two-mile distance from all educational institutions for the Base Year, Baseline and Plan scenarios. The environmental justice population within a one-mile and two-mile from schools seemed to be similar with the analysis for parks and other natural lands: household income Quintiles 5 and 4 had a slightly higher share within the study areas than other household income quintiles. Moreover, Asians, Whites and Hispanics had a higher share than other population groups. Disabled and elderly groups, and children age 5-14 also yielded a higher share than other populations.

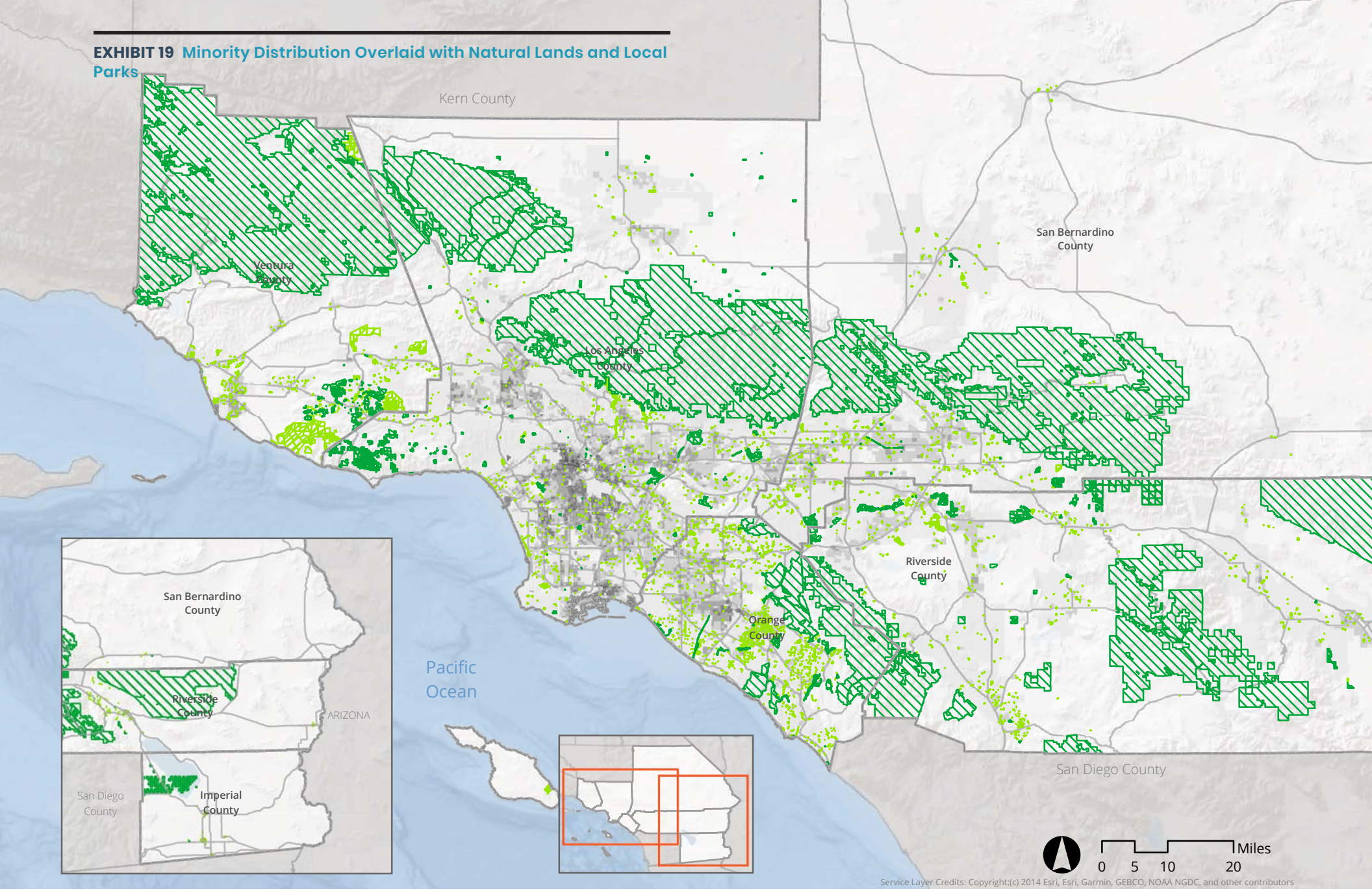
Similar to the parks proximity analysis, the proportions of environmental justice populations within a one-mile and two-mile distance from schools were further calculated to determine the population change for future years. The results suggested that the proportion of young children aged 0-4, seniors (age 65+), households in poverty (Poverty 1), African Americans, Asians, Other Races and households in income Quintile 4 and 5, on average, would garner higher improvement within a one-mile and two-mile distance across EJA, DAC, and COC Areas if the 2016 RTP/SCS plan were to be implemented. For more information on the Proximity to Parks and Schools analysis, as part of the 2016 RTP/SCS, please visit SCAG official website.

ACCESSIBILITY TO THE SAN GABRIEL NATIONAL MONUMENT

Historically, SCAG has analyzed accessibility to parks as part of its environmental justice analysis for the RTP/SCS. In the 2016 RTP/SCS, accessibility to the San Gabriel National Monument was conducted as a case study to better understand the connection between Southern California's public transportation and our national and federal lands. Results show that there is currently no direct transit access to the National Monument. However, the relative proximity of both Metro Gold Line and Metrolink service to the National Monument present significant opportunities for future transit connections.

The results show that that there is no readily available access to the San Gabriel National Monument by transit and walking. By bicycle, using a three-mile threshold, there are transit stops with accessibility, yet there are limitations by transit schedule, weekday and especially on the weekend. These findings are consistent with the conclusions of the 2008 and 2012 Regional Transportation Plan environmental justice reports, indicating that access to national and state parks by public transportation in the region is very limited. Staff will continue to work with transit agencies and stakeholders to promote and enhance park and natural lands accessibility through public transit and other transportation options in the development of the Connect SoCal Plan. For more information on the San Gabriel National Monument accessibility study, as part of the 2016 RTP/SCS, please visit SCAG official website.

EXHIBIT 19 Minority Distribution Overlaid with Natural Lands and Local Parks



State & Federal Natural Lands

Local Parks

County Boundaries

City Boundaries

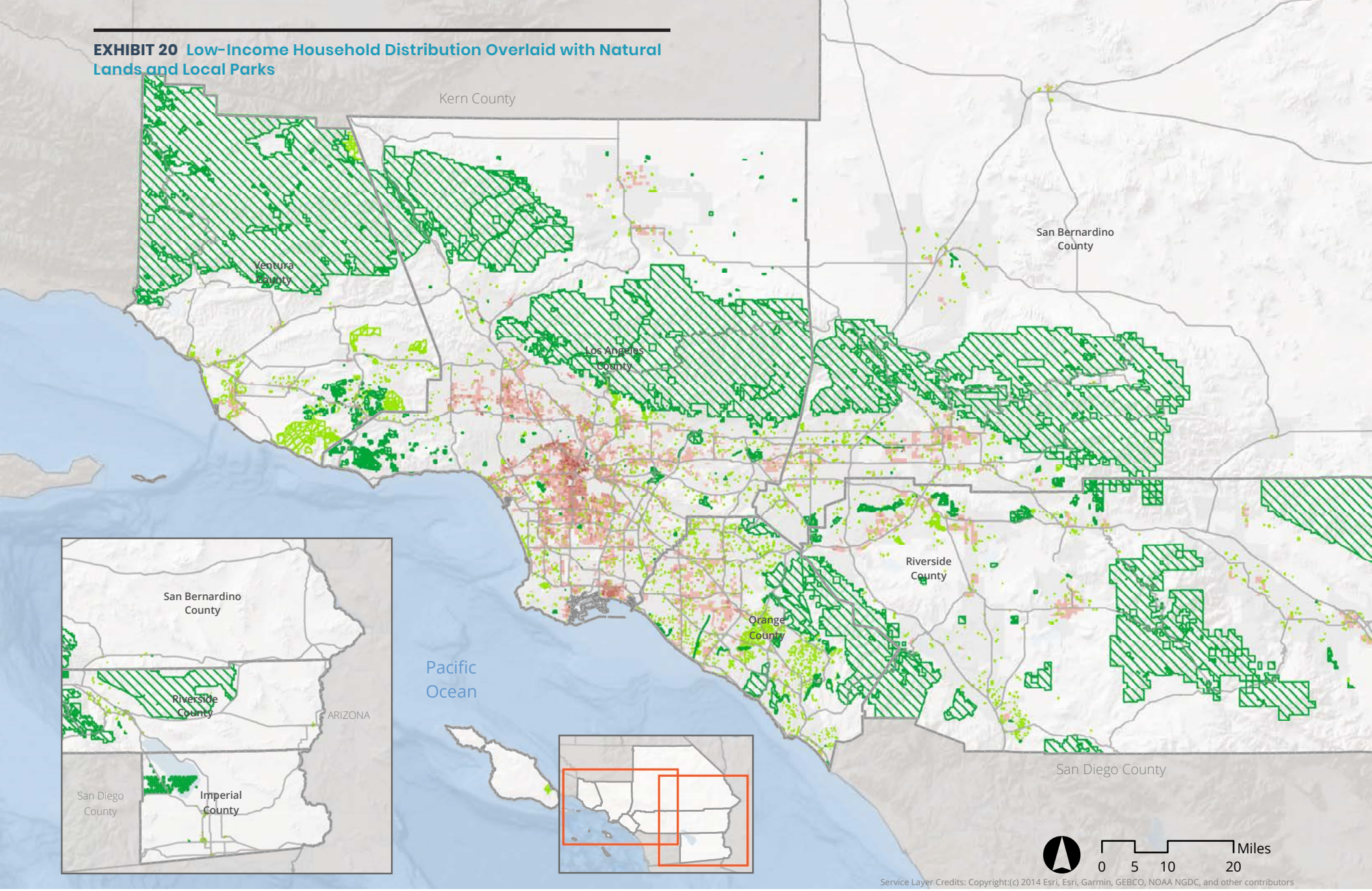
Freeway

Minority Population Density

Low — High

Source: SCAG, 2020, California Protected Areas Database, 2017; California Conservation Easement Database, 2016

EXHIBIT 20 Low-Income Household Distribution Overlaid with Natural Lands and Local Parks



State & Federal Natural Lands

Local Parks

County Boundaries

City Boundaries

Freeway

Low-Income Household Density

Low — High

Source: SCAG, 2020, California Protected Areas Database, 2017; California Conservation Easement Database, 2016

TABLE 25 Local Park Accessibility by Transportation Options and EJ Variables

Average Weighted Local Park Accessibility by Auto within 30 Minutes (Measured as the Share of the Region's Local Park Acreage Accessible for Each Cohort)												
	SCAG (BY)	SCAG (BL)	SCAG (PL)	EJA (BY)	EJA (BL)	EJA (PL)	DAC (BY)	DAC (BL)	DAC (PL)	COC (BY)	COC (BL)	COC (PL)
Seniors	7.80%	7.20%	8.10%	7.30%	6.70%	7.70%	6.30%	6.90%	8.10%	6.90%	6.10%	7.80%
Disabled	7.70%	7.00%	8.10%	7.30%	6.60%	7.80%	6.20%	6.90%	8.10%	6.90%	6.00%	7.80%
Poverty 1	7.10%	6.40%	7.40%	7.00%	6.20%	7.30%	6.30%	6.40%	7.60%	6.70%	5.80%	7.80%
Hispanic	8.00%	7.20%	8.40%	7.90%	7.00%	8.40%	6.90%	7.20%	8.60%	7.00%	6.10%	8.40%
White	7.70%	7.10%	7.80%	6.80%	6.10%	6.90%	5.80%	6.70%	7.60%	7.20%	6.30%	7.30%
African American	6.60%	6.10%	7.20%	6.50%	6.10%	7.30%	6.00%	6.60%	7.90%	6.00%	5.60%	7.70%
Native American	6.90%	6.10%	6.70%	6.50%	5.70%	6.40%	5.60%	6.50%	7.40%	6.80%	5.80%	7.30%
Asian	8.30%	7.20%	8.30%	8.10%	7.00%	8.20%	6.90%	7.10%	8.30%	7.60%	6.50%	8.10%
Other Race	7.60%	6.70%	7.60%	7.10%	6.30%	7.20%	6.10%	6.70%	7.80%	6.80%	5.90%	7.50%
Income 1	6.90%	6.10%	7.10%	6.80%	6.00%	7.10%	5.90%	6.30%	7.50%	6.60%	5.70%	7.30%
Income 2	7.40%	6.50%	7.60%	7.20%	6.40%	7.60%	6.20%	6.70%	8.00%	6.80%	5.90%	7.70%
Income 3	7.60%	6.80%	7.80%	7.50%	6.60%	7.80%	6.40%	6.90%	8.20%	7.00%	6.00%	7.90%
Income 4	7.90%	7.20%	8.20%	7.60%	6.80%	8.00%	6.60%	7.10%	8.30%	7.10%	6.20%	8.00%
Income 5	8.00%	7.40%	8.20%	7.40%	6.60%	7.70%	6.40%	6.90%	8.00%	6.90%	6.10%	7.70%
Average	7.50%	6.80%	7.80%	7.20%	6.40%	7.50%	6.20%	6.80%	8.00%	6.90%	6.00%	7.70%

TABLE 25 Local Park Accessibility by Transportation Options and EJ Variables - Continued

Average Weighted Local Park Accessibility by All Transit within 45 Minutes (Measured as the Share of the Region's Local Park Acreage Accessible for Each Cohort)												
	SCAG (BY)	SCAG (BL)	SCAG (PL)	EJA (BY)	EJA (BL)	EJA (PL)	DAC (BY)	DAC (BL)	DAC (PL)	COC (BY)	COC (BL)	COC (PL)
Seniors	0.23%	0.23%	0.23%	0.27%	0.28%	0.23%	0.28%	0.27%	0.28%	0.30%	0.31%	0.30%
Disabled	0.24%	0.24%	0.24%	0.28%	0.28%	0.24%	0.28%	0.28%	0.28%	0.31%	0.32%	0.31%
Poverty 1	0.28%	0.26%	0.27%	0.30%	0.30%	0.27%	0.31%	0.30%	0.30%	0.35%	0.34%	0.33%
Hispanic	0.23%	0.23%	0.23%	0.29%	0.30%	0.23%	0.27%	0.29%	0.29%	0.32%	0.32%	0.30%
White	0.18%	0.17%	0.17%	0.24%	0.24%	0.17%	0.29%	0.23%	0.24%	0.25%	0.26%	0.30%
African American	0.26%	0.25%	0.25%	0.34%	0.34%	0.25%	0.25%	0.34%	0.34%	0.40%	0.31%	0.30%
Native American	0.19%	0.18%	0.18%	0.25%	0.25%	0.18%	0.28%	0.26%	0.26%	0.31%	0.30%	0.29%
Asian	0.22%	0.21%	0.22%	0.27%	0.28%	0.22%	0.28%	0.27%	0.28%	0.27%	0.28%	0.32%
Other Race	0.20%	0.20%	0.20%	0.27%	0.27%	0.20%	0.28%	0.27%	0.27%	0.30%	0.31%	0.30%
Income 1	0.23%	0.22%	0.23%	0.29%	0.29%	0.23%	0.27%	0.30%	0.30%	0.34%	0.31%	0.30%
Income 2	0.22%	0.22%	0.22%	0.29%	0.29%	0.22%	0.27%	0.29%	0.29%	0.33%	0.31%	0.30%
Income 3	0.21%	0.21%	0.21%	0.28%	0.28%	0.21%	0.27%	0.27%	0.27%	0.31%	0.31%	0.30%
Income 4	0.21%	0.20%	0.20%	0.27%	0.28%	0.20%	0.27%	0.26%	0.27%	0.29%	0.29%	0.30%
Income 5	0.18%	0.18%	0.18%	0.25%	0.26%	0.18%	0.28%	0.25%	0.25%	0.27%	0.28%	0.30%
Average	0.22%	0.21%	0.22%	0.28%	0.28%	0.22%	0.28%	0.28%	0.28%	0.31%	0.30%	0.30%

TABLE 25 Local Park Accessibility by Transportation Options and EJ Variables - Continued

Average Weighted Local Park Accessibility by Local Bus within 45 Minutes (Measured as the Share of the Region's Local Park Acreage Accessible for Each Cohort)												
	SCAG (BY)	SCAG (BL)	SCAG (PL)	EJA (BY)	EJA (BL)	EJA (PL)	DAC (BY)	DAC (BL)	DAC (PL)	COC (BY)	COC (BL)	COC (PL)
Seniors	0.24%	0.24%	0.27%	0.29%	0.28%	0.31%	0.29%	0.28%	0.31%	0.32%	0.31%	0.34%
Disabled	0.25%	0.25%	0.32%	0.29%	0.28%	0.31%	0.30%	0.29%	0.31%	0.33%	0.32%	0.34%
Poverty 1	0.29%	0.27%	0.29%	0.32%	0.30%	0.31%	0.33%	0.31%	0.31%	0.36%	0.34%	0.37%
Hispanic	0.25%	0.23%	0.26%	0.31%	0.30%	0.31%	0.28%	0.30%	0.31%	0.34%	0.32%	0.33%
White	0.19%	0.18%	0.19%	0.25%	0.24%	0.31%	0.30%	0.24%	0.31%	0.27%	0.27%	0.32%
African American	0.29%	0.25%	0.30%	0.36%	0.34%	0.31%	0.28%	0.35%	0.31%	0.43%	0.41%	0.33%
Native American	0.20%	0.18%	0.20%	0.26%	0.25%	0.31%	0.29%	0.28%	0.31%	0.33%	0.31%	0.31%
Asian	0.24%	0.22%	0.26%	0.29%	0.28%	0.31%	0.29%	0.27%	0.31%	0.29%	0.29%	0.36%
Other Race	0.22%	0.20%	0.23%	0.29%	0.27%	0.31%	0.29%	0.28%	0.31%	0.32%	0.31%	0.32%
Income 1	0.25%	0.22%	0.26%	0.31%	0.29%	0.31%	0.29%	0.30%	0.31%	0.36%	0.33%	0.34%
Income 2	0.24%	0.22%	0.25%	0.31%	0.29%	0.31%	0.29%	0.30%	0.31%	0.35%	0.32%	0.34%
Income 3	0.23%	0.21%	0.24%	0.29%	0.28%	0.31%	0.29%	0.28%	0.31%	0.32%	0.30%	0.33%
Income 4	0.22%	0.21%	0.23%	0.28%	0.28%	0.31%	0.29%	0.27%	0.31%	0.30%	0.29%	0.33%
Income 5	0.20%	0.19%	0.20%	0.27%	0.26%	0.31%	0.29%	0.26%	0.31%	0.28%	0.28%	0.33%
Average	0.24%	0.22%	0.25%	0.29%	0.28%	0.31%	0.29%	0.29%	0.31%	0.33%	0.31%	0.33%

Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

TABLE 26 Other Natural Lands Accessibility by Transportation Options and EJ Variables (Measured as a Share of the Region's Natural Lands Acreage Accessible for Each Cohort)

Average Weighted Other Natural Lands Accessibility by Auto within 30 Minutes (Measured as the Share of the Region's Other Natural Lands Acreage Accessible for Each Cohort)												
	SCAG (BY)	SCAG (BL)	SCAG (PL)	EJA (BY)	EJA (BL)	EJA (PL)	DAC (BY)	DAC (BL)	DAC (PL)	COC (BY)	COC (BL)	COC (PL)
Seniors	1.52%	1.41%	1.62%	1.44%	1.33%	1.46%	1.18%	1.07%	1.19%	1.15%	1.15%	0.99%
Disabled	1.58%	1.51%	1.69%	1.49%	1.41%	1.54%	1.22%	1.17%	1.30%	1.21%	1.25%	1.02%
Poverty 1	1.52%	1.51%	1.67%	1.39%	1.34%	1.44%	1.26%	1.11%	1.20%	1.16%	1.21%	1.03%
Hispanic	1.57%	1.54%	1.72%	1.51%	1.46%	1.57%	1.48%	1.23%	1.34%	1.24%	1.28%	1.33%
White	1.54%	1.47%	1.61%	1.74%	1.63%	1.75%	1.65%	1.22%	1.32%	1.60%	1.51%	1.29%
African American	1.10%	1.39%	1.44%	0.98%	1.22%	1.33%	1.23%	1.10%	1.22%	0.60%	0.99%	1.11%
Native American	1.62%	1.59%	1.81%	1.57%	1.52%	1.68%	1.55%	1.19%	1.32%	1.43%	1.42%	1.23%
Asian	0.89%	0.87%	1.02%	0.76%	0.75%	0.85%	0.75%	0.75%	0.85%	0.70%	0.67%	0.77%
Other Race	1.27%	1.24%	1.34%	1.32%	1.24%	1.35%	1.26%	1.07%	1.17%	1.12%	1.08%	1.10%
Income 1	1.41%	1.42%	1.55%	1.33%	1.30%	1.37%	1.32%	1.06%	1.11%	1.05%	1.13%	1.08%
Income 2	1.54%	1.52%	1.69%	1.45%	1.39%	1.50%	1.41%	1.12%	1.23%	1.21%	1.23%	1.19%
Income 3	1.46%	1.45%	1.62%	1.38%	1.35%	1.44%	1.36%	1.12%	1.19%	1.16%	1.22%	1.16%
Income 4	1.41%	1.38%	1.55%	1.37%	1.31%	1.44%	1.33%	1.11%	1.22%	1.13%	1.17%	1.17%
Income 5	1.29%	1.29%	1.41%	1.34%	1.32%	1.42%	1.34%	1.10%	1.16%	1.11%	1.18%	1.11%
Average	1.41%	1.40%	1.55%	1.36%	1.33%	1.44%	1.31%	1.10%	1.20%	1.13%	1.18%	1.11%

TABLE 26 Other Natural Lands Accessibility by Transportation Options and EJ Variables (Measured as a Share of the Region's Natural Lands Acreage Accessible for Each Cohort) - Continued

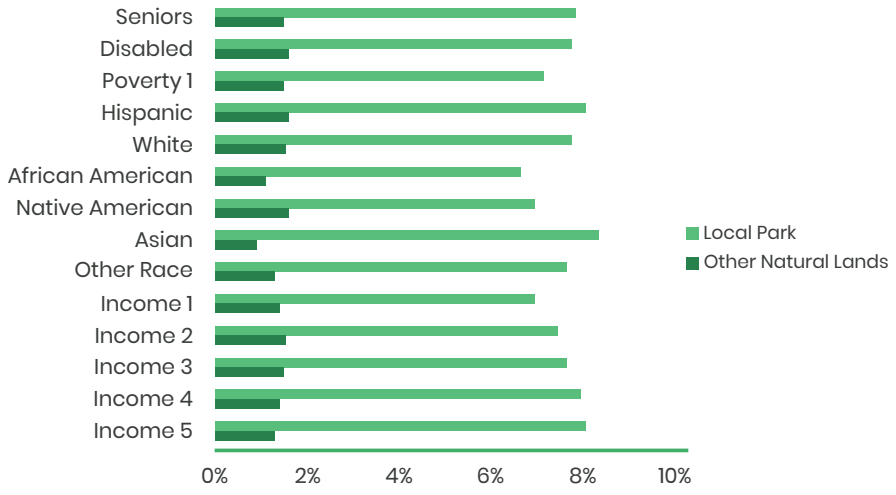
Average Weighted Other Natural Lands Accessibility by All Transit within 45 Minutes (Measured as the Share of the Region's Other Natural Lands Acreage Accessible for Each Cohort)												
	SCAG (BY)	SCAG (BL)	SCAG (PL)	EJA (BY)	EJA (BL)	EJA (PL)	DAC (BY)	DAC (BL)	DAC (PL)	COC (BY)	COC (BL)	COC (PL)
Seniors	0.24%	0.25%	0.25%	0.25%	0.26%	0.25%	0.16%	0.16%	0.14%	0.28%	0.24%	0.24%
Disabled	0.31%	0.30%	0.30%	0.32%	0.32%	0.30%	0.19%	0.19%	0.16%	0.33%	0.28%	0.28%
Poverty 1	0.25%	0.26%	0.26%	0.24%	0.25%	0.26%	0.14%	0.16%	0.13%	0.25%	0.23%	0.24%
Hispanic	0.29%	0.24%	0.24%	0.34%	0.32%	0.24%	0.19%	0.21%	0.19%	0.41%	0.29%	0.30%
White	0.21%	0.20%	0.21%	0.30%	0.35%	0.21%	0.16%	0.13%	0.09%	0.17%	0.20%	0.29%
African American	0.18%	0.12%	0.12%	0.19%	0.16%	0.12%	0.10%	0.08%	0.06%	0.11%	0.12%	0.16%
Native American	0.24%	0.24%	0.25%	0.33%	0.29%	0.25%	0.10%	0.13%	0.13%	0.22%	0.23%	0.35%
Asian	0.15%	0.19%	0.21%	0.14%	0.19%	0.21%	0.26%	0.10%	0.10%	0.14%	0.17%	0.23%
Other Race	0.20%	0.19%	0.19%	0.27%	0.29%	0.19%	0.15%	0.13%	0.10%	0.22%	0.24%	0.32%
Income 1	0.20%	0.21%	0.22%	0.22%	0.24%	0.22%	0.18%	0.14%	0.12%	0.23%	0.25%	0.26%
Income 2	0.22%	0.22%	0.22%	0.26%	0.26%	0.22%	0.21%	0.14%	0.12%	0.26%	0.25%	0.31%
Income 3	0.20%	0.21%	0.22%	0.25%	0.26%	0.22%	0.20%	0.14%	0.12%	0.23%	0.26%	0.34%
Income 4	0.23%	0.23%	0.23%	0.28%	0.29%	0.23%	0.20%	0.16%	0.13%	0.29%	0.29%	0.32%
Income 5	0.20%	0.20%	0.20%	0.28%	0.29%	0.20%	0.25%	0.14%	0.12%	0.18%	0.21%	0.30%
Average	0.22%	0.22%	0.22%	0.26%	0.27%	0.22%	0.18%	0.14%	0.12%	0.24%	0.23%	0.28%

TABLE 26 Other Natural Lands Accessibility by Transportation Options and EJ Variables (Measured as a Share of the Region's Natural Lands Acreage Accessible for Each Cohort) - Continued

Average Weighted Other Natural Lands Accessibility by Local Bus within 45 Minutes (Measured as the Share of the Region's Other Natural Lands Acreage Accessible for Each Cohort)												
	SCAG (BY)	SCAG (BL)	SCAG (PL)	EJA (BY)	EJA (BL)	EJA (PL)	DAC (BY)	DAC (BL)	DAC (PL)	COC (BY)	COC (BL)	COC (PL)
Seniors	0.24%	0.23%	0.25%	0.27%	0.27%	0.34%	0.18%	0.18%	0.26%	0.29%	0.28%	0.43%
Disabled	0.32%	0.26%	0.03%	0.34%	0.32%	0.34%	0.22%	0.20%	0.26%	0.34%	0.31%	0.49%
Poverty 1	0.26%	0.25%	0.29%	0.27%	0.26%	0.34%	0.18%	0.18%	0.26%	0.26%	0.27%	0.42%
Hispanic	0.31%	0.28%	0.42%	0.36%	0.33%	0.34%	0.21%	0.23%	0.26%	0.40%	0.37%	0.38%
White	0.24%	0.25%	0.29%	0.35%	0.36%	0.34%	0.20%	0.16%	0.26%	0.18%	0.19%	0.39%
African American	0.20%	0.16%	0.17%	0.20%	0.16%	0.34%	0.20%	0.09%	0.26%	0.12%	0.11%	0.51%
Native American	0.27%	0.25%	0.36%	0.34%	0.29%	0.34%	0.12%	0.15%	0.26%	0.22%	0.22%	0.45%
Asian	0.17%	0.20%	0.34%	0.16%	0.20%	0.34%	0.28%	0.13%	0.26%	0.14%	0.16%	0.39%
Other Race	0.24%	0.25%	0.28%	0.31%	0.30%	0.34%	0.20%	0.16%	0.26%	0.22%	0.23%	0.40%
Income 1	0.24%	0.24%	0.35%	0.26%	0.26%	0.34%	0.21%	0.17%	0.26%	0.24%	0.23%	0.35%
Income 2	0.25%	0.24%	0.36%	0.28%	0.27%	0.34%	0.23%	0.17%	0.26%	0.26%	0.24%	0.39%
Income 3	0.23%	0.23%	0.34%	0.28%	0.27%	0.34%	0.23%	0.16%	0.26%	0.23%	0.25%	0.42%
Income 4	0.26%	0.25%	0.36%	0.31%	0.30%	0.34%	0.25%	0.18%	0.26%	0.31%	0.28%	0.43%
Income 5	0.23%	0.23%	0.29%	0.33%	0.30%	0.34%	0.28%	0.18%	0.26%	0.20%	0.21%	0.40%
Average	0.25%	0.24%	0.30%	0.29%	0.28%	0.34%	0.21%	0.17%	0.26%	0.24%	0.24%	0.42%

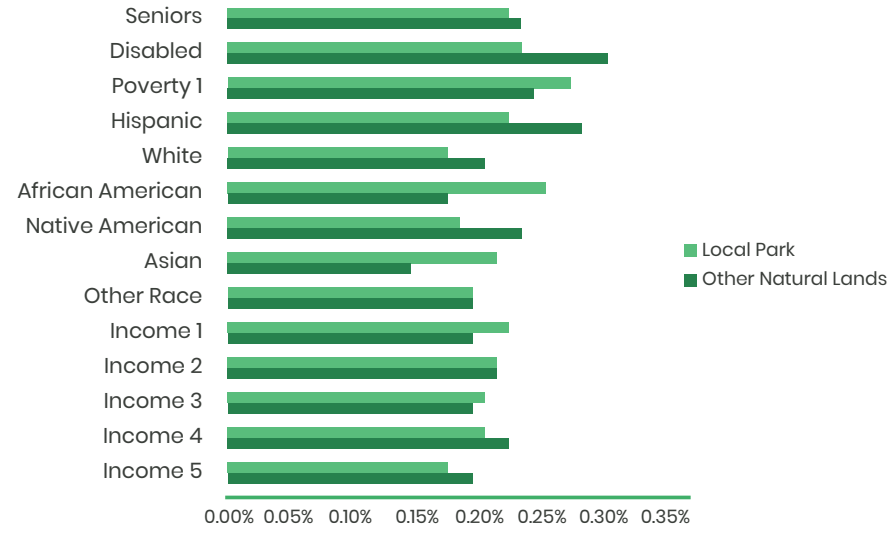
Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

FIGURE 11 Park Accessibility by Auto Within 30 Minutes of Travel (2016)



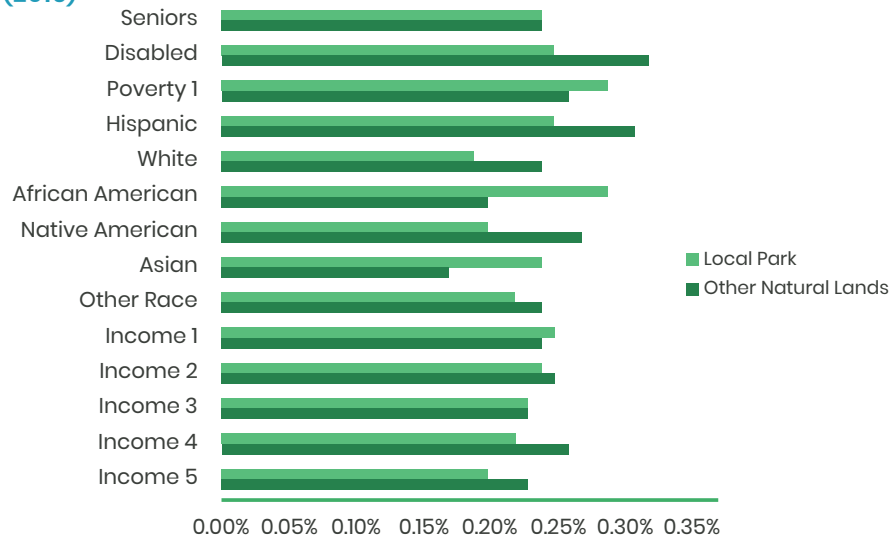
Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

FIGURE 12 Park Accessibility by All Transit Within 45 Minutes of Travel (2016)



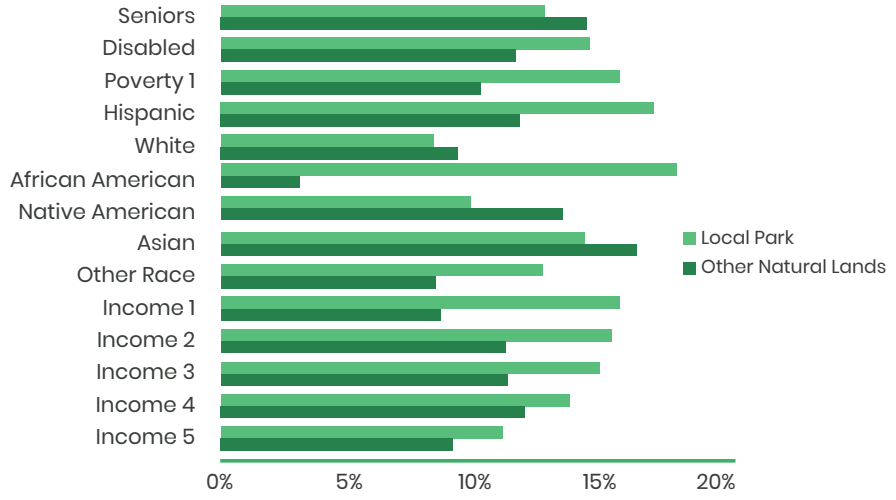
Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

FIGURE 13 Park Accessibility by Local Bus Within 45 Minutes of Travel (2016)



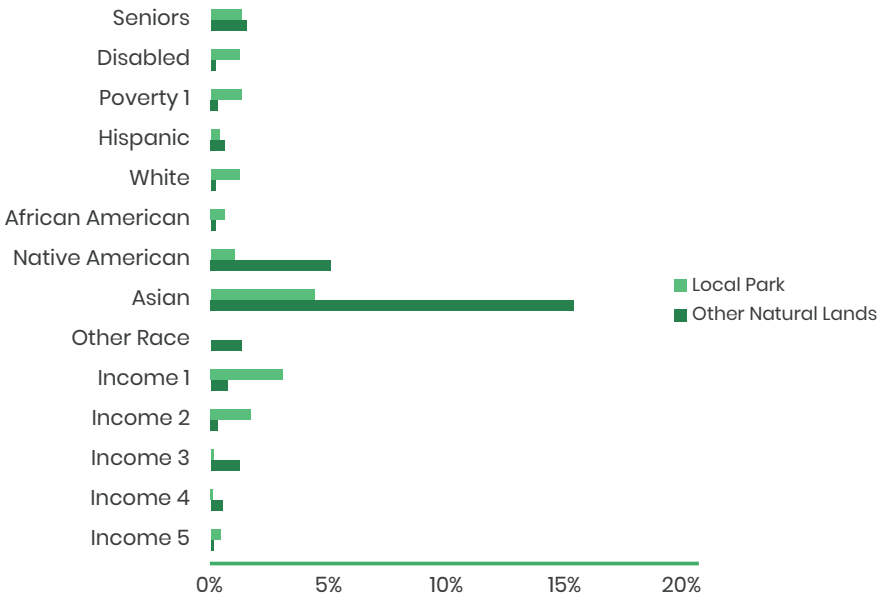
Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

FIGURE 14 Improvements in Park Accessibility by Auto Within 30 Minutes of Travel (2045)



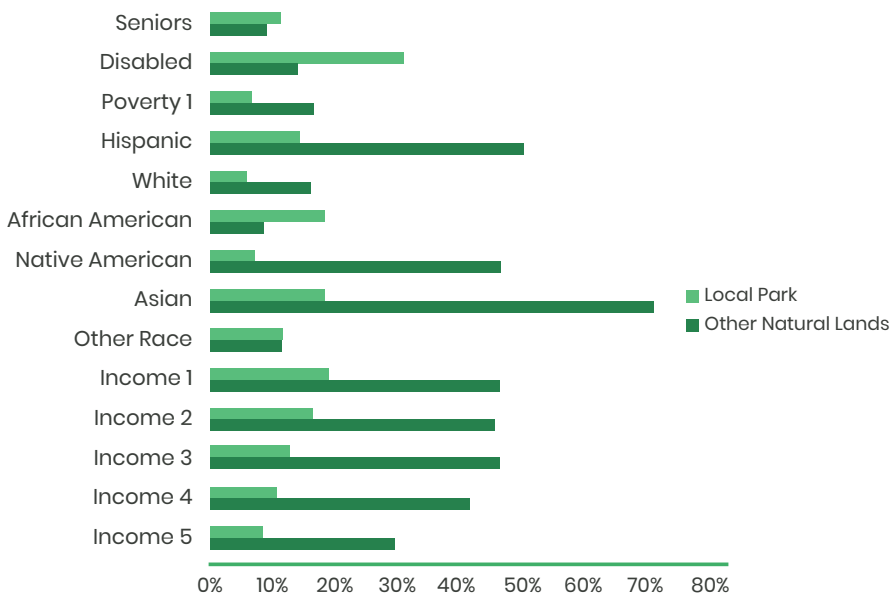
Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

FIGURE 15 Improvements in Park Accessibility by All Transit Within 45 Minutes of Travel (2045)



Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

FIGURE 16 Improvements in Park Accessibility by Local Bus Within 45 Minutes of Travel (2045)



Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

TABLE 27 Comparison of Local Park and Other Natural Lands Accessibility by Auto and EJ Variables

Comparison of Weighted Local Park Accessibility by Auto within 30 Minutes (Measured as the Share of the Region's Local Park Acreage Accessible for Each Cohort)								
	2045 Base Line - 2016 Base year				2045 Plan - 2045 Base Line			
	SCAG Region	EJA	DAC	COC	SCAG	EJA	DAC	COC
Seniors	-7.60%	-8.30%	10.20%	-11.60%	13.10%	16.30%	16.90%	28.60%
Disabled	-8.30%	-9.40%	10.20%	-12.10%	14.90%	17.80%	18.10%	29.70%
Poverty 1	-10.60%	-11.50%	2.80%	-13.40%	16.10%	18.50%	18.60%	34.20%
Hispanic	-10.30%	-11.50%	4.60%	-12.90%	17.50%	20.00%	20.30%	36.40%
White	-7.60%	-10.80%	16.00%	-12.50%	8.60%	12.80%	13.40%	15.40%
African American	-7.10%	-5.60%	10.50%	-5.70%	18.40%	19.40%	18.80%	36.10%
Native American	-11.30%	-12.80%	17.60%	-13.80%	10.10%	13.30%	13.20%	24.80%
Asian	-12.80%	-13.90%	2.70%	-15.10%	14.70%	17.30%	18.20%	25.80%
Other Race	-11.00%	-12.30%	10.30%	-13.60%	13.00%	15.70%	16.50%	27.40%
Income 1	-11.20%	-11.60%	7.60%	-14.50%	16.10%	19.00%	19.30%	28.90%
Income 2	-11.10%	-11.30%	8.00%	-13.10%	15.80%	18.60%	18.80%	30.60%
Income 3	-11.50%	-11.90%	7.30%	-13.20%	15.30%	18.00%	18.50%	30.40%
Income 4	-9.40%	-10.70%	7.70%	-12.30%	14.10%	17.70%	17.60%	28.70%
Income 5	-8.30%	-10.70%	8.60%	-11.50%	11.40%	15.40%	16.10%	26.60%
Average	-9.90%	-10.90%	8.90%	-12.50%	14.20%	17.10%	17.40%	28.80%

TABLE 27 Comparison of Local Park and Other Natural Lands Accessibility by Auto and EJ Variables - Continued

Comparison of Weighted Other Natural Lands Accessibility by Auto within 30 Minutes (Measured as the Share of the Region's Other Natural Lands Acreage Accessible for Each Cohort)								
	2045 Base Line - 2016 Base year				2045 Plan - 2045 Base Line			
	SCAG Region	EJA	DAC	COC	SCAG Region	EJA	DAC	COC
Seniors	-6.80%	-8.00%	-9.00%	0.20%	14.80%	10.40%	10.50%	16.00%
Disabled	-4.50%	-5.40%	-3.70%	3.00%	11.90%	9.90%	10.80%	22.20%
Poverty 1	-0.30%	-3.70%	-12.10%	4.60%	10.50%	7.50%	7.90%	17.40%
Hispanic	-2.10%	-3.20%	-16.70%	3.50%	12.10%	7.40%	8.70%	-3.40%
White	-4.50%	-6.40%	-26.50%	-5.60%	9.60%	7.30%	8.80%	17.00%
African American	26.60%	25.20%	-10.60%	65.90%	3.20%	8.40%	10.20%	-10.50%
Native American	-1.60%	-3.10%	-23.00%	-0.90%	13.80%	10.00%	10.90%	15.00%
Asian	-2.20%	-2.00%	-0.60%	-4.10%	16.80%	13.80%	13.10%	-12.80%
Other Race	-2.80%	-5.80%	-15.00%	-3.00%	8.70%	8.80%	9.70%	-1.40%
Income 1	0.60%	-2.00%	-20.10%	7.80%	8.90%	5.10%	5.20%	4.40%
Income 2	-1.40%	-4.00%	-20.10%	1.40%	11.50%	8.00%	9.00%	3.50%
Income 3	-0.50%	-2.40%	-17.60%	5.00%	11.60%	7.20%	6.50%	5.10%
Income 4	-2.30%	-4.60%	-16.70%	3.20%	12.30%	10.20%	10.30%	-0.40%
Income 5	0.30%	-1.30%	-17.70%	6.20%	9.40%	7.20%	5.70%	6.20%
Average	-0.10%	-1.90%	-15.00%	6.20%	11.10%	8.70%	9.10%	5.60%

Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

TABLE 28 Comparison of Local Park and Natural Lands Space Accessibility by All Transit and EJ Variables

Comparison of Weighted Local Park Accessibility by All Transit within 45 Minutes (Measured as the Share of the Region's Local Park Acreage Accessible for Each Cohort)								
	2045 Base Line - 2016 Base year				2045 Plan - 2045 Base Line			
	SCAG Region	EJA	DAC	COC	SCAG Region	EJA	DAC	COC
Seniors	0.20%	3.10%	-0.60%	1.40%	1.30%	20.90%	1.20%	-1.30%
Disabled	-0.70%	2.90%	-1.00%	1.60%	1.20%	19.10%	0.60%	-2.40%
Poverty 1	-4.30%	0.00%	-3.60%	-1.60%	1.30%	12.70%	1.10%	-2.00%
Hispanic	-2.70%	2.40%	9.30%	1.00%	0.40%	31.50%	1.00%	-7.60%
White	-5.00%	2.00%	-18.40%	4.60%	1.20%	40.70%	0.90%	15.00%
African American	-5.20%	0.60%	34.30%	-20.70%	0.60%	35.00%	-0.60%	-6.10%
Native American	-7.40%	0.70%	-6.80%	-3.40%	1.00%	39.70%	0.20%	-4.00%
Asian	-2.10%	3.20%	-2.90%	6.10%	4.40%	25.10%	2.50%	13.50%
Other Race	-2.40%	-0.30%	-3.50%	2.80%	0.00%	36.50%	1.60%	-3.10%
Income 1	-2.60%	1.20%	12.30%	-7.00%	3.10%	29.30%	-0.30%	-3.70%
Income 2	-1.90%	1.50%	9.80%	-6.00%	1.70%	32.60%	-0.60%	-2.10%
Income 3	-2.50%	1.30%	-0.40%	0.10%	0.10%	34.70%	0.40%	-2.00%
Income 4	-1.30%	2.10%	-4.30%	1.30%	0.10%	35.10%	1.10%	2.20%
Income 5	-1.50%	2.40%	-12.80%	2.40%	0.40%	42.20%	0.80%	9.40%
Average	-2.80%	1.70%	0.80%	-1.20%	1.20%	31.10%	0.70%	0.40%

TABLE 28 Comparison of Local Park and Natural Lands Space Accessibility by All Transit and EJ Variables - Continued

Comparison of Weighted Other Natural Lands Accessibility by All Transit within 45 Minutes (Measured as the Share of the Region's Other Natural Lands Acreage Accessible for Each Cohort)								
	2045 Base Line - 2016 Base year				2045 Plan - 2045 Base Line			
	SCAG Region	EJA	DAC	COC	SCAG Region	EJA	DAC	COC
Seniors	4.30%	2.60%	2.40%	-14.30%	1.50%	4.20%	17.10%	3.40%
Disabled	-4.30%	-1.90%	-3.80%	-15.90%	0.20%	5.80%	15.60%	1.40%
Poverty 1	1.10%	5.60%	7.70%	-6.30%	0.30%	-1.80%	16.10%	0.90%
Hispanic	-15.80%	-6.90%	10.80%	-28.50%	0.60%	32.40%	12.20%	4.00%
White	-0.50%	14.20%	-23.50%	17.80%	0.20%	68.50%	34.80%	45.20%
African American	-32.90%	-15.70%	-20.50%	2.10%	0.20%	30.70%	32.80%	38.20%
Native American	-2.80%	-11.90%	35.10%	3.60%	5.10%	18.00%	7.10%	50.00%
Asian	20.80%	32.60%	-60.10%	20.70%	15.40%	-12.30%	0.00%	37.10%
Other Race	-8.80%	7.70%	-9.90%	12.00%	1.30%	54.70%	35.00%	32.60%
Income 1	7.00%	6.50%	-23.80%	6.00%	0.70%	10.60%	16.70%	5.10%
Income 2	2.20%	0.80%	-35.20%	-2.50%	0.30%	16.00%	17.20%	21.70%
Income 3	5.10%	2.60%	-32.70%	14.50%	1.20%	19.50%	17.70%	30.40%
Income 4	1.30%	1.30%	-23.10%	-0.20%	0.50%	22.90%	19.50%	8.80%
Income 5	-0.60%	1.00%	-41.40%	15.90%	0.10%	45.90%	20.70%	38.30%
Average	-1.70%	2.70%	-15.60%	1.80%	2.00%	22.50%	18.80%	22.70%

Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

TABLE 29 Comparison of Local Park and Other Natural Lands Accessibility by Local Bus and EJ Variables

Comparison of Weighted Local Park Accessibility by Local Bus within 45 Minutes (Measured as the Share of the Region's Local Park Acreage Accessible for Each Cohort)								
	2045 Base Line - 2016 Base year				2045 Plan - 2045 Base Line			
	SCAG Region	EJA	DAC	COC	SCAG Region	EJA	DAC	COC
Seniors	-1.30%	-2.90%	-2.70%	-5.20%	11.40%	8.80%	7.70%	10.20%
Disabled	-1.80%	-2.80%	-3.00%	-4.90%	31.10%	8.10%	5.30%	8.60%
Poverty 1	-6.00%	-5.80%	-6.00%	-7.90%	6.80%	2.70%	-0.20%	8.70%
Hispanic	-9.80%	-4.00%	6.20%	-6.10%	14.50%	4.20%	1.30%	4.20%
White	-5.80%	-1.70%	-17.10%	0.00%	5.90%	25.90%	25.00%	20.70%
African American	-13.40%	-7.10%	27.70%	-3.80%	18.60%	-8.50%	-13.60%	-20.20%
Native American	-9.00%	-4.40%	-4.50%	-6.00%	7.20%	24.90%	10.30%	0.70%
Asian	-8.80%	-3.10%	-6.90%	-1.30%	18.50%	9.80%	12.10%	24.30%
Other Race	-8.20%	-5.10%	-4.20%	-2.90%	11.80%	12.80%	10.60%	4.30%
Income 1	-11.00%	-6.50%	4.00%	-9.20%	19.20%	4.80%	1.60%	2.70%
Income 2	-9.20%	-4.80%	4.10%	-6.60%	16.60%	5.60%	3.00%	3.20%
Income 3	-8.30%	-4.10%	-1.80%	-5.90%	12.90%	9.80%	8.10%	8.60%
Income 4	-6.50%	-2.50%	-4.50%	-3.80%	10.80%	11.20%	11.50%	11.70%
Income 5	-4.90%	-2.30%	-12.60%	-2.50%	8.60%	17.60%	20.00%	18.40%
Average	-7.40%	-4.10%	-1.50%	-4.70%	13.80%	9.80%	7.30%	7.60%

TABLE 29 Comparison of Local Park and Other Natural Lands Accessibility by Local Bus and EJ Variables - Continued

Comparison of Weighted Other Natural Lands Accessibility by Local Bus within 45 Minutes (Measured as the Share of the Region's Other Natural Lands Acreage Accessible for Each Cohort)								
	2045 Base Line - 2016 Base year				2045 Plan - 2045 Base Line			
	SCAG Region	EJA	DAC	COC	SCAG Region	EJA	DAC	COC
Seniors	-2.80%	-2.50%	-1.50%	-3.20%	9.10%	26.30%	45.10%	56.90%
Disabled	-16.70%	-7.00%	-7.40%	-7.30%	14.20%	5.90%	30.90%	55.10%
Poverty 1	-2.70%	-2.40%	-1.60%	3.50%	16.80%	27.80%	46.80%	55.70%
Hispanic	-11.70%	-8.80%	7.90%	-8.90%	50.50%	3.60%	15.60%	3.10%
White	4.10%	1.70%	-22.60%	5.00%	16.20%	-5.40%	68.50%	104.10%
African American	-20.60%	-20.00%	-52.20%	-2.90%	8.70%	109.70%	178.10%	348.60%
Native American	-6.50%	-14.30%	29.00%	-1.50%	46.70%	14.90%	74.90%	104.90%
Asian	14.60%	26.20%	-54.90%	14.50%	71.30%	71.20%	109.60%	140.30%
Other Race	4.40%	-0.80%	-16.10%	3.20%	11.60%	11.00%	59.50%	74.20%
Income 1	-1.00%	-1.10%	-20.40%	-1.80%	46.50%	32.30%	57.60%	48.20%
Income 2	-1.90%	-3.40%	-29.20%	-6.60%	45.80%	23.50%	59.00%	62.20%
Income 3	0.40%	-1.50%	-30.00%	10.10%	46.50%	23.30%	60.60%	69.00%
Income 4	-3.60%	-5.70%	-27.50%	-8.30%	41.80%	14.50%	47.80%	52.00%
Income 5	-1.10%	-7.00%	-37.20%	4.20%	29.70%	11.40%	49.20%	94.10%
Average	-3.20%	-3.30%	-18.90%	0.00%	32.50%	26.40%	64.50%	90.60%

Source: SCAG Regional Travel Model and Socioeconomic Growth Forecast

HOW WILL THIS IMPACT HEALTH AND SAFETY?

ACTIVE TRANSPORTATION HAZARDS CI LU S

Promoting a healthier and more active lifestyle in our communities is considered one of the important goals in Connect SoCal. In addition to a healthy lifestyle, walking and biking can potentially reduce vehicular trips, which reduce VMT and GHG emissions. It is important to analyze and improve traffic safety to encourage more active transportation trips. According to SCAG's Transportation Safety Regional Existing Conditions Report, southern California is home to roughly 19 million people, about half the entire state's population, and 15 million licensed drivers. We rely on our cars, buses, rail lines, bicycles, and feet to get around. Collectively, we travel more than 440 million miles every day going to work, the grocery store, to visit family, and for various other purposes. With all these trips being made, it is not surprising that mistakes are being made. Collisions are happening to people from all walks of life, to those who drive and disproportionately, to those who walk and bike.

Unsafe speed is the primary factor for approximately a third of all collisions in the SCAG region. Speeding makes a crash more likely, and in a crash that is speeding related, a person is more likely to be injured and the injuries are more likely to be severe. People who walk or bicycle are more physically vulnerable and are at a much greater risk of sustaining serious injuries in collisions. In the SCAG region, bicyclists and pedestrians account for 8.9 percent of all daily trips, but account for 27 percent of fatalities, and while overall traffic fatalities have decreased nationwide and in California, the number of bicyclists and pedestrian fatalities and serious injuries have increased in recent years. For example, the number of fatalities for pedestrians in 2016 was 50 percent higher than it was in 2011, the most recent low point. Fortunately, collisions can be analyzed, and the region can work together to reduce their likelihood, which will improve the quality of life for residents. For additional information related to transportation safety in the SCAG region, please visit the Transportation Safety Regional Existing Conditions Report. This analysis examines ethnicity and income quintiles in pedestrian- and bicyclist-involved collisions hotspots. Overall, based on the 2016 collision data, active transportation-related collision hotspots have a consistent pattern and are occurred mostly in urban areas.

METHODOLOGY

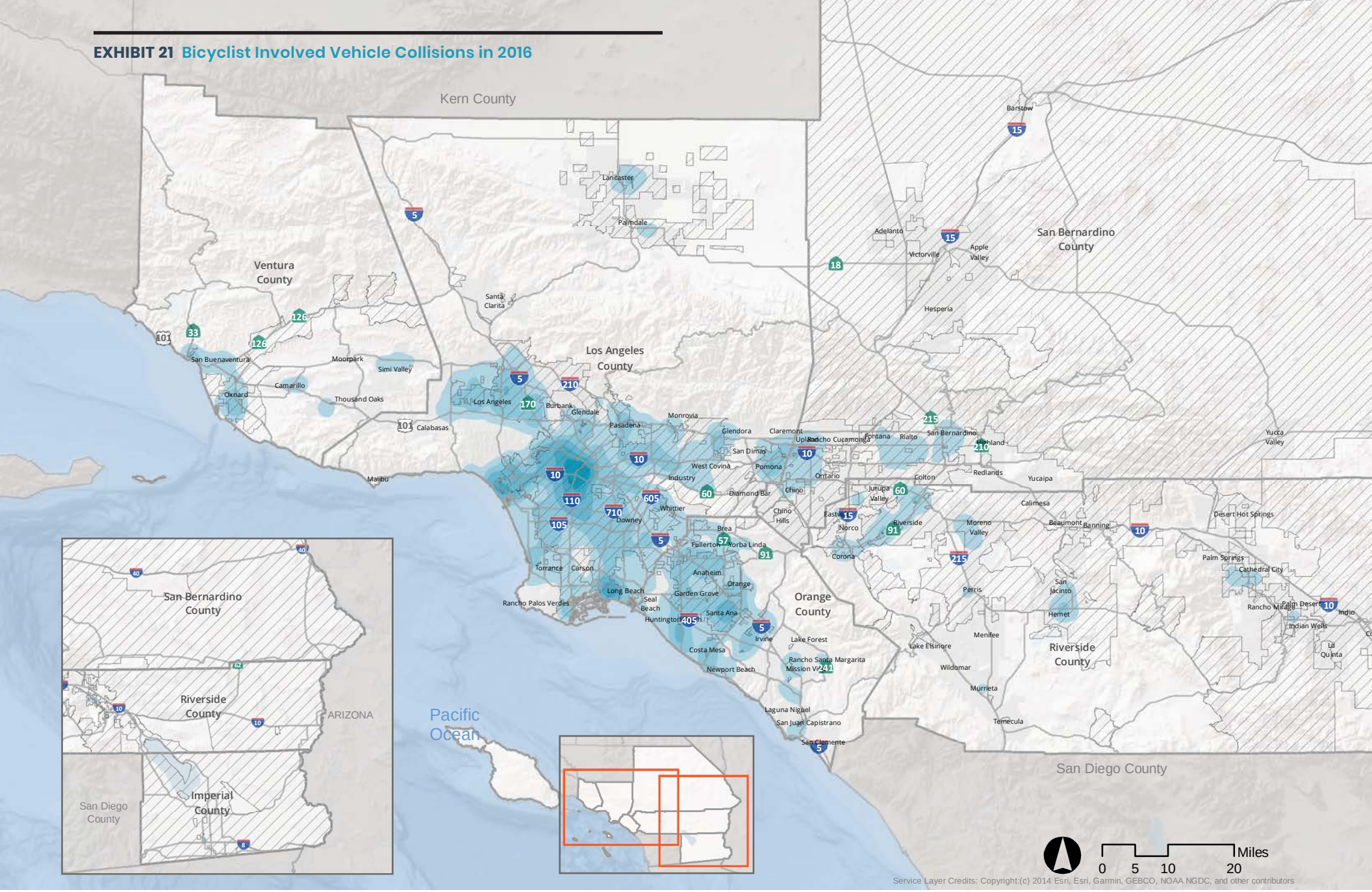
Vehicle collision data for the State of California is maintained by the Transportation Injury Mapping System (TIMS). TIMS was established by a group of researchers at the Safe Transportation Research and Education Center (SafeTREC) at the University of California, Berkeley. In collaboration with the California Office of Traffic Safety (OTS) and a project called "California Statewide Integrated Traffic Records System" (SWITRS), SafeTREC developed an interactive web-based mapping system that visualizes historical vehicle collision data, including pedestrian- and bicycle-involved collisions.

To understand the varying levels of hazard for active transportation users in the region, SCAG obtained 2016 collision data from TIMS, which is consistent with Connect SoCal's base year. In this analysis, we are interested in identifying areas that show the highest concentrations of pedestrian and bicyclist involved vehicle collisions using GIS technologies. In order to tabulate impacts for EJ groups, these areas were further studied to understand who lives in the neighborhoods that have seen the highest rates of these collisions. A geospatial technique, specifically kernel density, was utilized to identify areas with the highest concentration of collisions based on the spatial relationship of all pedestrian or bicycle incidents.

RESULTS

EXHIBIT 21 and **EXHIBIT 22** illustrate the concentration of vehicle collisions involving bicyclists and pedestrians, respectively. The density of collisions and resulting severity of hazard is categorized into six groups reflecting relative risk: "None to Very Low," "Low," "Moderately Low," "Moderate," "Moderately High," and "High." According to the 2016 collision data, active transportation collision hotspots have consistent patterns and are spread across urban areas (e.g. Downtown Los Angeles, Santa Monica, Long Beach, Huntington Beach, Irvine, etc.).

EXHIBIT 21 Bicyclist Involved Vehicle Collisions in 2016

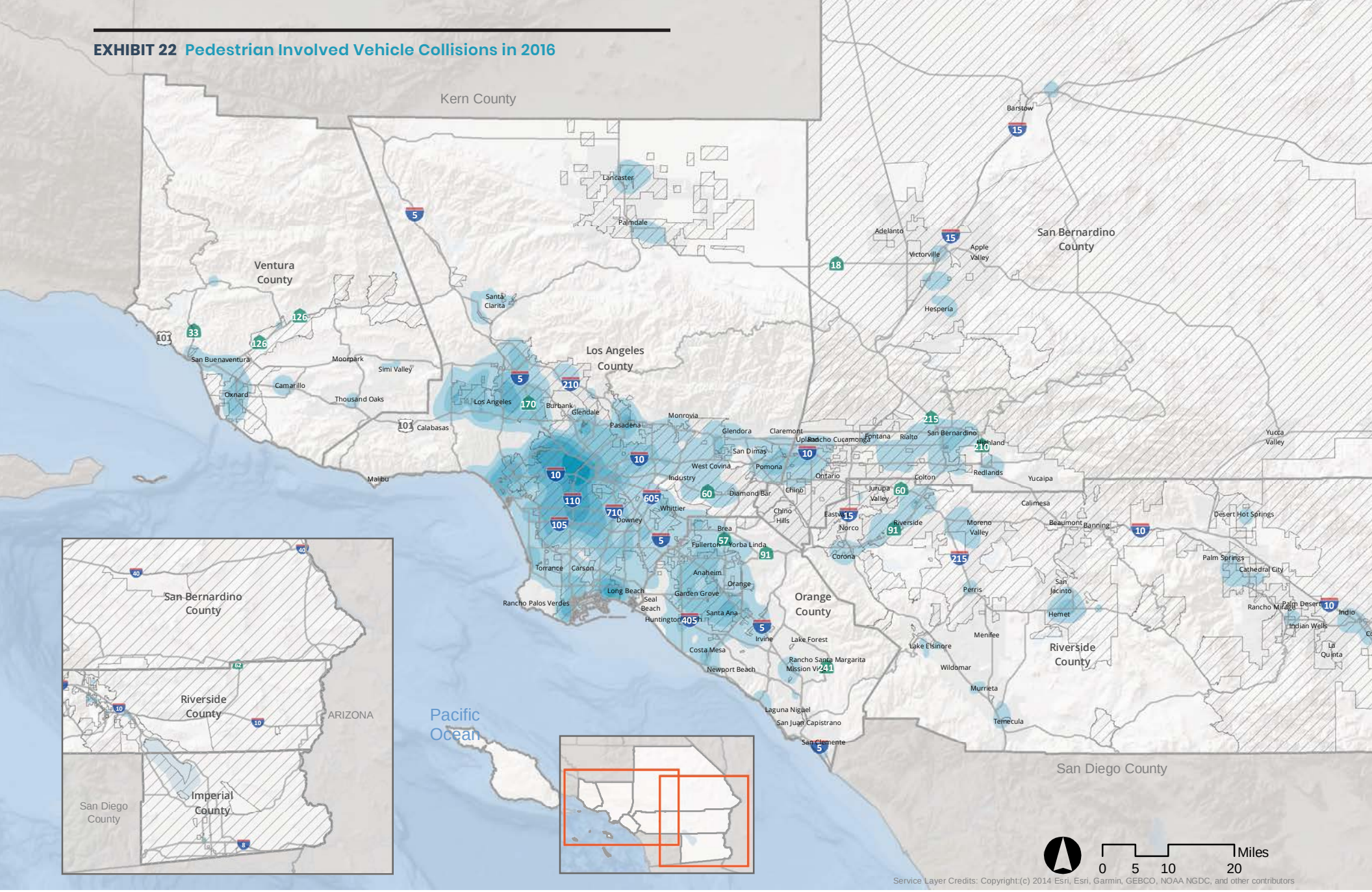


Service Layer Credits: Copyright:(c) 2014 Esri, Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

None to Very Low
Low
Moderately Low
Moderate
Moderately High
High
County Boundaries
City Boundaries
Freeway
Environmental Justice Areas

Source: SWITRS, TIMS, SCAG, 2020

EXHIBIT 22 Pedestrian Involved Vehicle Collisions in 2016



None to Very Low
Low
Moderately Low
Moderate
Moderately High
High
County Boundaries
City Boundaries
Freeway
Environmental Justice Areas

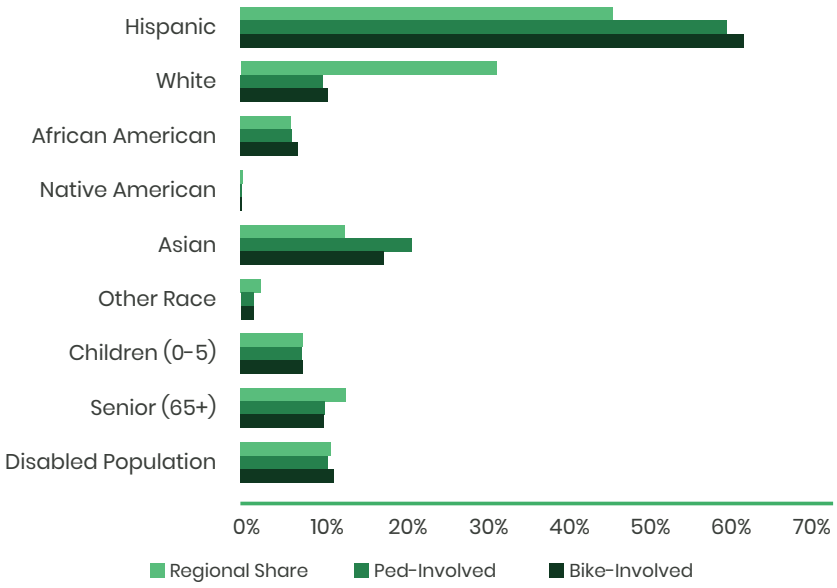
Source: SWITRS, TIMS, SCAG, 2019

FIGURE 17 - **FIGURE 19** provide additional details on the residents in these neighborhoods, specifically their ethnic background and income quintiles. Key findings are:

- There is a higher concentration of Hispanics and Asians in high-risk areas that are seen in the region
- There is a lower share of disabilities, seniors, and children, but a higher concentration of households below poverty or near poverty (i.e. Poverty 1, Poverty 2, Poverty 3) than is seen in the region
- When looking at all households, it appears that neighborhoods with the highest concentration of active transportation-related collisions have a higher share of lower-income earning households (i.e. household income quintile one and two) that are seen in the region. The opposite trend applies to higher-income households

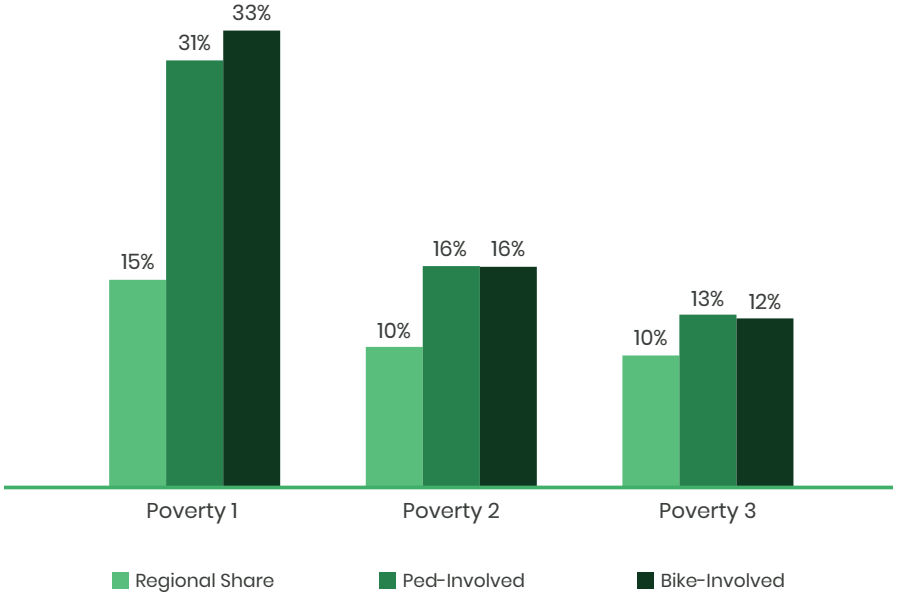
Consequently, the results have yielded that there is an equity issue within these hotspots of active transportation-related collisions in the region. It is important that SCAG include safety strategies in Connect SoCal to address this particular impact. Therefore, Connect SoCal has included strategies improve safety for all residents in the region such as GoHuman Campaign and Toward-Zero-Death. Please refer to the EJ Toolbox for strategies to reduce the risk for active transportation users.

FIGURE 17 2016 Population Breakdown of SCAG Region and High Concentrated Area of Bike and Ped Collisions



Source: SCAG, SWITRS, TIMS, 2016

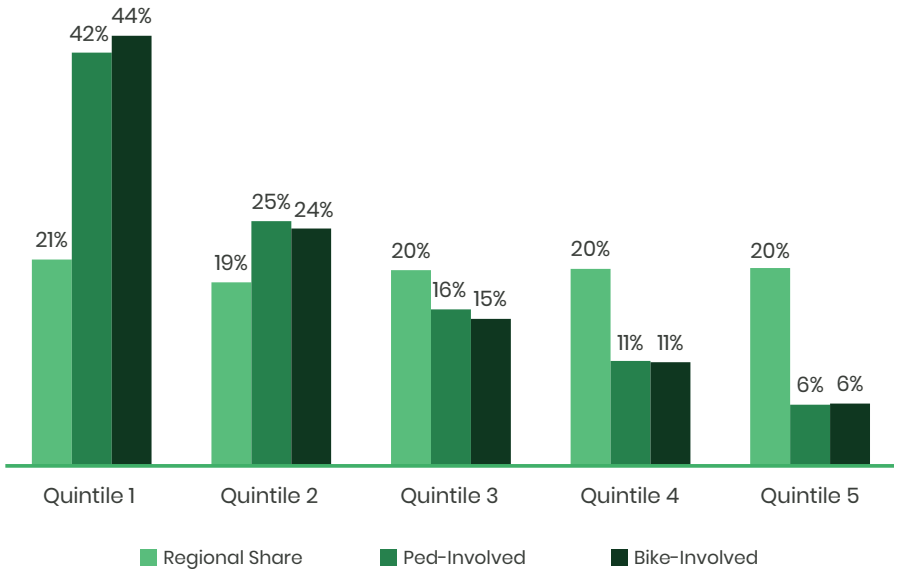
FIGURE 18 2016 Household Poverty Breakdown of the SCAG Region and High Concentrated Area of Bike and Ped Collisions



Source: SCAG, SWITRS, TIMS, 2016

In addition to the in-house analysis, SCAG has collaborated with Cal Poly Pomona to research and conduct spatiotemporal analysis on influential factors related to pedestrian- and bicycle-involved collisions. Two reports were completed in July 2017 and February 2019, for the first time, with the involvement of the Department of Urban and Regional Planning and the Department of Civil Engineering. This type of research is crucial for SCAG to explore and inform decision makers on potential areas to improve traffic safety in the region, especially in the EJ communities

FIGURE 19 2016 Household Income Quintile Breakdown of SCAG Region and High Concentrated Area of Bike and Ped Collisions



Source: SCAG, SWITRS, TIMS, 2016

CASE STUDY 1 – ADVANCED RESEARCH ON THE BUILT ENVIRONMENT AND COLLISIONS

The first report identified i) collision hotspots by different transportation modes and ii) influential factors that associate with different collision hotspots. The influential factors include built environments (e.g. intersection density), socioeconomic characteristics (e.g. population density), and activity characteristics (e.g. land use diversity index).

Of twenty-one variables, only one variable, automobile speed, presents a statistically significant correlation with all the types of collision. This implies that the intersections that each of automobile, pedestrian, and bicycle collision becomes a dominant type of collision at the intersections where automobile drives faster. The outputs indicate that automobile speed significantly influences collision regardless the type of collision. Thus, it is important to control automobile speed in order to improve overall roadway safety. In this vein, it can be expected that the current transportation policies such as traffic calming, complete streets, and road diet must positively contribute to not only pedestrian and bicycle safety, but also the safety between automobiles.

Another interesting finding is the impact of bicycle lane on traffic safety an intersection. The probability of bicycle and automobile collision to become a dominant collision type is significantly lower at the intersections that have bicycle lanes implemented. Although it is not surprising to find the contribution of bicycle lane to bicycle safety, its positive contribution to automobile safety is unexpected. This contribution is probably caused by drivers' cautious behavior. The existence of bicycle lanes as well as bicyclists on bicycle lanes probably make automobile slow down and drivers be cautious in traffic patterns and ambient environment. Therefore, the collisions not only between automobile and bicycle but also between automobiles do not stand out at the intersections with bicycle lane.

Intersection density presents positive correlations with both automobile collision and pedestrian collision. This implies that intersection density contributes both types of automobile and pedestrian collision to become a dominant collision type at intersection. Intersections tend to make automobiles stop, idle, and speed up. These behaviors of automobile probably contribute

to make automobile movement complex. In the areas with high intersection density, automobile should repeat the complex movements and behaviors. The model outputs represent the impact of the behaviors on automobile collision. On the other hand, the number of intersections is one of the popular indicators for walkability. The higher number of intersections indicates walkable environment, and presumably attracts pedestrians. The positive correlation between intersection density and pedestrian collision probably reflects the dynamic between large volume of pedestrian and complex movements of automobile.

CASE STUDY 2 – ANALYSIS OF PEDESTRIAN COLLISIONS AT MID-BLOCKS AND INTERSECTIONS

The second report explored a wide spectrum of built environment and collisions definitions and indicators, identify the intersections and mid-blocks with high concentration of pedestrian collisions within the SCAG region, and explore the influence of built environment (as well as roadway design) on pedestrian collision at intersection and mid-block within Los Angeles County (urban area) and San Bernardino County (suburban area). In detail, this research includes: a) temporal analysis of pedestrian-involved collisions in the SCAG region, b) the identification of intersection and mid-block pedestrian collision hotspots in Los Angeles and San Bernardino Counties, and c) the development of bi-nominal logistic models that test the influence of built environment and roadway design collisions on pedestrian collision.

The findings for intersection level include:

- The influence of intersection condition and built environment on pedestrian collisions at intersection level is comparable and consistent in both Los Angeles and San Bernardino Counties
- The positive contribution of structured medians and sidewalks to pedestrian safety at intersection is consistently identified from both Los Angeles and San Bernardino Counties
- The negative contribution of VMT to pedestrian safety is identified from Los Angeles County. This probably reflects the influence of automobile traffic on pedestrian collisions, which is much complex and significant in an urban area like Los Angeles County
- Although two variables, street tree and adjacent parking lots, are not include in the model for San Bernardino County, they are closely related with pedestrian safety

The findings from the statistical models for mid-block level include:

- The correlation between physical conditions of roadway segment and pedestrian safety is more dominant in San Bernardino County than in Los Angeles County. This probably reflects the diverse physical conditions of roadways in San Bernardino County from the areas with well-established pedestrian facilities and amenities to the areas with no such facilities and amenities, in comparison to an urban area like Los Angeles County, where pedestrian facilities and amenities are generally available.
- In San Bernardino County, the major physical conditions of roadway segment that statistically correlated to pedestrian safety were sidewalks, sidewalks with parking lot entranceways, and crosswalks.
- In Los Angeles County, the major physical conditions of roadway segment that negatively contribute to pedestrian safety was the frequent junctions that make pedestrians cross a road.

CLIMATE VULNERABILITY LU S

As impacts of climate change manifest themselves through droughts, warming trends, and extreme weather events, governments at all levels increasingly must focus on climate change adaptation, thereby limiting the negative effects of climate change on communities. California Governor Brown recently underscored the need for governments to commit to significant carbon reductions, noting "we have to redesign our cities, our homes, and our cars."[2] Mitigation of and adaptation to climate change necessitates innovative transportation and land-use planning strategies.

With respect to EJ; the climate mitigation and adaptation literature makes it clear that EJ populations are often those most vulnerable and might have the most to gain from climate mitigation and adaptation strategies.[3] Care must be taken when identifying climate strategies using transportation and land use policies to achieve a full accounting of the distribution of costs and impacts.

Climate change adaption efforts in the SCAG region must be tailored to two climate regions, both of which face threats from climate change: The South Coast Region and the Desert region. The impacts of climate change in the SCAG region are of significant local concern as evidenced by its large population (18 million), warm and arid climate, and communities in coastal/low lying areas. The State of California has identified potential impacts of climate change for these two sub-regions: sea-level rise and public health concerns from health and air pollution in the South Coast; public health, social vulnerability, and biodiversity threats in the Desert Region; and water supply in both regions.[4] Each region will have slightly different climate change exposure characteristics that constitute its "vulnerability profile."

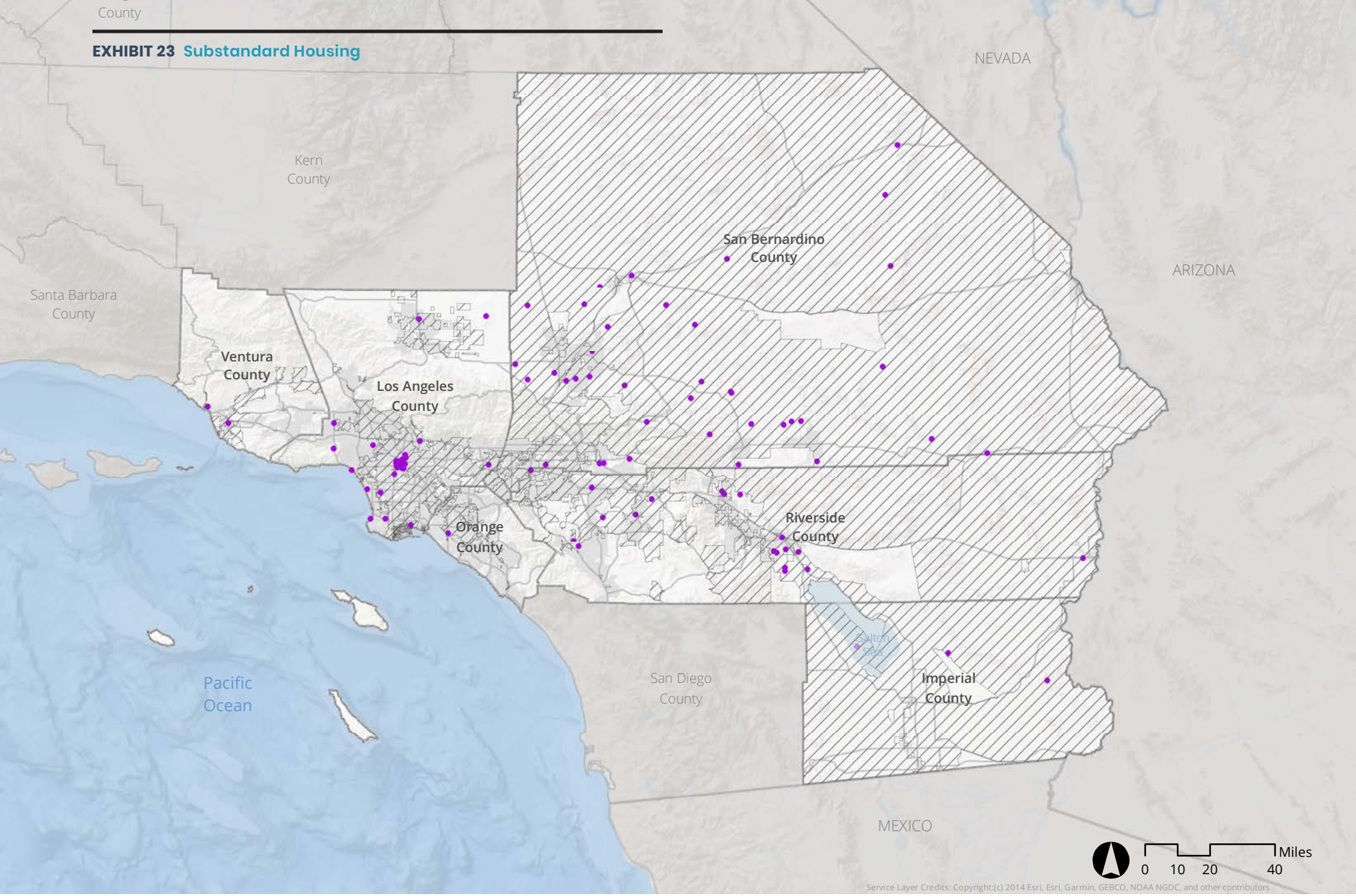
For example, in the SCAG region, extreme heat is of great concern. Racial and ethnic minority groups and lower-income households have been found to suffer more during extreme heat waves. These groups have lower access than other population segments to common adaptation options including tree canopy (which provides shading and is correlated with a decreased urban heat island effect) and car ownership to access public cooling centers.[7] The elderly, immigrant populations and those in rural locations may have lower awareness of and access to cooling centers.[8] Other examples include breathing worse air due to an increase in air pollution exposure for lower price housing along and adjacent to noisy busy roadways; reduced access to fresh fruit and vegetables, and even paying more for similar food products; and fewer job opportunities in sectors that employ significant proportions of low-income individuals including agriculture and tourism.[9]

Substandard housing is another condition that would impact people during extreme weather events. The traditional indicator for determining if a housing unit is substandard is the lack of some or all plumbing facilities. In the SCAG region, 57,000 housing units fall in these criteria out of nearly 6.4 million (less than one percent). This number is relatively small when compared with all housing units in the region, 51,000 of these substandard housing units are in Environment Justice Areas (89.3 percent). **EXHIBIT 23** illustrates the location of all substandard housing units in the SCAG region (derived using the 2009-2013 ACS), and their relationship with EJA.

Another concern impacted by climate change is coastal flooding, which will have a large impact on Ventura, Los Angeles, and Orange counties. **EXHIBIT 24** shows projected coastal inundation areas in year 2100 when the region's sea level is modeled to reach 55 feet. Exposure to coastal flooding may cause a range of detrimental physical, economic and psychological effects on the populations impacted. Many of the areas affected fall outside EJA or other areas of concern, but about 50,000 people are anticipated to be impacted from EJA, and 48,000 in DAC. In regard to COC, there will slightly more than 3,000 people affected by the Harbor Gateway and Wilmington areas.

County

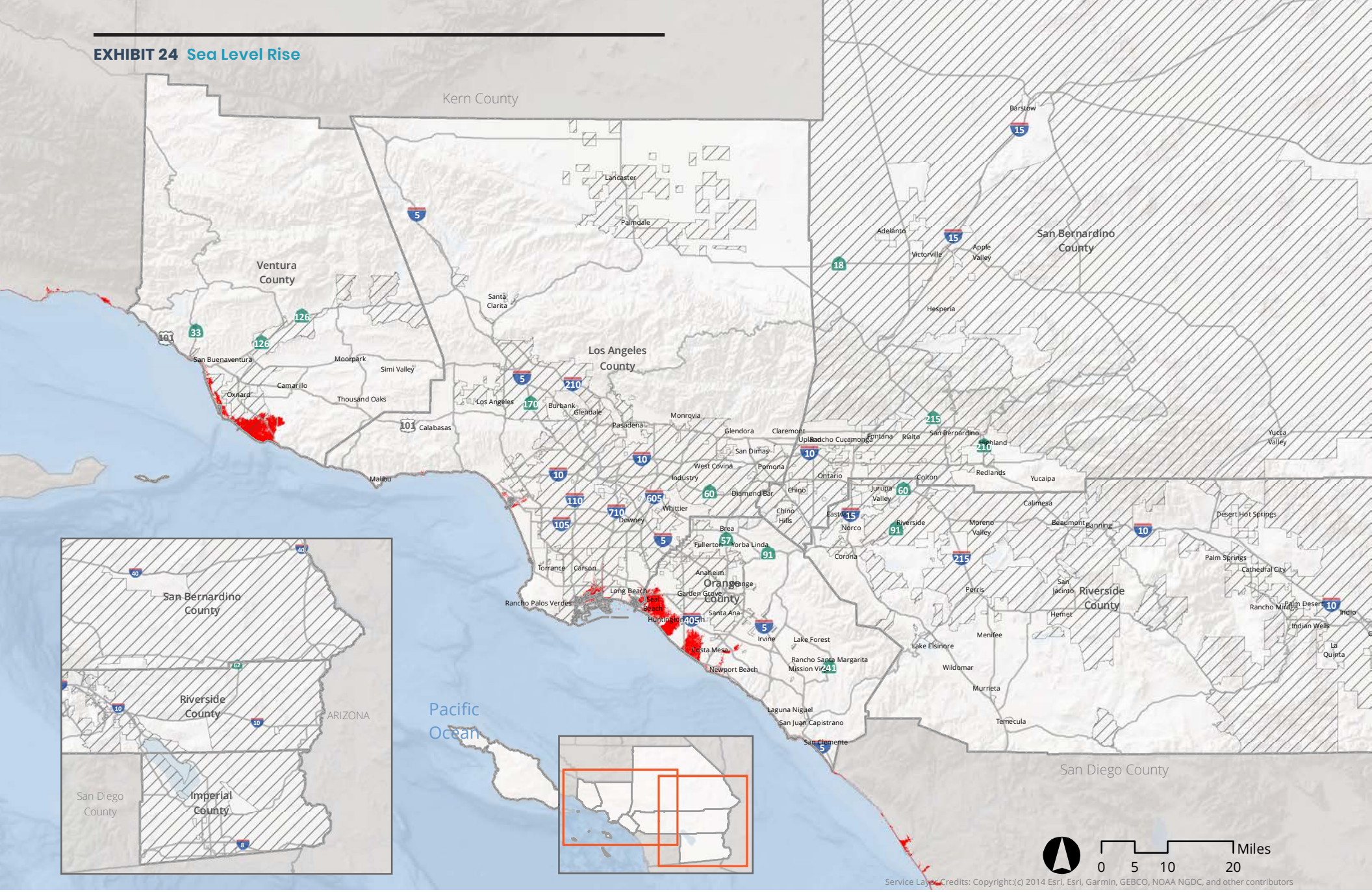
EXHIBIT 23 Substandard Housing



Dot Density • 1 Dot = 100 • Housing Without Plumbing ▨ Environmental Justice Areas

Source: ACS 2017 and SCAG, 2019

EXHIBIT 24 Sea Level Rise



Coastal Areas At Risk for Sea Level Rise in 2100

Environmental Justice Areas

County Boundaries

City Boundaries

Freeway

Source: NOAA and SCAG, 2019

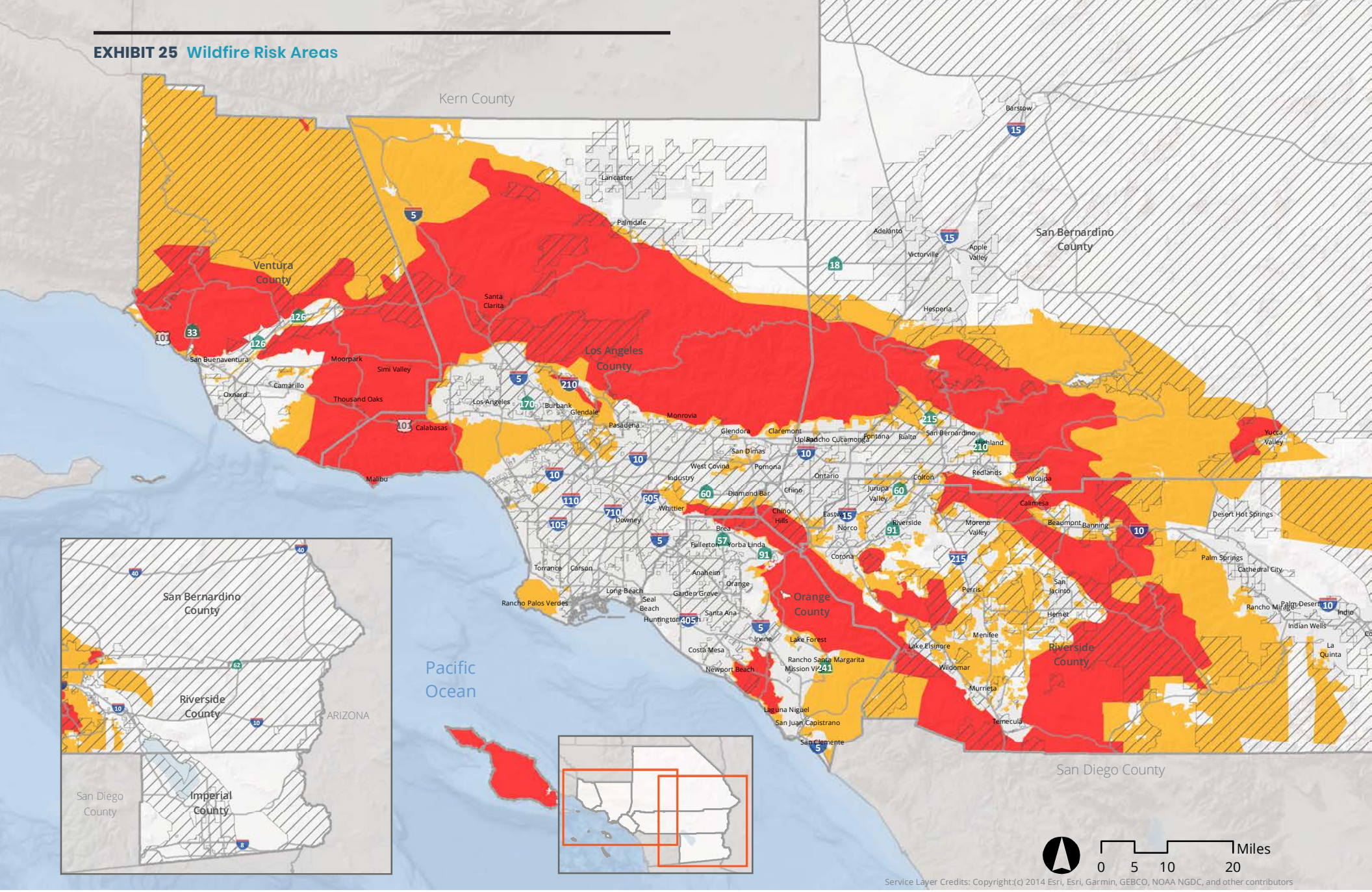
In addition to a rise in sea level, warmer temperatures combined with longer dry seasons have resulted in more wildfires in recent years. **EXHIBIT 25** illustrate the areas and population impacted by various levels of fire risk throughout the region. Large fires statewide are anticipated to increase from roughly 58 percent to 128 percent over the next several years, and the resulting burn areas will increase from 57 percent to 169 percent by 2085. As a result, air quality, water quality and perhaps food production and energy pricing will be affected. These extra costs are expected to more severely impact low-income communities.

TABLE 30 Population and Household in Sea Level Rise Area

		Los Angeles	Pct.	Orange	Pct.	Ventura	Pct.	SCAG Region	Pct.
Population	White	18,382	54%	83,351	71%	8,441	49%	110,174	65.3%
	Minority	15,615	46%	34,245	29%	8,805	51%	58,665	34.7%
	Hispanic	8,607	25%	14,599	12%	6,792	39%	29,998	17.8%
	African American	2,082	6%	1,222	1%	468	3%	3,772	2.2%
	Native American	117	0%	337	0%	49	0%	503	0.3%
	Asian	3,688	11%	14,086	12%	998	6%	18,773	11.1%
	Other Race	1,122	3%	4,001	3%	498	3%	5,620	3.3%
	Age 0 to 4	1,513	4%	4,908	4%	1,050	6%	7,470	4.4%
	Senior (65+)	5,198	15%	25,764	22%	2,359	14%	33,320	19.7%
	Disabled	3,672	11%	12,589	11%	2,621	15%	18,882	11.2%
	Total	33,997	20%	117,596	70%	17,247	10%	168,840	100.0%
Households	Poverty 1	1,785	11%	3,776	8%	747	12%	6,308	9%
	Poverty 2	1,136	7%	2,654	5%	528	9%	4,318	6%
	Poverty 3	1,056	6%	3,387	7%	453	7%	4,897	7%
	Quintile 1	3,019	18%	7,457	15%	1,082	17%	11,558	16%
	Quintile 2	2,582	15%	6,844	14%	1,213	20%	10,638	15%
	Quintile 3	3,239	19%	8,416	17%	1,574	25%	13,229	18%
	Quintile 4	3,339	20%	10,893	22%	1,219	20%	15,451	21%
	Quintile 5	4,819	28%	15,514	32%	1,118	18%	21,451	30%
	Total	16,997	24%	49,124	68%	6,206	9%	72,328	100%

Source: NOAA, Census, SCAG

EXHIBIT 25 Wildfire Risk Areas



Environmental Justices Areas
Tier 3 - Extreme
Tier 2 - Elevated
County Boundaries
City Boundaries
Freeway

Source: California Public Utilities Commission (CPUC) and SCAG, 2019

FLOOD HAZARDS IN THE SCAG REGION

Flood hazard is mapped and analyzed using the Digital Flood Insurance Rate Map (DFIRM) data from the Federal Emergency Management Agency (FEMA). **EXHIBIT 26** illustrates the extent of flood hazard in a flood-prone community and shows areas within the 100-year Flood Hazard Zones and 500-year Flood Hazard Zones region-wide. The former Flood Hazard Zone has a one percent annual chance of occurring and the latter 0.2 percent.

TABLE 32 shows that minority communities are disproportionately affected minorities comprise 71 percent of the population living in 100-year Flood Hazard Zones and 77 percent of the population residing in a 500-year Flood Zones. This analysis also shows lower-income households are disproportionately impacted. The poorest households, as well as the lowest quintile income households, have a larger concentration in flood hazard zones than in the greater region.

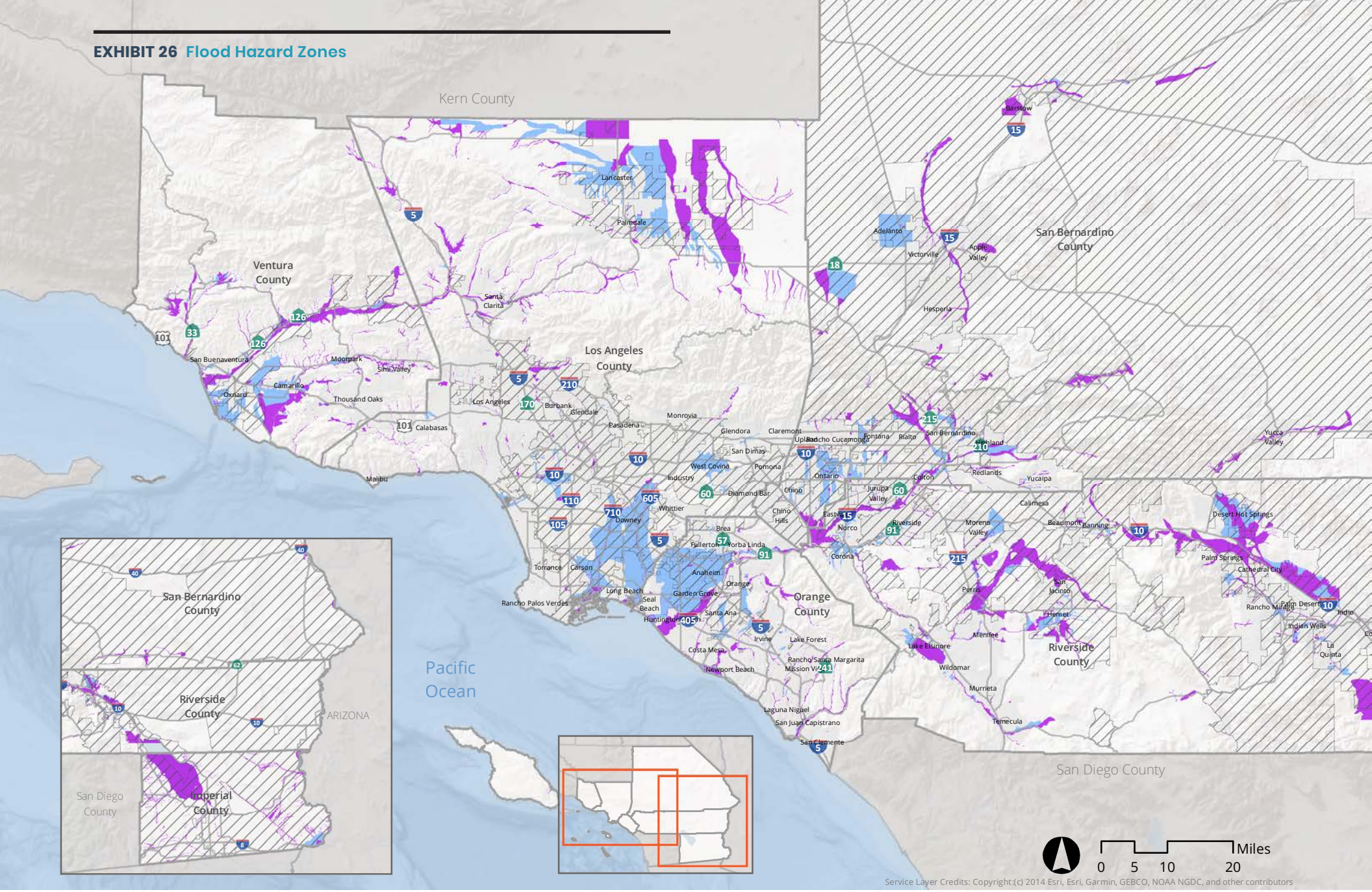
In regards to Climate Change, global warming is projected to alter precipitation patterns, increase the intensity of major storm events, and increase risks of floods throughout the U.S. and the SCAG region. As a consequence, many communities are at risk for devastation from floods. Flooding may cause serious health impacts and risks that include death and injury, contaminated drinking water, hazardous material spills, and increases in the populations of disease-carrying insects and rodents. Other negative impacts would include damage to critical infrastructure and community disruption/displacement. Indeed, flooding may cause a range of detrimental physical, economic, and psychological effects for residents at risk, which are disproportionately minority and low-income persons.

TABLE 31 Population and Households in Very High Wildfire Risk Areas

Population	Imperial		Los Angeles		Orange		Riverside		San Bernardino		Ventura	
	High Risk Areas	Pct.	High Risk Areas	Pct.	High Risk Areas	Pct.	High Risk Areas	Pct.	High Risk Areas	Pct.	High Risk Areas	Pct.
Hispanic	-	-	173,777	3.7%	20,986	2.1%	62,044	6.2%	41,975	4.2%	25,410	7.7%
White	-	-	458,630	16.8%	134,503	10.1%	102,274	11.8%	81,120	12.0%	113,320	28.3%
Minority	-	-	348,000	4.9%	59,309	3.5%	91,193	6.9%	64,213	4.7%	46,851	11.0%
African American	-	-	28,865	3.5%	2,083	4.7%	8,815	6.7%	8,606	5.0%	1,979	15.1%
Native American	-	-	1,402	7.4%	345	5.5%	1,101	10.1%	757	8.9%	365	15.3%
Asian	-	-	118,826	9.0%	29,051	5.5%	13,284	10.5%	8,422	6.8%	14,030	25.9%
Pacific Islanders	-	-	649	2.9%	207	2.5%	409	7.0%	262	4.5%	146	10.8%
Other Race	-	-	1,967	7.8%	421	7.5%	360	9.8%	321	7.9%	287	20.9%
Multi-Race	-	-	22,514	11.6%	6,217	8.6%	5,180	10.8%	3,870	8.9%	4,634	24.9%
Total	-	-	806,630	8.2%	193,812	6.4%	193,467	8.8%	145,333	7.1%	160,172	19.5%

Source: CalBRACE, Census, SCAG

EXHIBIT 26 Flood Hazard Zones



Environmental Justice Areas
100-year Flood Hazard Zone
500-year Flood Hazard Zone
County Boundaries
City Boundaries
Freeway

Source: FEMA and SCAG, 2019

POTENTIAL STRATEGIES

California leads the United States and many parts of the world in legislation aimed to curb climate change trends through carbon reduction and adaptation policies. The state's Global Warming Solutions Act (AB 32) requires the reduction of carbon emissions from major industries, such as power plants, cement plants, oil refineries, and others. In alignment with the Global Warming Solutions Act, SB 375 aims to reduce greenhouse gas emissions from motor vehicles, as cars and light trucks account for 30 percent of the state's overall emissions. Indeed, these laws benefit all Californians by lessening the amount of greenhouse gas emissions and seeking strategies to cope and adapt to the world's changing climate. However, it is important to recognize that climate change does not affect all people equally. People in communities of color and low-income communities will bear the greatest health and economic consequences of climate change. Therefore, it is critical for policymakers to consider the locations of these communities when planning for the future.

By reaching the region's reduction targets under SB 375, Connect SoCal helps reduce the impacts of climate change on the region. The land use strategies in the Plan specifically help the region improve its resiliency to the impacts of drought and reduce the risk of sea level impacts and wildfires on new development. Connect SoCal anticipates a large share of growth to occur in small-lot single-family and multifamily housing that is targeted for infill locations within high-quality transit areas. The RTP/SCS also reduces future development in areas that contain high-quality plant and animal habitats, including parklands, natural lands, farmland, and other natural resource areas. These land uses are important to the region's environment, economy and public health.

Adapting to climate change is essential for protecting communities both today and well into the future. Adaptation planning helps prevent widespread suffering, dislocation, and infrastructure repair costs. Poor and marginalized communities face relatively greater adaptation challenges than segments of society with greater financial and social resources. EJ is, therefore, an important part of climate change adaptation, transportation, land use, and housing planning. For our region, more research needs to be done to assess vulnerabilities to climate change at the community and neighborhood level. Detailed mitigation strategies can be found in the EJ Toolbox section of this technical report.

TABLE 32 Population and Household in Flood Hazard Areas

Population and Households in 100 Year Flood Hazard Area in 2016														
Population	Imperial	Pct.	Los Angeles	Pct.	Orange	Pct.	Riverside	Pct.	San Bernardino	Pct.	Ventura	Pct.	Region	Pct.
White	549	20%	9,489	19%	14,679	17%	16,227	26%	10,834	32%	2,999	21%	54,776	22%
Minority	2,218	80%	40,427	81%	74,135	83%	45,739	74%	22,508	68%	11,597	79%	196,624	78%
Hispanic	1,979	72%	29,192	58%	40,459	46%	35,957	58%	16,463	49%	10,833	74%	134,884	54%
African American	73	3%	3,639	7%	977	1%	4,714	8%	3,218	10%	138	1%	12,759	5%
Native American	77	3%	118	0%	179	0%	282	0%	185	1%	30	0%	871	0%
Asian	52	2%	6,294	13%	31,057	35%	3,474	6%	1,737	5%	423	3%	43,038	17%
Other Race	38	1%	1,184	2%	1,462	2%	1,312	2%	904	3%	171	1%	5,072	2%
Age 0 to 4	52	2%	6,294	13%	31,057	35%	3,474	6%	1,737	5%	423	3%	43,038	17%
Senior (65+)	423	15%	5,362	11%	11,132	13%	7,683	12%	3,781	11%	1,674	11%	30,055	12%
Disabled	397	14%	5,882	12%	8,602	10%	8,974	14%	4,662	14%	2,029	14%	30,546	12%
Total	2,767	1%	49,917	20%	88,813	35%	61,966	25%	33,342	13%	14,596	6%	251,400	100%
Household in 100 Year Hazard Area in 2016														
Households	Imperial	Pct.	Los Angeles	Pct.	Orange	Pct.	Riverside	Pct.	San Bernardino	Pct.	Ventura	Pct.	Region	Pct.
Poverty 1	236	21%	4,207	12%	6,308	11%	5,021	16%	2,707	17%	1,440	12%	19,919	13%
Poverty 2	197	18%	2,894	8%	4,406	8%	3,636	11%	1,708	11%	917	8%	13,758	9%
Poverty 3	128	11%	2,670	8%	4,941	9%	3,395	11%	1,648	10%	1,117	9%	13,899	9%
Quintile 1	392	35%	6,393	18%	8,831	16%	7,386	23%	3,803	24%	2,060	17%	28,864	19%
Quintile 2	202	18%	6,070	18%	9,246	16%	6,772	21%	3,402	21%	2,088	17%	27,779	18%
Quintile 3	240	21%	6,705	19%	10,771	19%	7,098	22%	3,547	22%	2,364	20%	30,725	20%
Quintile 4	171	15%	7,122	21%	12,633	22%	6,129	19%	3,064	19%	2,898	24%	32,017	21%
Quintile 5	113	10%	8,393	24%	15,078	27%	4,645	15%	2,111	13%	2,698	22%	33,038	22%
Total	1,117	1%	34,683	23%	56,558	37%	32,030	21%	15,926	10%	12,107	8%	152,422	100%

TABLE 32 Population and Household in Flood Hazard Areas - Continued

Population in 500 Year Flood Hazard Area in 2016														
Population	Imperial	Pct.	Los Angeles	Pct.	Orange	Pct.	Riverside	Pct.	San Bernardino	Pct.	Ventura	Pct.	Region	Pct.
White	294	17%	248,403	18%	235,910	26%	63,039	35%	33,208	19%	42,045	29%	622,898	22%
Minority	1,432	83%	1,121,207	82%	667,870	74%	116,152	65%	137,585	81%	103,751	71%	2,147,997	78%
Hispanic	952	55%	793,001	58%	408,556	45%	93,289	52%	107,162	63%	86,803	60%	1,489,763	54%
African American	74	4%	137,278	10%	18,502	2%	10,482	6%	16,565	10%	3,114	2%	186,015	7%
Native American	332	19%	3,224	0%	1,831	0%	692	0%	380	0%	344	0%	6,803	0%
Asian	25	1%	158,008	12%	219,090	24%	7,428	4%	9,671	6%	10,204	7%	404,426	15%
Other Race	49	3%	29,696	2%	19,891	2%	4,261	2%	3,807	2%	3,286	2%	60,990	2%
Age 0 to 4	223	13%	97,523	7%	59,145	7%	12,070	7%	13,928	8%	11,094	8%	193,982	7%
Senior (65+)	349	20%	162,281	12%	110,846	12%	27,348	15%	14,802	9%	17,949	12%	333,575	12%
Disabled	322	19%	145,881	11%	81,417	9%	25,384	14%	18,648	11%	18,481	13%	290,132	10%
Total	1,726	0%	1,369,610	49%	903,780	33%	179,191	6%	170,793	6%	145,796	5%	2,770,895	100%
Household in 500 Year Hazard Area in 2016														
Households	Imperial	Pct.	Los Angeles	Pct.	Orange	Pct.	Riverside	Pct.	San Bernardino	Pct.	Ventura	Pct.	Region	Pct.
Poverty 1	197	23%	64,787	16%	34,817	14%	10,128	18%	8,720	19%	6,224	15%	124,873	16%
Poverty 2	182	22%	49,494	12%	27,507	11%	6,652	12%	5,972	13%	4,076	10%	93,883	12%
Poverty 3	145	17%	43,881	11%	26,355	10%	6,509	12%	6,131	13%	4,218	10%	87,239	11%
Quintile 1	460	55%	90,376	22%	47,059	18%	13,684	25%	10,640	23%	7,180	17%	169,400	21%
Quintile 2	166	20%	84,064	21%	49,378	19%	12,817	23%	11,044	24%	8,303	20%	165,772	21%
Quintile 3	81	10%	85,800	21%	56,919	22%	11,992	22%	10,617	23%	9,746	23%	175,153	22%
Quintile 4	95	11%	80,206	20%	56,814	22%	9,955	18%	9,137	20%	9,556	23%	165,763	21%
Quintile 5	40	5%	61,880	15%	44,471	17%	6,441	12%	5,016	11%	6,991	17%	124,839	16%
Total	842	0%	402,326	50%	254,640	32%	54,889	7%	46,453	6%	41,776	5%	800,927	100%

Source: SCAG, Federal Emergency Management Agency, Census

PUBLIC HEALTH IMPACTS S

Unlike the field of medicine, public health does not focus on individual patients or the treatment of particular diseases. Rather, public health initiatives seek to prevent disease and injury while promoting health and prolonging life among the population as a whole. Public health outcomes are the product of the Social Determinants of Health (SDOH), or the circumstances in which people are born, grow up, live, work, play and age. Economic opportunities, government policies and the built environment all play a role in shaping these circumstances and influencing public health outcomes. The Office of Disease Prevention and Health Promotion's Healthy People 2020 Initiative organizes the SDOH into five key domains: (1) Social and Community Context; (2) Health and Health Care; (3) Economic Stability; (4) Education; and, (5) Neighborhood and Built Environment. A growing body of evidence links neighborhood and built environment characteristics such as transportation and land use patterns to health behaviors that can either support or discourage healthy, active and safe lifestyles. This has led to interest, both nationally and across California, in expanding consideration of health outcomes of regional land use and transportation planning efforts. This section will specifically look at some of the existing public health conditions experienced by low income and minority residents throughout the SCAG region, and will breakdown the demographics of the neighborhoods that experience the highest risk for health exposure.

METHODOLOGY

Existing health conditions are examined by looking at the health information from Cal/EPA's CalEnviroScreen Tool, which provides census tract level data on ozone concentrations in the air, $PM_{2.5}$ concentrations in the air, diesel PM emissions, high-hazard/high-volatility pesticides, toxic releases from facilities, traffic density, drinking water contaminants, toxic cleanup sites, groundwater threats, hazardous waste facilities and generators, impaired water bodies, solid waste sites, asthma emergency room (ER) visits, and low birth-weight infants. Populations that live in the highest risk areas in the SCAG region for each of these criteria are examined. Relative vulnerability in SCAG's EJ communities are also compared to the remainder of the State of California.

RESULTS

CALENVIROSCREEN PUBLIC HEALTH VULNERABILITY ANALYSIS

Cal/EPA's office of Environmental Health Hazard Assessment (OEHHA) released the latest version of its environmental health screening tool, CalEnviroScreen 3.0, in January 2017. This groundbreaking tool helps to identify cumulative impacts from a comprehensive set of health and environmental indicators for each census tract in the State of California, and it has been used to designate "SB 535 Disadvantaged Areas" that are eligible for projects funded from the state's Cap-and-Trade auctions. The tool uses data from twelve different types of pollution factors to determine the relative amount of exposure for each census tract, along with seven population and socioeconomic factors to assess vulnerability. SCAG will examine 15 of these criteria to assess existing public health conditions in the region.

Since CalEnviroScreen is meant to be used as a comparative tool, detailed data for each criterion will not be included. Instead, this analysis will show how the region performs relative to all census tracts in the state. Due to the variation in geographic unit (census tract vs. a combination of multiple census tracts), raw criterion scores were converted to density and then ranked low to high based upon each criterion's concentrations for a given area. Ranked percentiles for each tract and larger geographic unit were then determined to compare risk in a given geography to all other tracts in the state. The higher a score is on a scale of zero to 100, the higher the observed exposure. **TABLE 33** shows the performance of the greater SCAG region for the selected criteria. SCAG performs relatively better for the instances of $PM_{2.5}$ Concentrations in the Air than all other variables. This could be due to the fact that the SCAG region is very large, and 98 percent of the region's population live in Urban Areas, which represent only 13 percent of the region's overall land area.

To get a better idea of how various communities in the SCAG region compare to the state, similar analyses were completed for COC, SB 535 Disadvantaged Areas, and EJ Areas. COC show consistently some of the highest exposure,

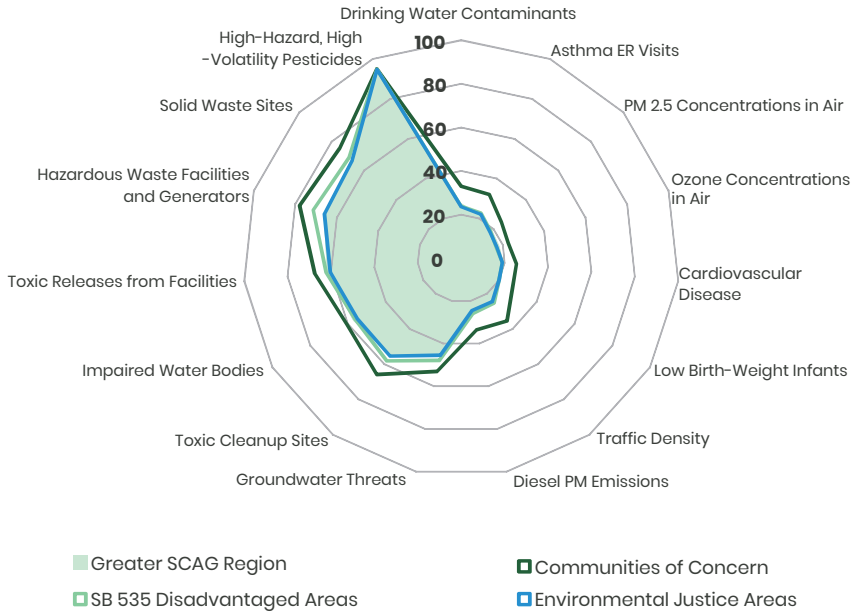
compared to the other geographies. SB 535 Disadvantaged Areas and EJ Areas perform in a pattern similar to the region as a whole. Communities of Concern place in the 78th percentile and higher for risk in Hazardous Waste Facilities and Generators, while the SCAG region falls in the 66th percentile. **FIGURE 20** visualizes this Table using a "spider chart," where a larger "spider web" indicates a higher risk for a particular geography.

TABLE 33 Criterion Exposure by Geography Relative to all Census Tracts in the State

CalEnviroScreen Criteria	Greater SCAG Region	Communities of Concern	SB 535 Disadvantaged Areas	Environmental Justice
Asthma ER Visits	21.8	31.9	22.5	22.1
$PM_{2.5}$ Concentrations in Air	19.2	24.8	18.3	17.9
Drinking Water Contaminants	25.1	32.9	23.7	23.6
Traffic Density	25.5	35.6	25.4	24.4
Diesel PM Emissions	24.5	33.6	26	24.5
Groundwater Threats	46	53	47.9	45.5
Toxic Cleanup Sites	55.5	65.8	58.2	55.4
Impaired Water Bodies	57.2	60.5	55.9	55.2
Hazardous Waste Facilities and Generators	66.4	77.9	71.3	66
Ozone Concentrations in Air	18.4	22.7	16.9	17
Toxic Release from Facilities	61.8	67.5	62.3	60.4
Solid Waste Sites	67.6	75.1	69.2	67.1
High-Hazard, High-Volatility Pesticides	95.1	95.1	94.8	94.7
Low Birth-Weight Infants	20.4	27.1	20	20
Cardio Vascular Disease	19.6	25.4	19	18.9

Source: SCAG, CalenviroScreen 3.0, Census

FIGURE 20 Criterion Exposure by Geography Relative to all Census Tracts in the State

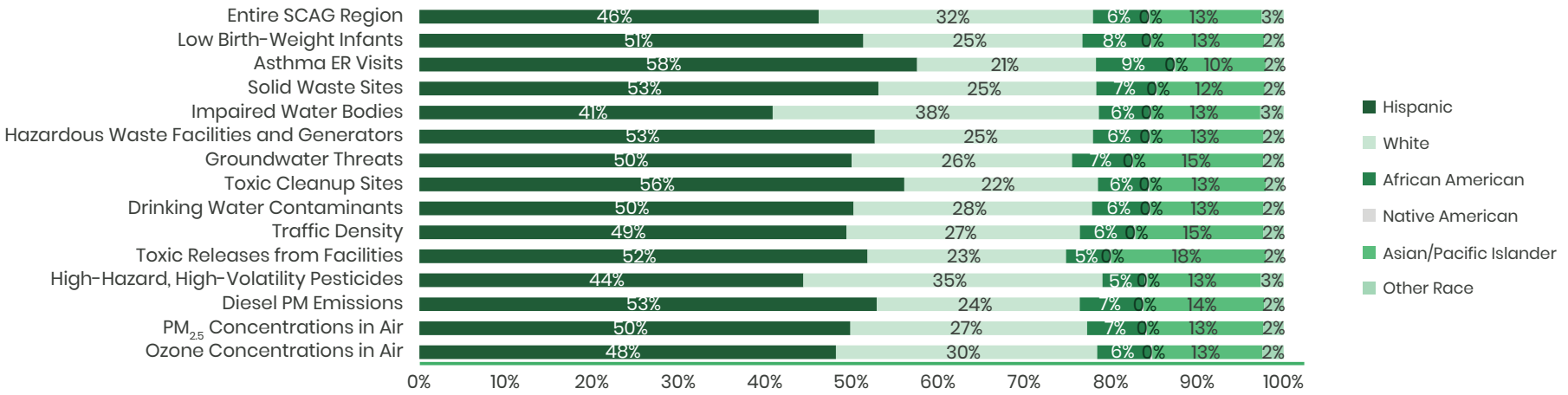


Source: CalEnviroScreen and SCAG

Along with examining how the region compares to all census tracts in the state, this appendix also looks at the areas with the highest risk relative only to the SCAG region by examining the population characteristics for the census tracts that place in the top 75th percentile and above in each of the measured CalEnviroScreen variables. **FIGURE 21** shows the race/ethnicity for populations that live in the highest risk areas for each of the exposure criteria. By comparing the breakdown of population by race/ethnicity in these areas with each group's share of the region as a whole, it is possible to determine if a particular group is experiencing relatively higher risk than others. For instance, Hispanics represent 46 percent of the population in 2016 in the greater SCAG region, but represent 63 percent of the population in areas that experience the highest amount of asthma-related emergency room visits and 44 percent of the population with the highest concentration of impaired water bodies. **FIGURE 22** lists the breakdown of households by income quintile for these same areas. **FIGURE 23** looks at the distribution of households below (or near) the poverty level.

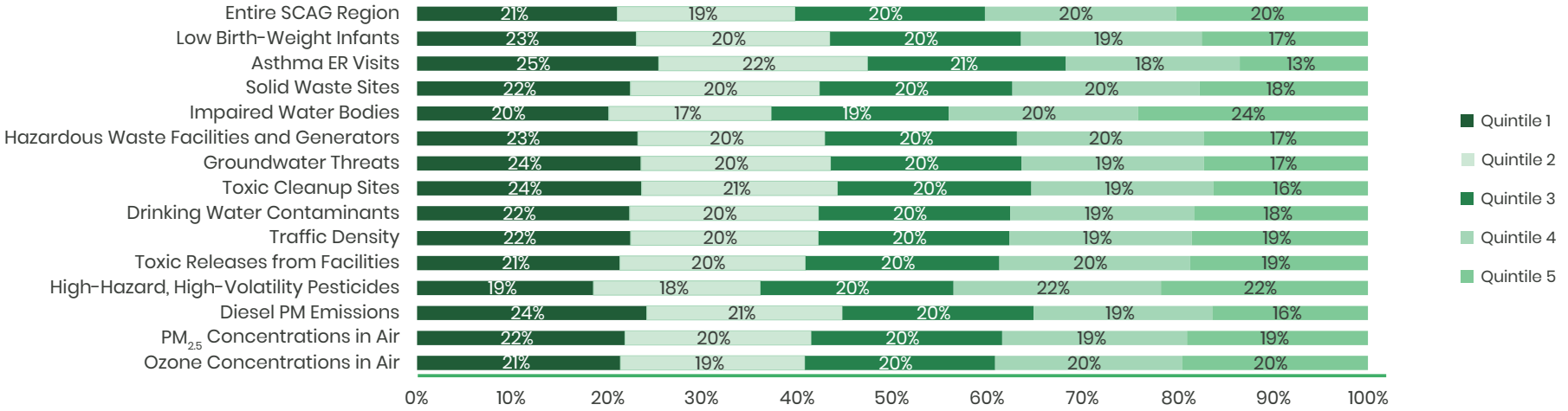
From this information, we can see that some areas with the highest exposure to health risks are often predominately home to low-income and minority population groups. Please refer to SCAG's EJ Toolbox located at the end of this report for more information on best practices regarding approaches for improving public health in local communities. For more information on Public Health, and its Social Determinants, please visit the Public Health Technical Report of the Connect SoCal Plan.

FIGURE 21 Population in the Highest Regional Exposure Areas by Race/Ethnicity



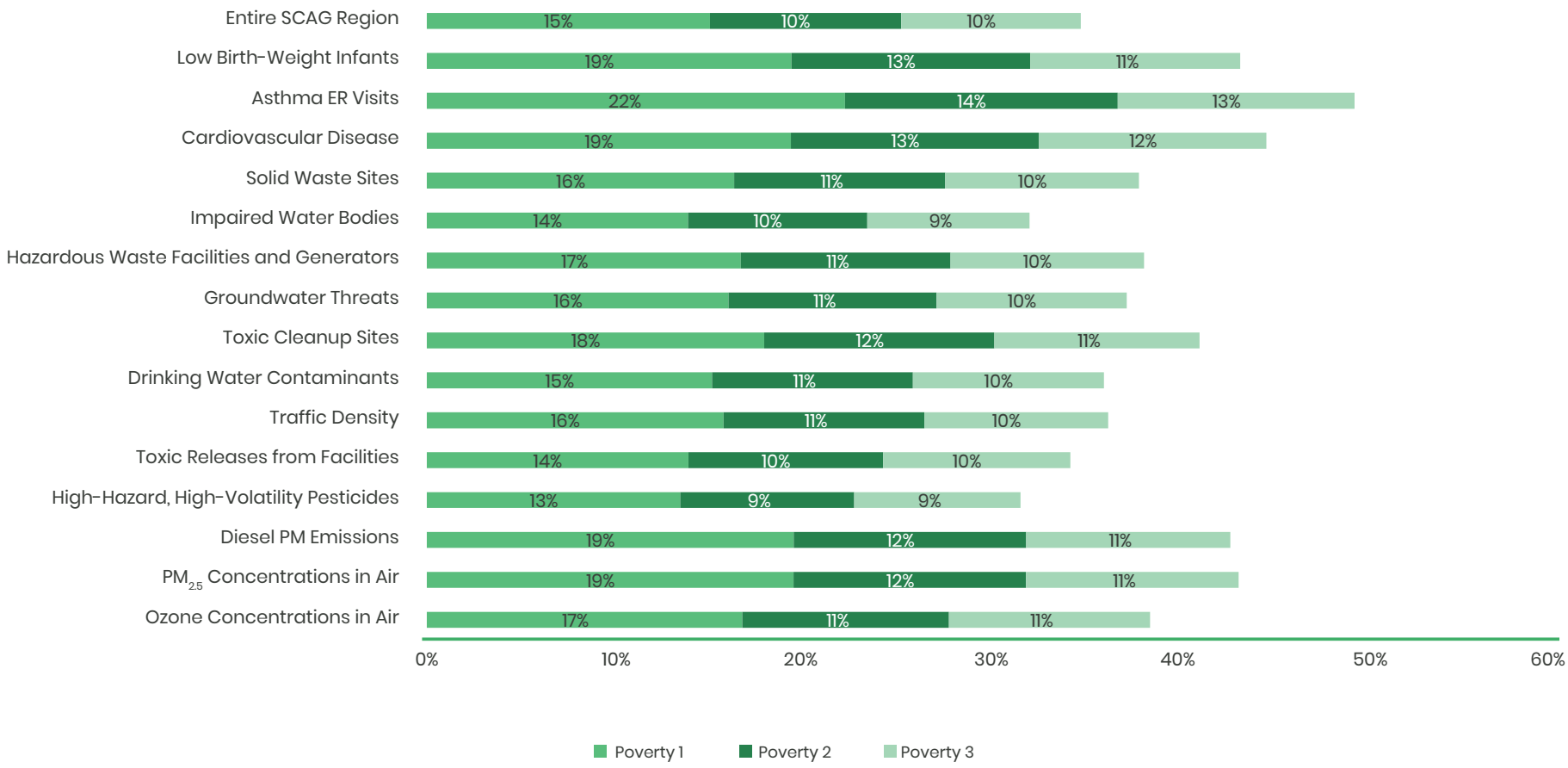
Source: CalEnviroScreen and SCAG

FIGURE 22 Population in the Highest Regional Exposure Areas by Income Quintile



Source: CalEnviroScreen and SCAG

FIGURE 23 **Population in the Highest Regional Exposure Areas at or near the Federal Poverty Level**



Source: CalEnviroScreen and SCAG

NOISE IMPACT ANALYSES

AVIATION NOISE IMPACTS CI LU N S

THE SCAG REGION

The six-county SCAG region is home to an expansive multiple airport system that includes seven commercial airports with scheduled passenger service, seven government/military airfields, and over 30 reliever and general aviation airports. More specifically, the seven commercial service airports in the region with scheduled passenger service are: Hollywood-Burbank (BUR), Imperial (IPL), Long Beach (LGB), Los Angeles (LAX), Ontario (ONT), Palm Springs (PSP), and Santa Ana (SNA). Sixteen of the airports in the region are designated by the Federal Aviation Administration (FAA) as reliever airports, which means that those airports could provide congestion relief for any of the commercial service airports in the region if needed. Furthermore, of the reliever and general aviation airports, several have the capacity to include scheduled commercial air service in the future if needed. Five of the reliever airports are forecasted to facilitate passenger demand in the 2020-2045 RTP/SCS (Connect SoCal): Oxnard (OXR), Palmdale (PMD), March (RIV), San Bernardino International (SBD), and Southern California Logistics (VCV). With such a large and versatile transportation system, the SCAG region airports support a significant amount of passenger and goods movement, and the subsequent volume of air traffic. As a result of the high amount of air traffic, there are potential concerns with aviation noise.

NOISE FUNDAMENTALS

Noise is defined as unexpected and unwanted sound. Unlike other linear measures, such as weight and time, noise levels are measured in decibels (dB) on a logarithmic scale. Thus, doubling a noise source, such as air traffic volume, does not double the noise level, but instead increases the resultant noise level by 3-dB. Conversely, reducing a noise source in half results in a 3-dB decrease. Thus, due to the logarithmic scale of the decibel unit, sound levels are not added or subtracted arithmetically. Moreover, in cases where existing ambient noise levels are already relatively high, there will be a small change in overall noise levels when a newer and lesser noise source is added. For example, when 70 dB ambient noise levels are combined with a 60-dB noise source, the resulting noise level equals 70.4 dB.[7]

Specifically concerning aviation, noise impacts are associated with aircraft operations. In particular, aircraft operations can generate substantial levels of noise exposure when one is in the immediate vicinity of airport runways, or when one is near the flight path of an aircraft departure or approach at lower altitudes. In addition to proximity to runways and departure/approach flight paths, other contributing factors to noise impacts include duration of noise exposure, the type of aircraft operated, number of aircraft operations (e.g. take-offs, landings, flyovers), altitude of the aircraft, and atmospheric conditions, which may influence the direction of aircraft operations and affect noise propagation.[8]

A significant challenge in managing and mitigating aircraft noise is that not every person or community perceives and responds to aircraft noise in the same way. From an individual to the neighborhood level, there are different thresholds and tolerances for sound. Furthermore, one community (e.g. urban environment) may deem a land use (e.g. airport expansion) acceptable within a certain noise level, while another (e.g. suburban) might not.[9] Therefore, the challenge remains in determining appropriate noise policies (e.g. land-use, restrictions on aircraft operations, curfews) in the face of varying, sometimes contradicting, reactions to aircraft sound.

NOISE REGULATIONS AND REQUIREMENTS

In 1976, the Secretary of Transportation and the Administrator of the Federal Aviation Administration (FAA) issued the Aviation Noise Abatement Policy (ANAP). The ANAP was the first comprehensive aviation noise abatement policy in the United States (U.S.). In defining the "aircraft noise problem," ANAP characterized aircraft noise exposure to a Day-Night Average Sound Level (DNL) of 65 to 75

7 SANDAG. 2050 RTP/SCS Final Environmental Impact Report (EIR). Section 4.12 Noise and Vibration.
8 SANDAG. 2050 RTP/SCS Final Environmental Impact Report (EIR). Section 4.12 Noise and Vibration.
9 SANDAG. 2050 RTP/SCS Final Environmental Impact Report (EIR). Section 4.12 Noise and Vibration.

dBA in residential areas as "significant", and a DNL of 75 dBA or more as "severe". Furthermore, ANAP established that noise created by aircraft can negatively impact the quality of life for people that reside within 65 CNEL (Community Noise Equivalency Level).[10] A CNEL is a measure for the sound exposure a community experiences in an estimated 24-hour period.[11] Thus, experiencing 65 or more db for over 24-hours would exceed the ANAP standard. The ANAP thresholds were based on case studies of previous community responses to aircraft noise.

Following ANAP, the Aviation Safety and Noise Abatement Act of 1979 (ASNA) was enacted in February 1980. The purpose of ANAP was to encourage airport operators to prepare and carry out noise compatibility programs. ASNA required the FAA to promulgate regulations to meet the following three key requirements:

- Establish a single, uniform, repeatable system for considering aviation noise around airport communities.
- Establish a single system for determining noise exposure from aircraft, which takes into account noise intensity, duration of exposure, frequency of operations, and time of occurrence.
- Identify land uses which are normally compatible with various exposures of individuals to noise.

To implement the requirements established under ASNA, the FAA then published, "14 Code of Federal Regulations (CFR) Part 150", which defines land use compatibility guidelines for aviation noise exposure. The CFR Part 150 guidelines consider land use compatibility for different uses over a range of DNL noise exposure levels, including the adoption of DNL 65 dBA as the limit for residential land use compatibility. As stated in the 1981 Federal Register Notice announcing CFR Part 150, the FAA's goal is "reducing substantially the number and extent of noise sensitive areas in the vicinity of airports that are subject to significant noise exposure."[12]

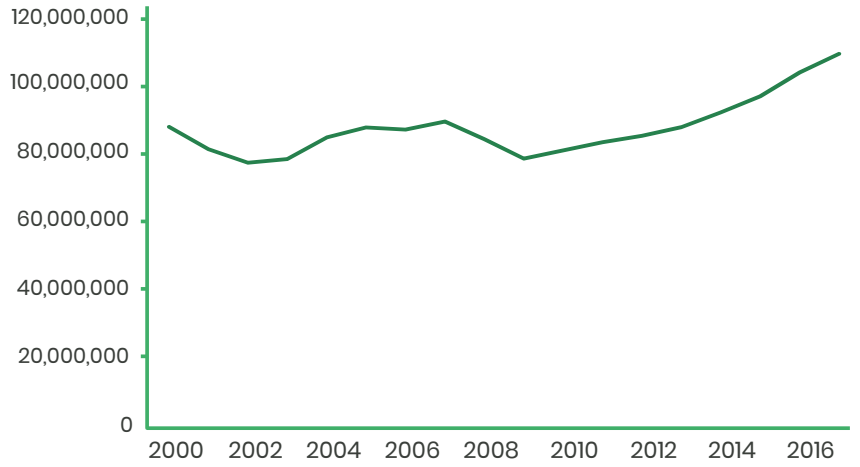
10 Federal Aviation Administration (FAA). History of Noise.
11 Community Noise Equivalent Level (CNEL) is a single number result that is calculated for a complete 24-hour period and usually made up of results taken at shorter intervals such as 5 minutes or 1 hour and then averaged over the whole 24 hours. Evening operations/noise is weighted more than daytime operations.
12 Federal Aviation Administration (FAA). History of Noise.

TRENDS AND DYNAMICS OF AVIATION NOISE IN THE SCAG REGION AND BEYOND

Although the air passenger demand in the SCAG region might raise concerns about aviation noise, the increased passenger activity did not translate to increased aircraft operations. In 2017, the SCAG region airports served 110.17 million annual passengers (MAP).[13] Translated to aircraft operations, in 2017, the SCAG region airports handled approximately 3.7 million aircraft operations (take-offs and landings).[14] However, despite increases in air passenger demand from 2000 to 2017, actual aircraft operations decreased during that same time period.

13 Passenger demand/activity data was compiled from airport activity reports, Caltrans Division of Aeronautics passenger reports, or data provided by Burbank, Long Beach, Los Angeles, Ontario, Palm Springs, and Imperial Airports.
14 Federal Aviation Administration (FAA). Air Traffic Activity Data System.

FIGURE 24 SCAG Region Passenger Demand (2000 to 2017)

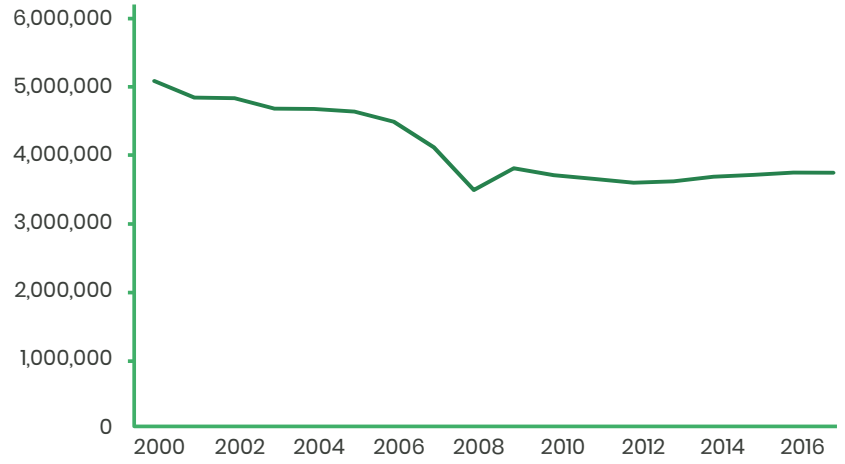


Source: Airport activity data provided by the airports and/or airport websites

Despite air passenger demand increasing at 1.3 percent per year, or 24.5 percent total, from 2000 to 2017, aircraft operations actually decreased by -1.8 percent per year, or -26.51 percent total, during that same time period. Increases in air passenger demand do not equate to increases in aircraft operations, and the subsequent noise impacts associated with increased aircraft operations. The trend in the airline business has been to shrink seats, add additional rows, and operate at higher load factors.[15] In other words, an aircraft on a route that used to have 120 seats, may now have 150 seats, and the previously 120 seat aircraft that was 80 percent full is now a 150 seats aircraft that is 90 percent or more full. However, the noise created by the 150 seats aircraft is the same or reduced due to newer planes and technology.[16] Thus, there are more passenger arrivals and departures with the same number of flights or less.[17]

15 Goldstein, Michael. 2018. "Meet the Most Crowded Airlines: Load Factor Hits All-Time High." Forbes.
16 Federal Aviation Administration (FAA). History of Noise.
17 Goldstein, Michael. 2018. "Meet the Most Crowded Airlines: Load Factor Hits All-Time High." Forbes.

FIGURE 25 SCAG Region Aircraft Operations (2000 to 2017)



Source: FAA ATADS database

Due in part to the increased load factors and larger aircraft, aircraft operations are forecasted by the FAA Terminal Area Forecast (TAF) to grow at a much slower rate than air passenger demand. Passenger activity is forecasted to grow in the SCAG region at 2.1 percent per year, but aircraft operations are forecasted to grow only at 0.74 percent[18] (please see the Aviation and Airport Ground Access Technical Report for more information on air passenger and operations activity and demand forecasts). Therefore, by reducing the number of aircraft operations, the newer technology and practices being employed by the airlines is also affecting overall noise impacts.

SCAG Region Air Passenger Forecast

- Base Year (2017): 110.17 million annual passengers
- Projected growth rate for air passenger demand: 2.1 percent
- Horizon Year (2045): 197.1 million annual passengers

SCAG Region Aircraft Operations Forecast (2017 to 2045)

- Base Year (2017): 3.7 million operations
- Projected growth rate for aircraft operations: 0.74 percent
- Horizon Year (2045): 4.58 million operations

In order to best assess aviation noise impacts, air passenger demand should be observed within the context of the new technology and business practices being employed by the airlines. Since the mid-1970's, the number of people exposed to significant aviation noise exposure in the U.S. has declined from approximately 7 million to just over 400,000 today. At the same time, the number of enplanements (each enplanement equals one person flying on a single commercial flight) has increased from approximately 200 million in 1975 to over 850 million today. In 1975, one person on the ground experienced significant noise exposure for every 30 enplanements, compared to today where more than 2100 enplanements are flown for every person on the ground experiencing significant noise exposure.

18 Federal Aviation Administration (FAA). 2018. Terminal Area Forecast.

According to the FAA, the single-most influential factor in the decrease in exposure to aviation noise was the transition to quieter aircraft. Following the framework established by 14 CFR Part 36, the FAA has adopted increasingly stringent noise certification standards for new aircraft.[19]

In summary, the areas around the airports experiencing significant sounds levels have been reduced through the following: the FAA noise certification standards; the development of new technology by aircraft and engine manufacturers; investments by U.S. airlines in newer, quieter aircraft; and mandates by the FAA and the U.S. Congress to retire older, noisier aircraft. Today's civilian aircraft are quieter than at any time in the history of powered flight, and the FAA, aircraft manufacturers, and airlines, continue to work to reduce aircraft noise at the source.[20] Moreover, today's aircraft are larger, have more passenger capacity, and are operating at higher load factors. Therefore, in addition to planes being quieter, they are also absorbing much of the increased passenger demand, resulting in decreasing and flattening aircraft operations. However, concerned communities and individuals should monitor aviation noise levels and impacts, including viewing the noise contour maps and visiting the noise abatement websites of the airports within their vicinity. The impacts of noise may vary from the community to the individual level. It is the goal of the FAA and the airports to mitigate those impacts across the board.

AGENCY AND AIRPORT NOISE ABATEMENT AND NOISE CONTOUR MAP WEBSITES

Generating noise contour maps requires the use of Aviation Environmental Design Tool (AEDT) or Integrated Noise Model (INM) data collected by the airports, which are sensitive and proprietary, and thus not readily available to the public. The airports are not obligated to share their respective noise data (e.g. INM, AEDT) with other agencies or the public in general. Moreover, specifically concerning noise contour forecasts, many airports do not project noise data out to the necessary horizon years required to support the SCAG EJ analysis. Therefore, without the necessary data (e.g. AEDT, INM), including projections out to 2045, producing noise contour maps and forecasts is not feasible. However, per the Vision 100-Century of Aviation Reauthorization Act (Public Law 108-176), the airports are required to produce airport-level noise contour maps and make them available to the public.[21]

Please use the following resources below for more information on aviation noise impacts, including some of the airport-specific noise management programs and contour maps:

- Federal Aviation Administration (FAA): Airport Noise and Land Use Information, including Noise Exposure Maps (NEMs)
- FAA: Aircraft Noise Issues
- Hollywood Burbank Airport (BUR): Noise Monitoring
- John Wayne Airport (SNA): Access and Noise
- Long Beach Airport (LGB): Noise Abatement website
- Los Angeles International Airport (LAX): Noise Management
- Ontario International Airport (ONT): Noise Management

ROADWAY NOISE IMPACTS CI LU N S

The SCAG region has an extensive roadway system, with nearly 25,000 centerline miles and 70,000 lane miles. It includes one of the country's most extensive High-Occupancy Vehicle (HOV) lane systems and a growing network of High Occupancy Toll (HOT) lanes. The region also has a vast network of arterials and other minor roadways. Noise from these transportation facilities may cause significant environmental concerns.

Exposure to noise is a continuing challenge to individual and community health, especially for low-income and minority populations, who tend to reside in

19 Federal Aviation Administration (FAA). History of Noise.
20 Federal Aviation Administration (FAA). History of Noise.
21 Federal Aviation Administration (FAA): Airport Noise and Land Use Information, including Noise Exposure Maps (NEMs)

higher proportions near busy roadways. To evaluate traffic noise impacts in the context of EJ in the larger region, SCAG conducted spatial analysis using GIS tools with FHWA's Traffic Noise Model (TNM).

METHODOLOGY

This analysis for roadway noise integrated the Federal Highway Administration's (FHWA) noise prediction model (called Traffic Noise Model (TNM)) and California Vehicle Noise (CALVENO) Emission Levels with SCAG's traffic model data to generate noise calculations across the region. Because higher speeds lead to higher noise emissions from motor vehicles, and heavy trucks have greater sound emissions than passenger cars, this analysis takes into account traffic volumes, vehicle types, vehicle speed, and roadway configurations to model traffic sound (noise) levels in each road segment for the SCAG region. This method considered three scenarios for analysis: the Base Year 2016 (existing), Baseline 2045 (trend), and Plan 2045. Information on anticipated vehicle traffic for these scenarios was derived from SCAG's travel demand models, which include data on traffic volume, speed, and vehicle types. There are two vehicle types in this noise computation: autos/light-duty trucks (LDT) and heavy-duty trucks (HDT).

California Department of Transportation (Caltrans) has implemented the robust sound wall installation program. More than 750 miles of sound wall installed in California. However, in this roadway noise methodology, the noise levels compute "free field" sound levels, which represent sound impacts without consideration for attenuation from intervening objects (barriers, buildings, terrain, etc.). In a free field environment, sound spreads spherically from a source and decreases in level at a rate of 6 dB per doubling of distance from a point source, and at a rate of 3 dB per doubling of distance from a line source. Since Caltrans has maintained a very robust sound wall installation program to mitigate noise impacts, one can reasonably conclude that any negative noise impacts that result from this analysis could potentially be mitigated in the future by the installation of sound walls.

The roadway traffic noise analysis is based on CNEL noise measurement. Community Noise Equivalent Level (CNEL) is a noise measurement used in California with higher weighting to evening and night traffic volumes. CNEL computes total noise exposure per day (24 hours), which includes three periods in one day (daytime, evening time, and night time) with different weightings in traffic volume calculations.

$$V_i = A_d \times (P_i, day + 3 \times P_i, evening + 10 \times P_i, night) / 2400$$

V_i	traffic volume (effective volume for a 24-hour period)
A_d	average daily traffic, in vehicles per 24-hour period
P_{day}	percentage (percent) of average daily traffic, daytime (7 am to 7 pm)
$P_{evening}$	percentage (percent) of average daily traffic, evening (7 pm to 10 pm)
P_{night}	percentage (percent) of average daily traffic, nighttime (10 pm to 7 am)
i	vehicle types

To quantify road noise impacts on EJ groups and within areas of concern, a 65 dB CNEL noise contour boundary was generated. The computation is based on the following formula, which considers the noise level of road segments versus distance and is used to determine the approximate distance that the 65 dB noise impact zone will extend out from the road centerline (noise sources).

For calculating the CNEL noise level (L), this computer for creating noise contours (impact areas) considers only distance (r) for attenuation.

Sound level *L* and Distance r

$L2 = L1 - | 20 * \log (r1 / r2) | \quad L2 = L1 - | 10 . \log(r1/ r2)2 |$

$r2 = r1 * 10^{(|L1 - L2|/20)} \quad r1 = r2 / 10^{(|L1 - L2|/20)}$

Using GIS, the percentage of each affected TAZ's land area that fell within the 65-dB CNEL noise zone was identified, and this percentage was applied to the demographic data forecast for this TAZ. The demographic characteristics of each impacted TAZ were aggregated and compared with the regional demographics to determine if there would be any disproportionate impacts on EJ groups.

RESULTS

TABLE 34 shows that in 2016, there are about 3,710 miles of roadway in the 65-dB noise zone, which impacts an 89,900-acre area. There is a 12 percent increase in the amount of roadway mileage that will generate sound levels of 65-dB in the Baseline for 2045, compared to 2016. This will result in noise impacted areas growing by 24 percent to 111,100 acres. Connect SoCal, however, limits the length of 65-dB noise roadways, which are projected to increase by three percent to 4,260 miles. Increased speeds resulting from reduced congestion, however, will marginally improve the area impacted from roadway noise by less than one percent. When looking at the impacts on the region's population, the share of residents in 65-dB roadway noise areas is slightly higher, with 2.1 percent in 2016 and 2.8 percent in 2045. As indicated previously, given the robust sound wall installation program that Caltrans has implemented, the potential locations identified in this analysis and their impacts on EJ populations may be effectively mitigated. Please refer to the EJ Toolbox for additional strategies to reduce potential harm from roadway noise.

The 65-dB noise change by roadway length is visualized in **EXHIBIT 27**.

FIGURE 26 indicates that while areas impacted by roadway noise become slightly larger in 2045, they overlap to a lesser extent in the region's areas of concern: EJA (73 percent vs. 72 percent), DAC (48 percent vs. 48 percent), and COC (24 percent vs. 23 percent). This represents significant improvements in roadway noise for residents in these areas.

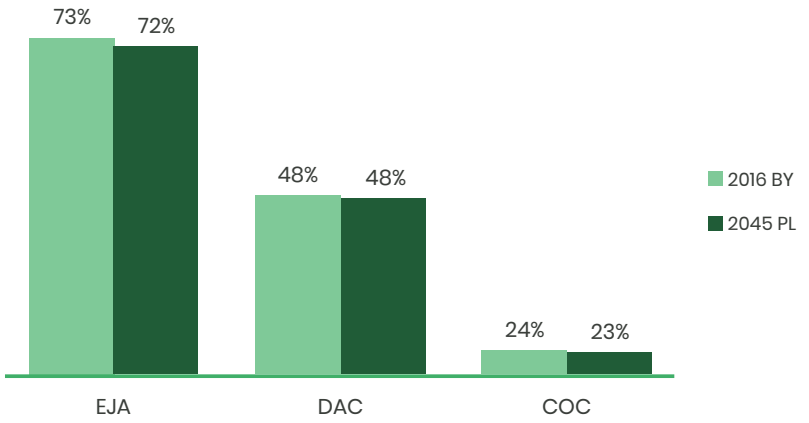
However, Connect SoCal also confirms that minority groups remain the most affected by roadway noise. **TABLE 35** indicates that racial and ethnic minorities account for over 80 percent of the residents in potential roadway noise impacted areas for 2045. The table provides detailed estimates of EJ groups within areas impacted by roadway noise in 2016 and in 2045 for both the Baseline and Plan scenario.

TABLE 34 65-dB Roadway Noise Summary by Area (Acre) and Length (Mile)

	2016 Base Year	2045 Baseline	2045 Plan	Base Year - Baseline	Baseline - Plan
Acre	89,900	111,100	110,200	24%	-1%
Mileage	3,710	4,140	4,260	12%	3%

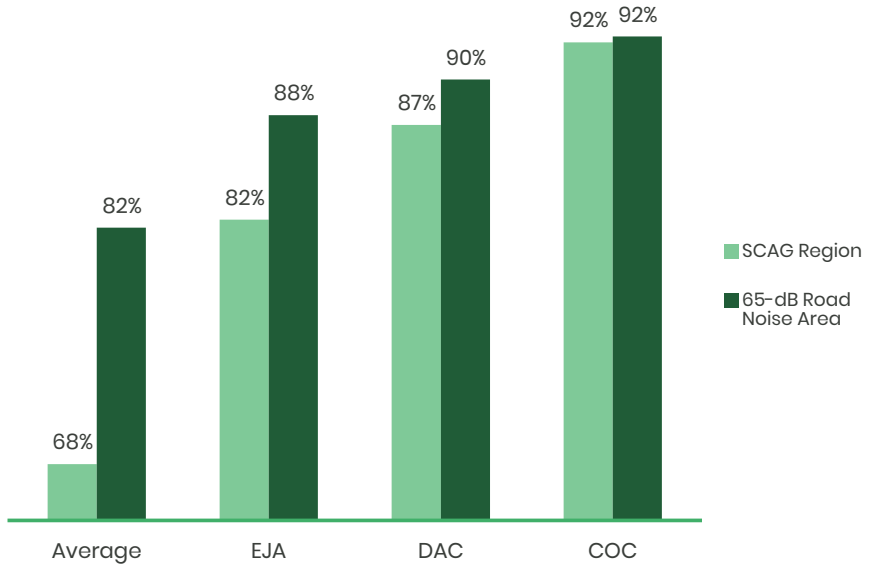
Source: SCAG Travel Demand Model

FIGURE 26 EJ Communities Distribution Within 65-dB Noise Area in 2016 and 2045



Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

FIGURE 27 Ethnicity Group Distribution Within 65-dB Roadway Noise Area in 2045



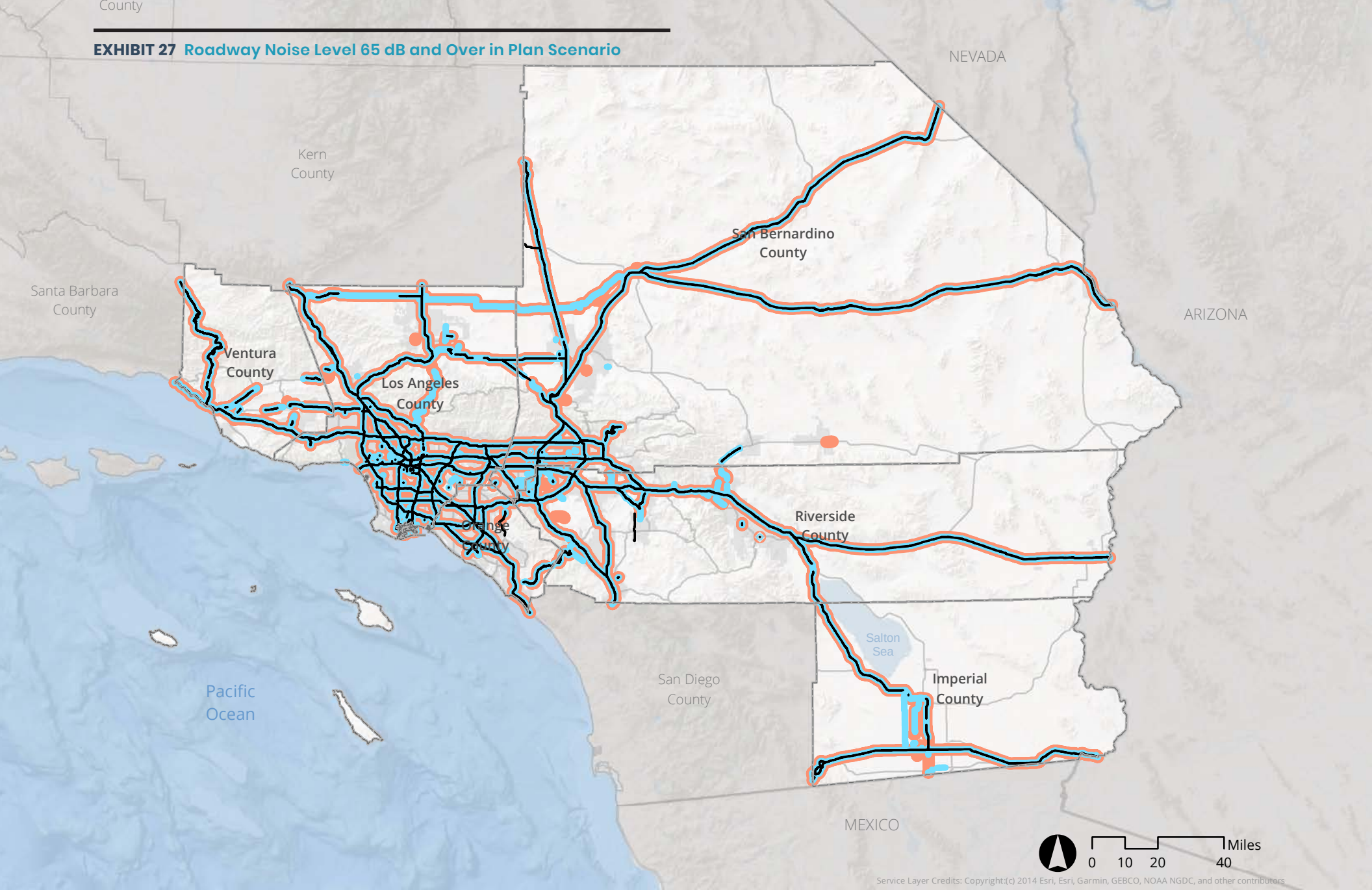
Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

TABLE 35 Distribution of EJ Population Within 65-dB Roadway Noise Area

	Sharing in the Region (2016)				Sharing in 65dB (2016)				Sharing in 65dB (2045 Baseline)				Sharing in 65dB (2045 Plan)			
	SCAG Region	COC	DGA	EJ	SCAG Region	COC	DGA	EJ	SCAG Region	COC	DGA	EJ	SCAG Region	COC	DGA	EJ
Population		**21%**	**34%**	**65%**	**2%**	**24%**	**48%**	**73%**	**3%**	**23%**	**47%**	**72%**	**3%**	**23%**	**48%**	**72%**
Hispanic	46%	71%	67%	59%	51%	72%	67%	60%	56%	71%	67%	62%	56%	71%	67%	62%
White	32%	8%	13%	18%	26%	8%	13%	17%	18%	7%	10%	12%	18%	8%	10%	12%
African American	6%	11%	9%	8%	6%	10%	8%	7%	5%	7%	6%	6%	5%	6%	6%	6%
Native American	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.3%	0.2%	0.3%	0.3%	0.3%	0.2%	0.3%	0.3%
Asian	13%	9%	9%	13%	14%	9%	10%	14%	18%	13%	14%	17%	17%	13%	14%	17%
Other Race	3%	1%	2%	2%	2%	1%	2%	2%	3%	2%	3%	3%	3%	2%	3%	3%
Age 0 to 4	6%	8%	8%	7%	7%	8%	8%	7%	6%	7%	6%	6%	6%	7%	6%	6%
Senior (65+)	13%	10%	10%	11%	12%	10%	11%	11%	21%	18%	18%	19%	21%	19%	19%	19%
Disabled	11%	11%	11%	11%	11%	12%	11%	11%	13%	13%	13%	13%	13%	14%	13%	13%
Households (HH)		**17%**	**30%**	**59%**	**2%**	**20%**	**43%**	**68%**	**3%**	**20%**	**42%**	**68%**	**3%**	**21%**	**43%**	**68%**
Quintile 1	21%	31%	29%	27%	22%	31%	28%	26%	22%	29%	27%	25%	22%	29%	27%	25%
Quintile 2	19%	25%	24%	22%	20%	25%	24%	22%	20%	24%	23%	22%	20%	24%	23%	22%
Quintile 3	20%	20%	21%	21%	21%	20%	21%	21%	22%	21%	22%	22%	21%	21%	22%	22%
Quintile 4	20%	16%	17%	18%	20%	16%	18%	19%	19%	15%	17%	18%	20%	16%	17%	18%
Quintile 5	20%	9%	9%	12%	17%	9%	9%	12%	17%	11%	11%	13%	17%	11%	11%	13%

Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

EXHIBIT 27 Roadway Noise Level 65 dB and Over in Plan Scenario



Source: SCAG, 2019

EMISSIONS IMPACT ANALYSES CI LU S

Exposure to air pollutants is an EJ issue due to the disproportionate share of minority and low-income population living in close proximity to freeways and heavily traveled corridors, particularly near port and logistics activities. This exposure to unhealthy air could result in many premature deaths and many children with asthma and respiratory symptoms. The SCAG region is at particular risk for health impacts due to air quality, as more than half of all Americans exposed to $PM_{2.5}$ pollution exceeding the national standard reside in the SCAG region.

There are 57 air quality monitoring stations around the SCAG region operated by SCAQMD, and other four air districts including 33 stations for $PM_{2.5}$ and 33 stations for ozone. AQMD issues daily air quality forecasts. **TABLE 36** shows the stations within EJA, DAC, and COC areas that are being included here to demonstrate how air quality is measured for various areas of concern in the region.

Air pollution comes from many different sources and can be classified into two types: ozone pollution and particulate matter. Ozone pollution takes a gaseous form and is generated as vapor emitted from fuel commonly used in vehicles, industrial processes, etc. Ozone is formed by the reaction between volatile organic compounds (VOC) and oxides of nitrogen (NOX) in the presence of sunlight. Ozone negatively impacts the respiratory system. Particulate matter (PM_{10} and $PM_{2.5}$) are very fine particles made up of materials such as soot, ash, chemicals, metals and fuel exhaust that are released into the atmosphere. Particulate pollution has been linked to significant health problems, including aggravated asthma, increases in adverse respiratory problems, chronic bronchitis, decreased lung function and premature death.

Transportation projects can have both positive and negative impacts on the environment. On the one hand, investments can cause travelers to shift to less polluting modes (e.g., bus, rail transit, carpooling, or passenger rail). On the other hand, investments that increase traffic on a particular facility usually degrade air quality in the immediate vicinity of that facility.

In order to evaluate the EJ impacts of Connect SoCal, this analysis examines the air pollutant emissions that result from the Plan at the regional level, neighborhood level (i.e. TAZ), and for areas of concern. SCAG's air pollutant emissions analysis is based on emission estimates for pollutants that have localized health effects: carbon monoxide (CO) and particulate matter ($PM_{2.5}$). The analysis is also conducted for $PM_{2.5}$ exhaust emissions from heavy-duty vehicles: an indicator of diesel toxic air contaminants.

TABLE 36 Distribution of Air Quality Monitoring Stations in SCAG Region and EJ Areas

Stations	SCAG Region	EJ	DAC	COC	Region	EJ	DAC	COC
$PM_{2.5}$	33	18	13	5	58%	55%	39%	15%
Ozone	33	27	18	7	58%	82%	55%	21%
Total	57	37	25	9	100%	65%	44%	16%

Note: Some of stations are with multi-monitoring function to air pollutants in air quality monitoring networks
Data Source: SCAQMD, 2019 Annual Air Quality Monitoring Network Plan, and CA ARB Database

METHODOLOGY

Since ambient pollutant concentration levels are directly linked to localized emissions and cannot be easily estimated, the geographic emissions distribution analysis presented here focuses on pollutants that tend to have localized effects. These are generally proportionate to emissions—carbon monoxide (CO) and fine particulate matter ($PM_{2.5}$). The results are computed based on the average emissions (tons per day) at the TAZ level. The analysis does not cover pollutants that do not have localized effects proportionate to emissions but are regionally distributed as a result of chemical interactions, photochemical reactions, and meteorology (VOC, NOX, and SOX).

RESULTS

In the SCAG region, there are great improvements in the reductions of CO and $PM_{2.5}$ emissions that are projected to occur between the Base Year of the Plan, 2016, and 2045. As a result, the percentage of the overall population that resides in areas where CO and $PM_{2.5}$ emissions improve (are reduced) in 2045 increases considerably as well.

TABLE 37 and **TABLE 38** display the difference in CO and $PM_{2.5}$ emissions between 2016 and 2045 for the Baseline scenario. Also presented is the difference in CO and $PM_{2.5}$ resulting from the Plan (Baseline minus Plan) in 2045.

Specifically, CO and $PM_{2.5}$ emissions improve in the SCAG region by 69 percent and 2.4 percent, respectively, when comparing 2016 to the 2045 Baseline. When considering the impacts of Connect SoCal, the Plan will result in an additional six percent and 4.3 percent reduction (as compared to the Baseline) in 2045.

Most areas of concern in the SCAG region (EJA, DAC, and COC) display an equal or greater improvement from 2016 to the 2045 Baseline in CO and $PM_{2.5}$ emissions as compared to the Region as a whole. This is not the case, however, for EJA area, where the reduction by 4.1 percent in $PM_{2.5}$ from 2045 Baseline to Plan is less than the improvement by 4.3 percent incurred at the regional level.

TABLE 39 and **TABLE 40** provide additional information on the population who live in areas that will experience reductions of $PM_{2.5}$ and CO as a result of the Plan. In **TABLE 39**, for instance, 96 percent of the entire population in the region will live in areas that will have decreases in CO Emissions resulting from Connect SoCal. When looking at our areas of concern, 97 percent of the population in EJA will reside in areas where CO emissions show improvements from the Plan. Similarly in DAC, 97 percent of the population would be residing in areas where improvements in CO emissions are projected. In COC, 96 percent of the residents will live in areas where CO emissions are reduced as a result of the Plan.

TABLE 37 CO Emission Reductions

	SCAG Region	EJA	DAC	COC
2016 Base Year vs. 2045 Baseline	69%	69%	69%	71%
Baseline vs. Plan	6%	6%	6%	6%

Source: SCAG Travel Demand Model

TABLE 38 $PM_{2.5}$ Emission Reductions

	SCAG Region	EJA	DAC	COC
2016 Base Year vs. 2045 Baseline	2.4%	2.2%	4.0%	7.0%
Baseline vs. Plan	4.3%	4.1%	4.5%	4.3%

Source: SCAG Travel Demand Model

TABLE 40 shows that 63 percent of the region's population will be living in areas that incur reductions in $PM_{2.5}$ emission as a result of the Plan. Greater improvements for EJA, DAC and COC than the Region as a whole that about 70 percent, 75 percent, and 79 percent of the population will be living in areas that benefit from the Plan, respectively.

At the same time, lower percentages of EJ population (23 percent and 19 percent of population in DAC and COC), compared to 27% of population in the region, will live in areas where $PM_{2.5}$ emissions is increasing as a result of the plan. Although improvements are significant across the region as a result of the Plan, some areas will incur disproportional impacts. **TABLE 41** - **TABLE 44** present information of comparison figures on the population who will be residing in areas that will experience reductions (better air quality) and increases (worse air quality) in $PM_{2.5}$ and CO emissions as a result of the Plan. Information is presented for each race/ethnicity and is broken down by income quintile. In assessing impacts to EJ groups, it is important to compare the concentration of these communities with the region as a whole. In **TABLE 41**, for example, 46 percent of population is Hispanic living in the region in 2016.

However, higher proportions of Hispanic population of the impact areas, 52 percent and 65 percent, will reside in the areas of reductions (better air quality) and increases (worse air quality) in CO mission change between 2016 base year and 2045 baseline, respectively.

Looking into the figures, the concentration of household income quintile for areas that incur improvements in CO and $PM_{2.5}$ emissions is very similar to that of the greater region. Within areas that show increases in CO and $PM_{2.5}$ emissions, Hispanic and African American households by income quintile have the same or show a marginally higher concentration (within one percent) than is seen in the region as a whole. **EXHIBIT 28 - EXHIBIT 31** display the geographic location of areas that show levels of improvements (standard deviation from the mean) of CO and $PM_{2.5}$ emissions in the SCAG region, both from 2016 to the 2045 Baseline and from the Baseline to the Plan.

Building on this analysis, the next section will investigate the impacts of emissions for areas that are in close proximity to freeways and high-traffic roads.

TABLE 39 Population Share by CO Emission Change Areas Resulting from the Plan (vs. Baseline)

	SCAG Region (2016)	Areas with CO Reductions	Areas with CO Increases
SCAG Region	100%	96%	1%
EJA	65%	97%	1%
DAC	34%	97%	1%
COC	21%	96%	2%

Source: SCAG Travel Demand Model

TABLE 40 Population Share by $PM_{2.5}$ Emission Change Areas Resulting from the Plan (vs. Baseline)

	SCAG Region (2016)	Areas with $PM_{2.5}$ Reductions	Areas with $PM_{2.5}$ Increases
SCAG Region	100%	70%	27%
EJA	65%	70%	28%
DAC	34%	75%	23%
COC	21%	79%	19%

Source: SCAG Travel Demand Model

TABLE 41 Distribution of EJ Population Within CO Emission Change Between 2016 Base Year and 2045 Baseline

	SCAG Region (2016)	CO Better	CO Worse
Population			
Hispanic	46%	52%	65%
White	32%	22%	18%
African American	6%	5%	6%
Native American	0.2%	0.3%	0.9%
Asian	13%	17%	7%
Other Race	3%	3%	3%
Age 0 to 4	6%	5%	5%
Senior (65+)	13%	21%	20%
Disabled	11%	13%	15%
Households			
Quintile 1	21%	21%	24%
Quintile 2	19%	19%	19%
Quintile 3	20%	21%	22%
Quintile 4	20%	19%	19%
Quintile 5	20%	20%	16%

Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

TABLE 42 Distribution of EJ Population Within $PM_{2.5}$ Emission Change Between 2016 Base Year and 2045 Baseline

	SCAG Region (2016)	$PM_{2.5}$ Better	$PM_{2.5}$ Worse
Population			
Hispanic	46%	50%	55%
White	32%	22%	21%
African American	6%	4%	7%
Native American	0.20%	0.30%	0.40%
Asian	13%	19%	14%
Other Race	3%	3%	3%
Age 0 to 4	6%	5%	5%
Senior (65+)	13%	21%	20%
Disabled	11%	12%	13%
Households			
Quintile 1	21%	21%	22%
Quintile 2	19%	19%	19%
Quintile 3	20%	21%	21%
Quintile 4	20%	19%	19%
Quintile 5	20%	21%	19%

Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

TABLE 43 Distribution of EJ Population Within CO Emission Change Between Baseline and Plan in 2045

	SCAG Region (2045)	CO Better	CO Worse
Population			
Hispanic	52%	51%	55%
White	22%	22%	21%
African American	5%	5%	6%
Native American	0.30%	0.30%	0.40%
Asian	17%	17%	15%
Other Race	3%	3%	3%
Age 0 to 4	5%	5%	6%
Senior (65+)	21%	20%	21%
Disabled	13%	13%	14%
Households			
Quintile 1	21%	21%	23%
Quintile 2	19%	19%	20%
Quintile 3	20%	20%	21%
Quintile 4	20%	20%	18%
Quintile 5	20%	20%	18%

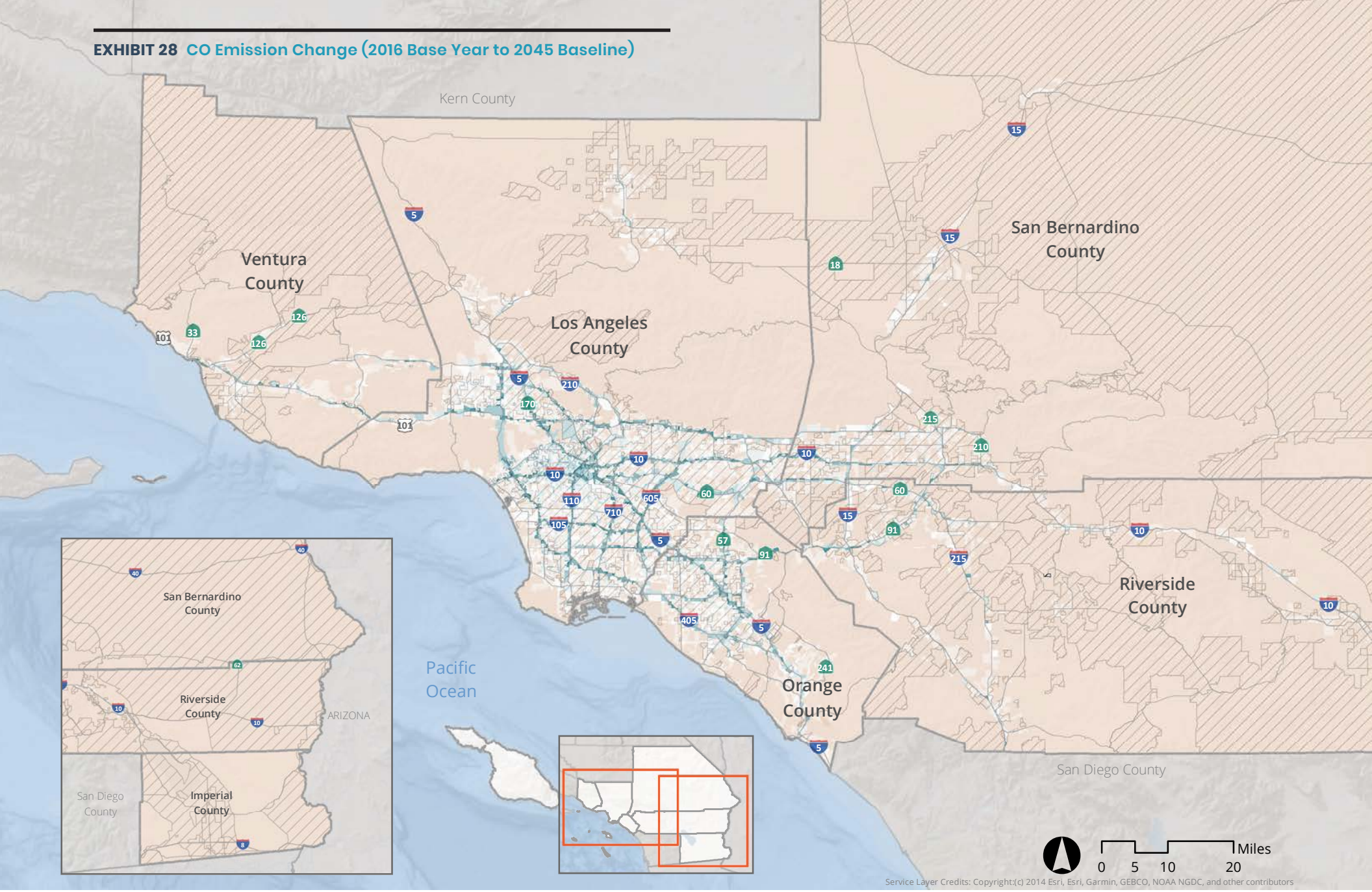
Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

TABLE 44 Distribution of EJ Population Within $PM_{2.5}$ Emission Change Between Baseline and Plan in 2045

	SCAG Region (2045)	$PM_{2.5}$ Better	$PM_{2.5}$ Worse
Population			
Hispanic	52%	51%	55%
White	22%	22%	21%
African American	5%	5%	6%
Native American	0.3%	0.3%	0.4%
Asian	17%	18%	15%
Other Race	3%	3%	3%
Age 0 to 4	5%	5%	6%
Senior (65+)	21%	20%	21%
Disabled	13%	13%	14%
Households			
Quintile 1	21%	21%	23%
Quintile 2	19%	19%	20%
Quintile 3	20%	20%	21%
Quintile 4	20%	20%	19%
Quintile 5	20%	20%	18%

Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

EXHIBIT 28 CO Emission Change (2016 Base Year to 2045 Baseline)



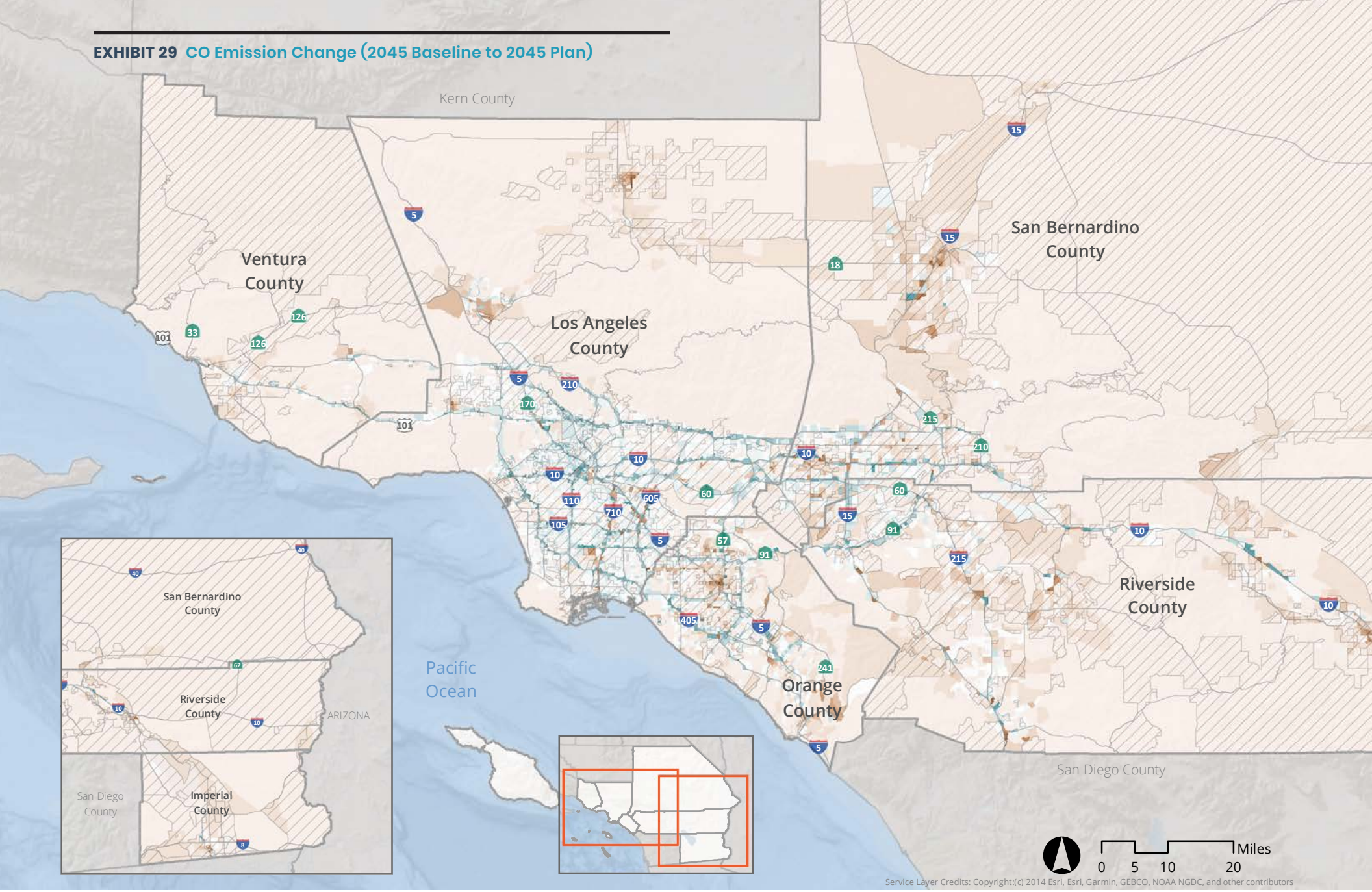
County Boundaries EJ Area Freeway

CO Emission Improvement

Less — More

Source: SCAG, 2019

EXHIBIT 29 CO Emission Change (2045 Baseline to 2045 Plan)



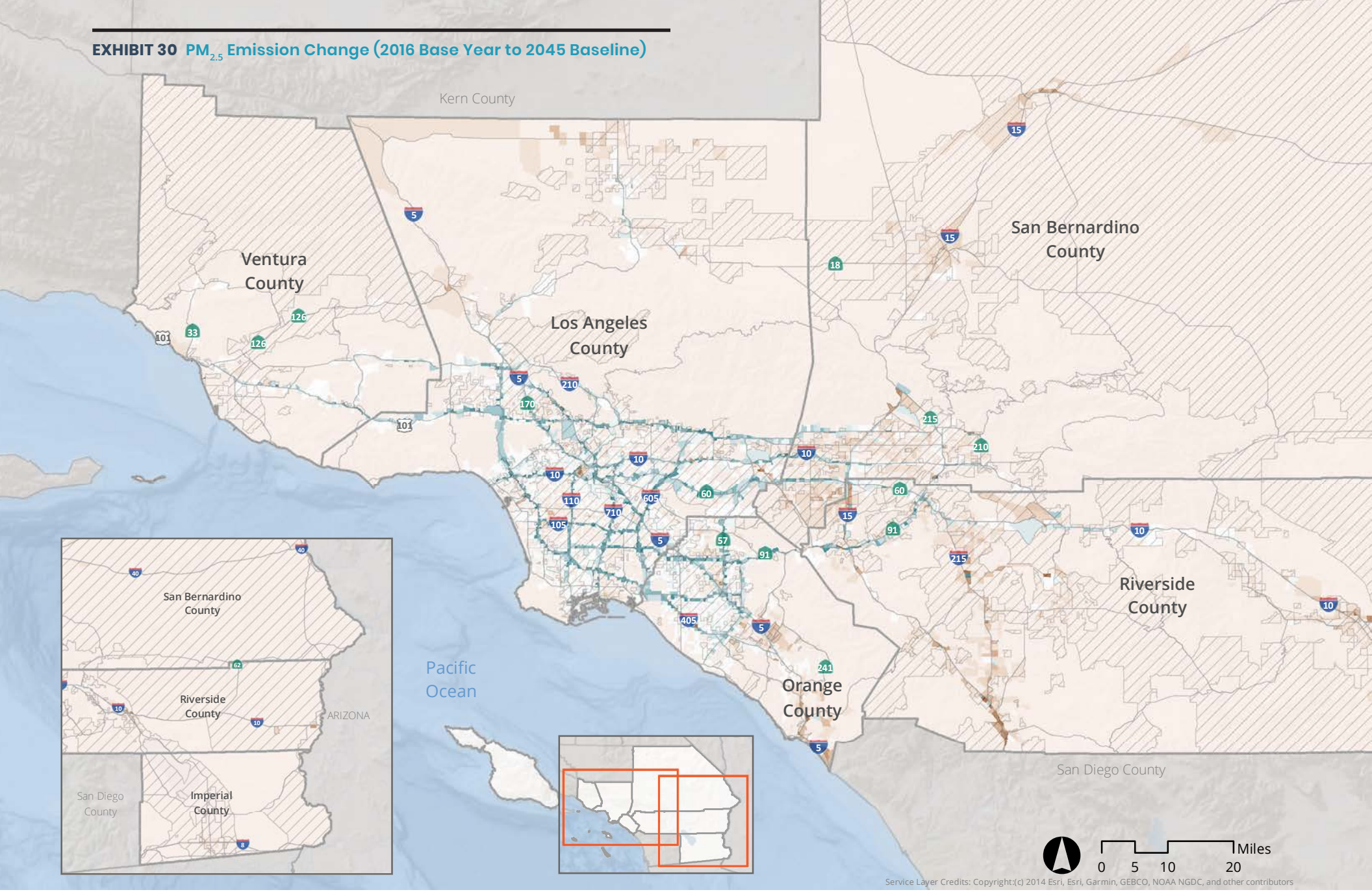
County Boundaries EJ Area Freeway

CO Emission Improvement

Less — More

Source: SCAG, 2019

EXHIBIT 30 $PM_{2.5}$ Emission Change (2016 Base Year to 2045 Baseline)



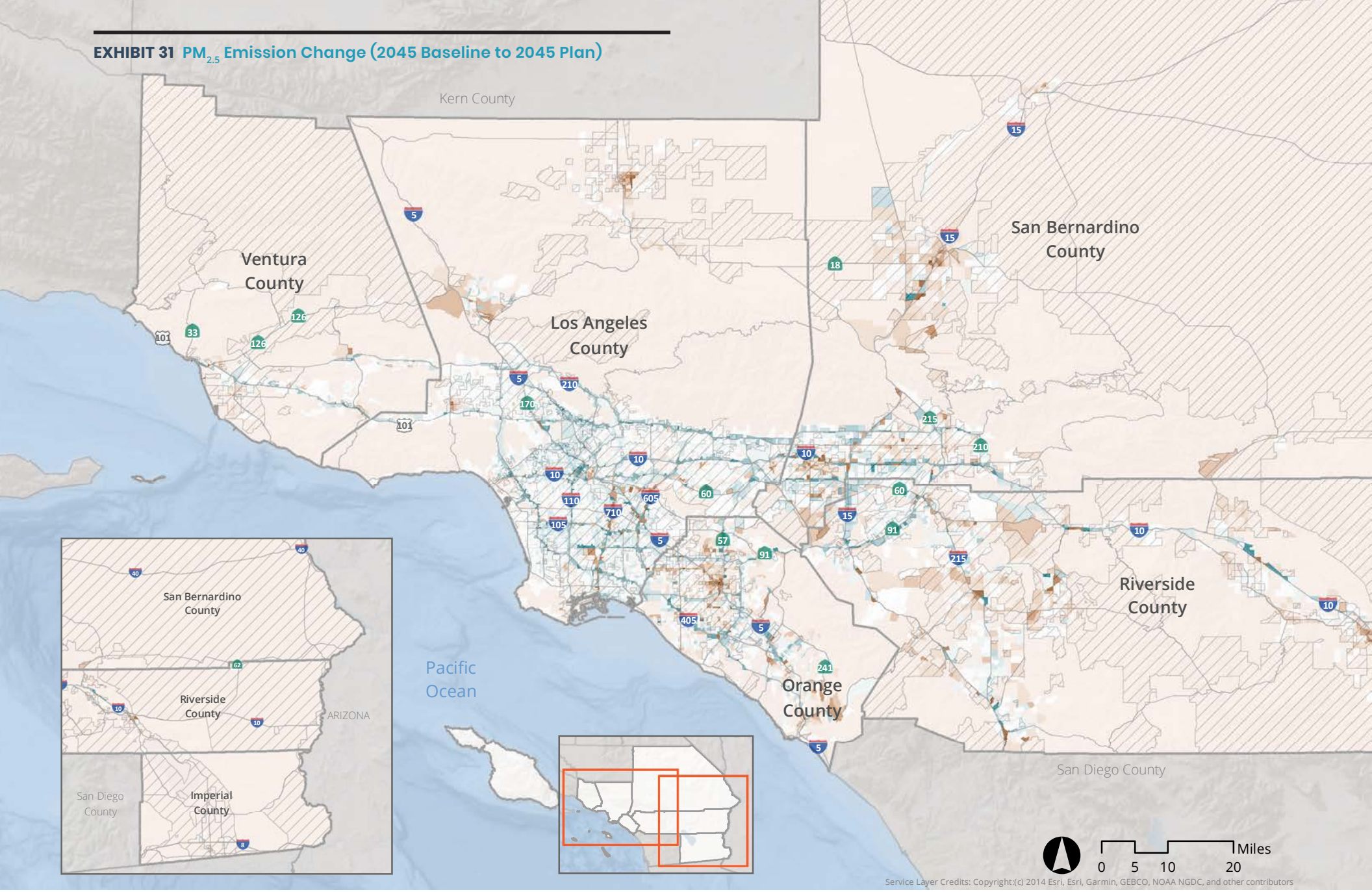
County Boundaries EJ Area Freeway

PM2.5 Emission Improvement

Less — More

Source: SCAG, 2019

EXHIBIT 31 $PM_{2.5}$ Emission Change (2045 Baseline to 2045 Plan)



County Boundaries EJ Area Freeway

PM2.5 Emission Improvement

Less — More

Source: SCAG, 2019

EMISSION IMPACTS ALONG FREEWAYS AND HIGH-TRAFFIC ROADS CI LU S

Exposure levels to PM and CO are often higher in areas adjacent to freeway and high-traffic roads than is seen elsewhere in the region. The average exposure to the nearby residents, workers and other sensitive receptors located near freeway and high-traffic roads can be much higher than other places in the region is measured by a concentration index (for example, emissions divided by land area).

METHODOLOGY

SCAG prepared additional analyses to highlight the emissions exposure within 500 feet of freeways and high-traffic roads. Steps included:

- Estimate the distribution of EJ groups within 500 feet of freeways and high-traffic roads
- Estimate households and employment within (1) 500 feet of freeways and high-traffic roads, (2) HQTAs and (3) the overlapped area of HQTAs and 500 feet of freeways and high-traffic roads
- Estimate the CO and PM emission reductions within 500 feet of freeways and high-traffic roads
- Estimate the distribution of EJ groups within 500 feet of freeways and high-traffic roads impacted by changes in CO and PM

RESULTS

The following tables and figures present a comparison of the distribution of EJ demographic groups in the areas adjacent to freeways and high-traffic roads with those in the greater SCAG region for the 2016 Base Year and for the 2045 planned year projection. As indicated in **TABLE 45** and **FIGURE 28** - **FIGURE 33**, most EJ population groups show higher concentrations in areas near freeway and high-traffic roads than is seen in the greater region, except for seniors over age 65, African Americans, and those identifying as “Other Race.” Alternatively, there is a relatively low presence of Whites and households in the highest income quintiles for areas near freeways and high-traffic roads.

TABLE 45 Distribution of EJ Demographic Groups Along Freeways and High-Traffic Roads

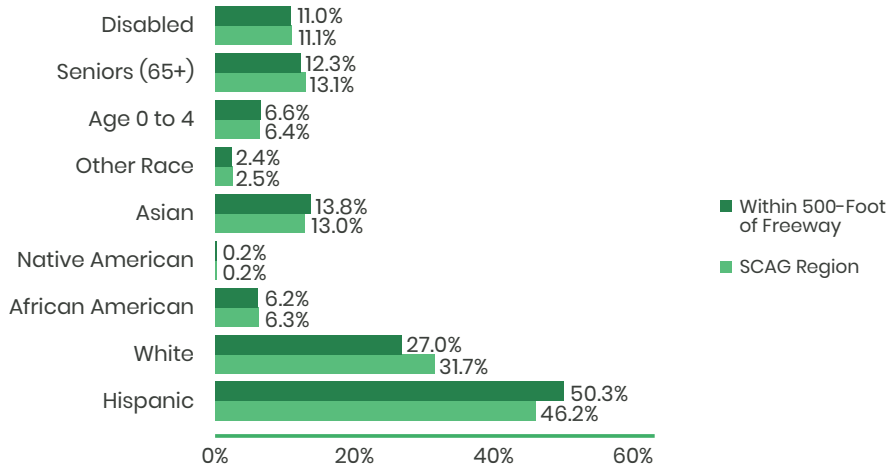
	500-Foot Freeway Buffer			SCAG Region		
	2016 Base Year	2045 Baseline	2045 Plan	2016 Base Year	2045 Baseline	2045 Plan
Population						
Hispanic	50%	55%	54%	46%	52%	52%
White	27%	19%	18%	32%	22%	22%
African American	6%	5%	5%	6%	5%	5%
Native American	0%	0%	0%	0%	0%	0%
Asian	14%	18%	19%	13%	17%	17%
Other Race	2%	3%	3%	3%	3%	3%
Age 0 to 4	7%	6%	6%	6%	5%	5%
Seniors (65+)	12%	21%	20%	13%	21%	21%
Disabled	11%	13%	13%	11%	13%	13%
Households						
Poverty 1*	16%	15%	15%	15%	14%	14%
Poverty 2*	11%	11%	11%	10%	10%	10%
Poverty 3*	10%	10%	10%	10%	10%	9%
Quintile 1	22%	22%	22%	21%	21%	21%
Quintile 2	19%	20%	20%	19%	19%	19%
Quintile 3	21%	21%	21%	20%	21%	20%
Quintile 4	20%	19%	19%	20%	19%	20%
Quintile 5	17%	18%	17%	20%	20%	20%
Hispanic Quintile 1	9%	10%	10%	8%	10%	9%
White Quintile 1	7%	6%	5%	8%	6%	6%
African American Quintile 1	3%	2%	2%	3%	2%	2%
Native American Quintile 1	0%	0%	0%	0%	0%	0%
Asian Quintile 1	3%	3%	4%	2%	3%	3%
Other Race Quintile 1	1%	1%	1%	0%	1%	1%

TABLE 45 Distribution of EJ Demographic Groups Along Freeways and High-Traffic Roads - Continued

	500-Foot Freeway Buffer			SCAG Region		
	2016 Base Year	2045 Baseline	2045 Plan	2016 Base Year	2045 Baseline	2045 Plan
Hispanic Quintile 2	9%	10%	10%	8%	10%	10%
White Quintile 2	6%	5%	5%	7%	5%	5%
African American Quintile 2	2%	1%	1%	2%	1%	1%
Native American Quintile 2	0%	0%	0%	0%	0%	0%
Asian Quintile 2	2%	3%	3%	2%	2%	2%
Other Race Quintile 2	0%	0%	0%	0%	0%	0%
Hispanic Quintile 3	9%	10%	10%	8%	10%	9%
White Quintile 3	8%	6%	5%	8%	6%	6%
African American Quintile 3	2%	1%	1%	2%	1%	1%
Native American Quintile 3	0%	0%	0%	0%	0%	0%
Asian Quintile 3	3%	4%	4%	2%	3%	3%
Other Race Quintile 3	0%	1%	1%	0%	1%	1%
Hispanic Quintile 4	7%	8%	8%	6%	7%	7%
White Quintile 4	8%	6%	6%	9%	7%	7%
African American Quintile 4	1%	1%	1%	1%	1%	1%
Native American Quintile 4	0%	0%	0%	0%	0%	0%
Asian Quintile 4	3%	4%	4%	3%	3%	4%
Other Race Quintile 4	0%	1%	1%	0%	1%	1%
Hispanic Quintile 5	4%	5%	4%	4%	5%	5%
White Quintile 5	9%	7%	7%	12%	9%	9%
African American Quintile 5	1%	1%	1%	1%	1%	1%
Native American Quintile 5	0%	0%	0%	0%	0%	0%
Asian Quintile 5	3%	5%	5%	3%	5%	5%
Other Race Quintile 5	0%	1%	1%	0%	1%	1%

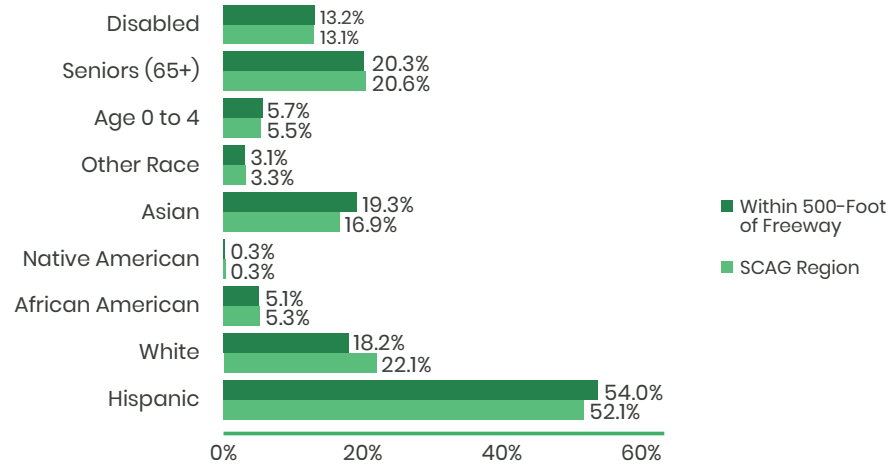
** Poverty 1 = Household below poverty; Poverty 2 = Household 100%~149% of poverty level; Poverty 3 = Household 150%~199% of poverty level*
Source: SCAG Socioeconomic Growth Forecast

FIGURE 28 Breakdown of Population Along Freeways and High-Traffic Roads (Base Year 2016)



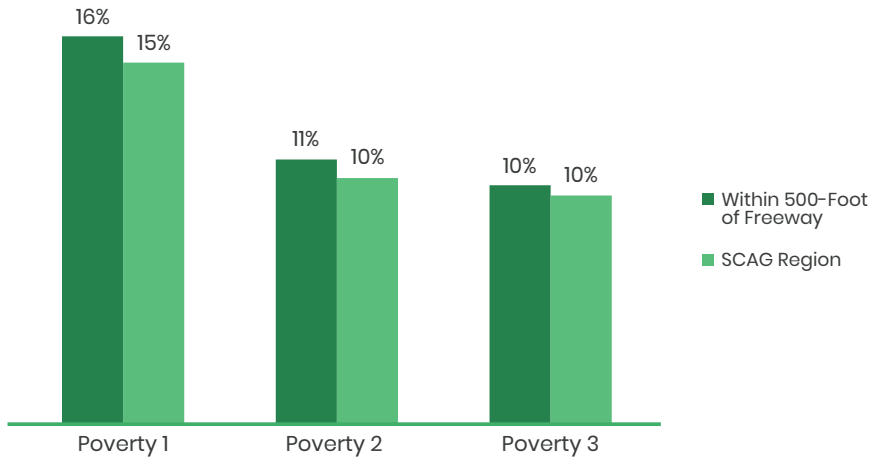
Source: SCAG Socioeconomic Growth Forecast

FIGURE 29 Breakdown of Population Along Freeways and High-Traffic Roads (2045 Plan)



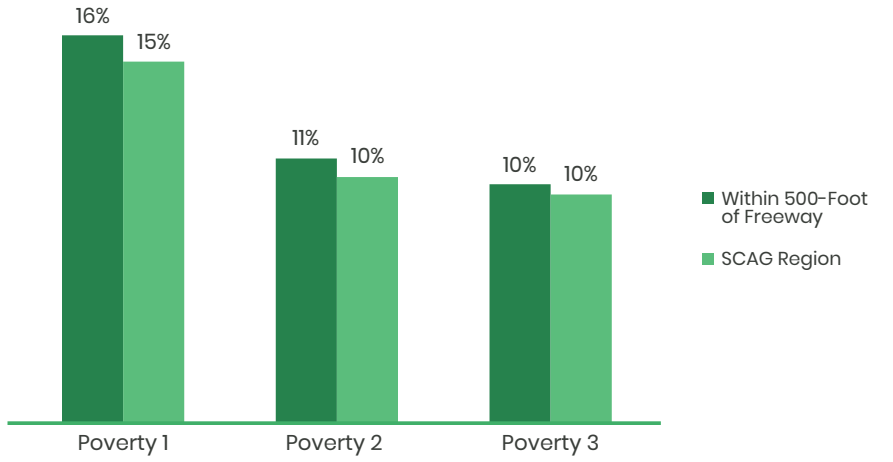
Source: SCAG Socioeconomic Growth Forecast

FIGURE 30 Breakdown of Poverty Households Along Freeways and High-Traffic Roads (Base Year 2016)



Source: SCAG Socioeconomic Growth Forecast

FIGURE 31 Breakdown of Poverty Households Along Freeways and High-Traffic Roads (2045 Plan)



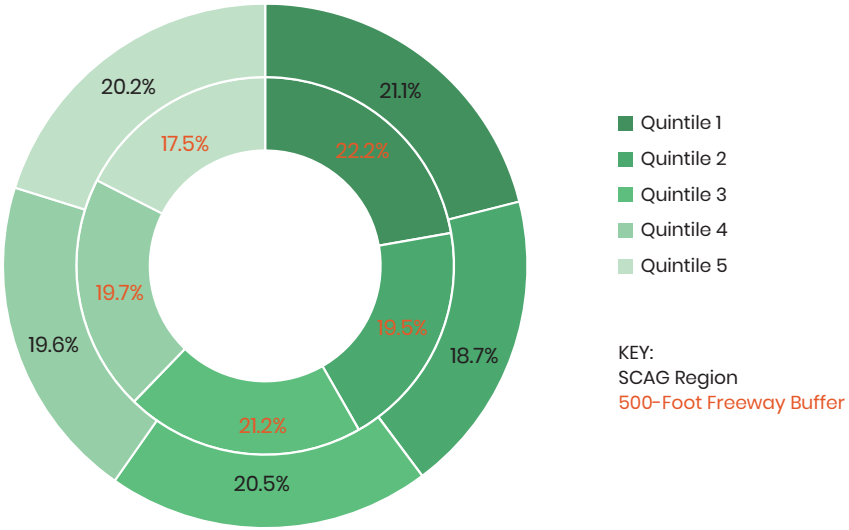
Source: SCAG Socioeconomic Growth Forecast

It is projected that the share of most EJ population groups will increase in the 2045 planned year (both Baseline and Plan), compared to Base Year 2016. Exceptions are African Americans and children age 0-4. There are no significant differences in the share of EJ population groups between the 2045 Baseline and the 2045 Plan. There are higher concentrations of EJ population groups in the areas adjacent to freeways and high-traffic roads both in Base Year 2016 and the 2045 planned year projection.

Since Connect SoCal process, there have been concerns raised by environmental groups, the health community, housing groups, and air quality regulation agencies about incompatible land uses, including sensitive receptors such as hospitals, senior/daycare centers, and housing near freeways and busy roadways. A sensitive receptor is a person in the population who is particularly susceptible to health effects due to exposure from air contaminants. The locations where these sensitive receptors congregate are considered sensitive receptor locations. **EXHIBIT 32** shows certain sensitive receptor locations including schools, colleges, child and senior care facilities, medical care/nursing facilities, and religious and recreational facilities in the SCAG region. The concentration of sensitive receptors is highest in central Los Angeles County, north Orange County, southwest San Bernardino County, and northwest Riverside County. The distribution of these facilities highly correlates with $PM_{2.5}$ emissions in the SCAG region, which suggests that there may be health impacts to these sensitive populations, especially along freeways and high-traffic roads.

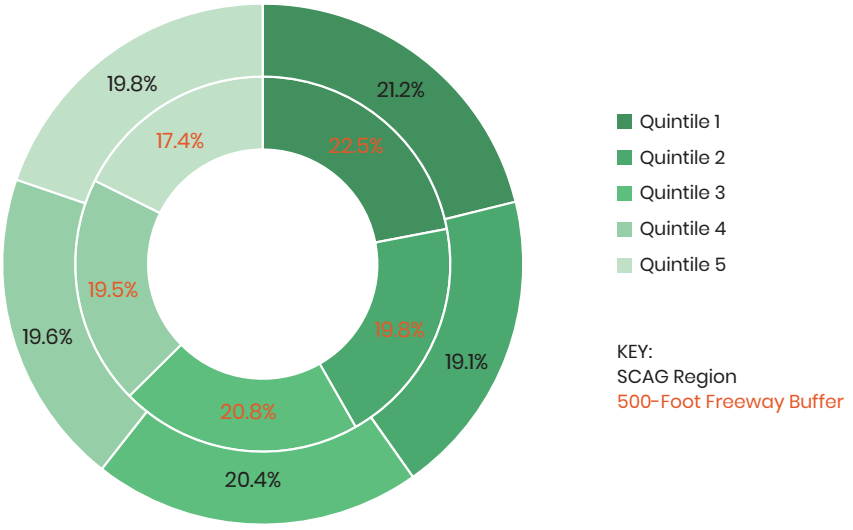
Connect SoCal land use strategy calls for redirecting future growth into high-quality transit areas (HQTAs). As a result, part of this growth will occur in areas where HQTAs overlap with areas within a distance of 500 feet from freeways and high-traffic roads. **EXHIBIT 33** shows the intersection of HQTAs (2045 Plan) and areas within a distance of 500 feet from freeways and high-traffic roads.

FIGURE 32 Breakdown of Households Income Quintile Along Freeways and High-Traffic Roads (Base Year 2016)



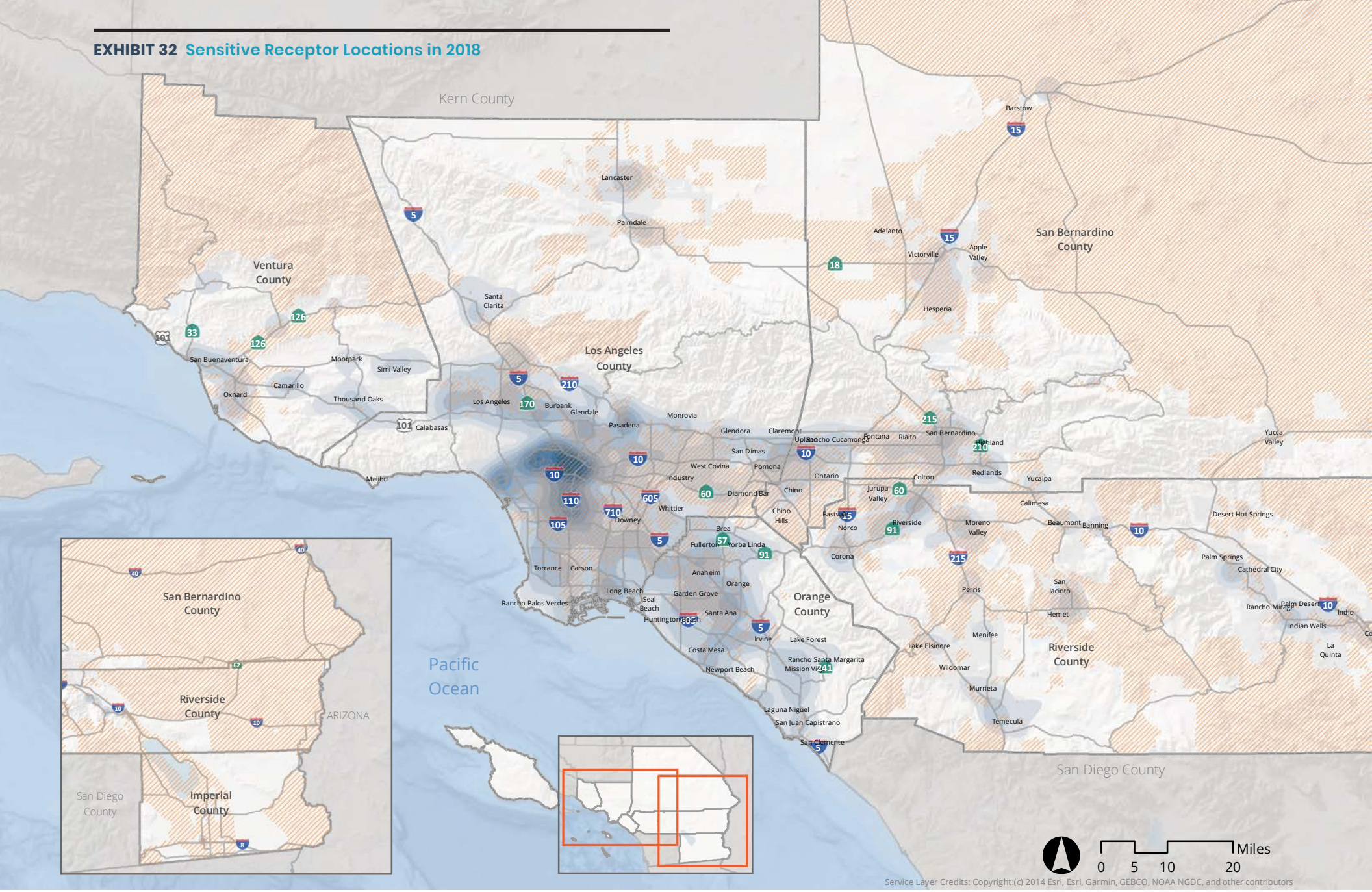
Source: SCAG Socioeconomic Growth Forecast

FIGURE 33 Breakdown of Households Income Quintile Along Freeways and High-Traffic Roads (2045 Plan)



Source: SCAG Socioeconomic Growth Forecast

EXHIBIT 32 Sensitive Receptor Locations in 2018



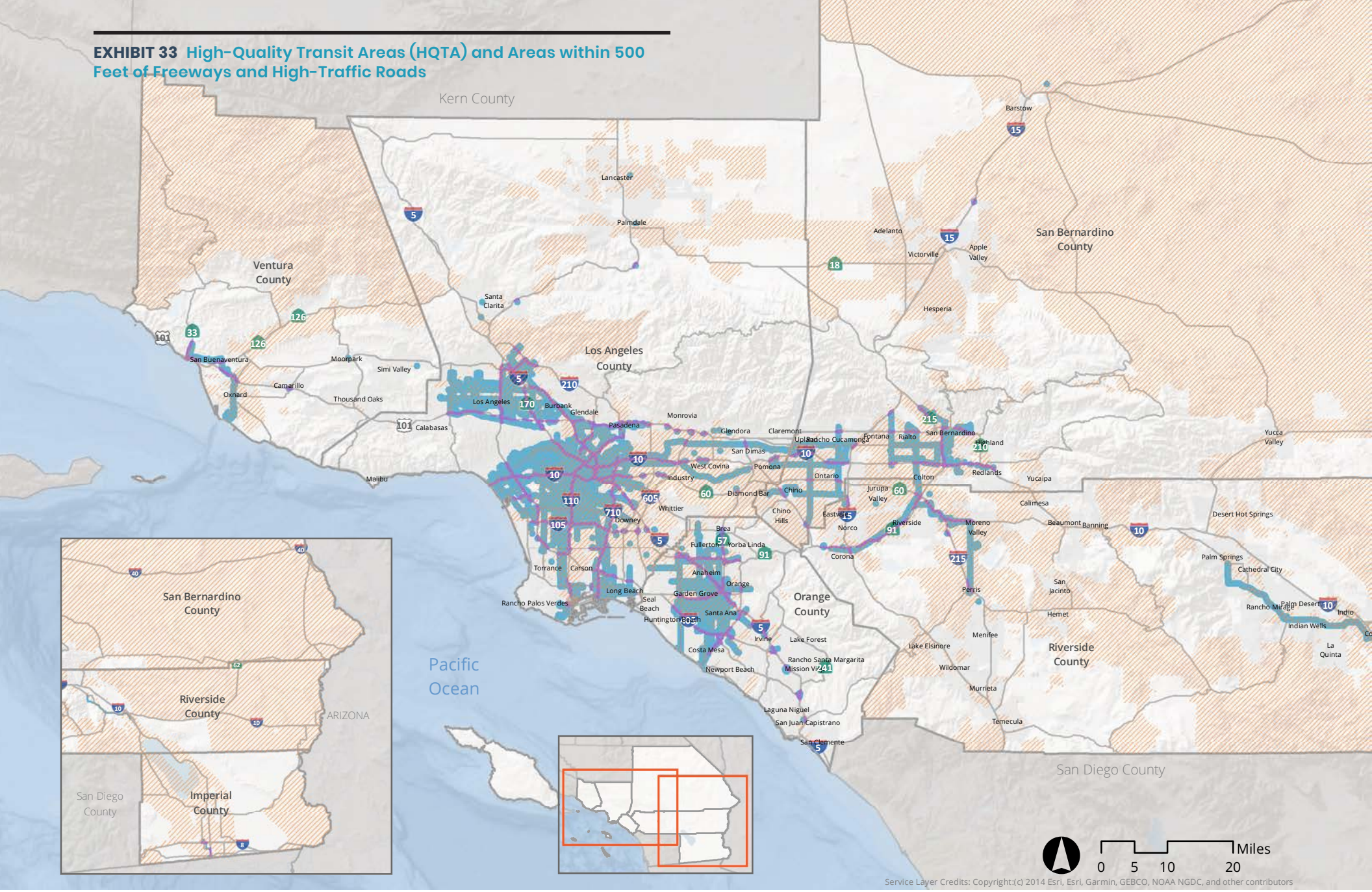
Sensitive Receptor Locations, 2018

Less Concentration — More Concentration

Environmental Justice Areas

(Note: Sensitive receptor locations include schools/colleges, child and senior care facilities, medical care and nursing facilities, and religious and recreational facilities.)
Source: 2019 TomTom Points of Interest, California School Campus Database (Version 2018)

EXHIBIT 33 High-Quality Transit Areas (HQTA) and Areas within 500 Feet of Freeways and High-Traffic Roads



Environmental Justice Areas

High Quality Transit Areas (2045 Plan)

Areas within 500 Feet of Freeways and High-Traffic Roads

Source: SCAG

TABLE 46 shows the share of households and employment within HQTAs (2045 Plan), 500 feet of freeways and high-traffic roads, and the overlapped area of HQTAs and 500 feet of freeways and high-traffic roads. As indicated in the table, freeway adjacent areas accommodate about 5 percent of regional households and about 9 percent of regional employment both in Base Year 2016 and Plan year 2045. HQTAs accommodate about 45 percent of regional households and about 54 percent of regional employment in Base Year 2016, while they accommodate about 46 percent of regional households and about 55 percent of regional employment in Plan year 2045. Neighborhoods where HQTAs overlap with areas within 500 feet of freeways and high-traffic roads accommodate about 3 percent of all regional households and about 5 percent of regional employment both in Base Year 2016 and Plan year 2045.

TABLE 47 presents a comparison of PM and CO emissions in TAZs within 500 feet of freeways and high-traffic roads with those in the SCAG region for Base Year 2016 and the Plan Year 2045. As shown in the table, the share of PM and CO emissions in freeway adjacent areas is significant relative to freeway adjacent area's share of the region's total land area. While regional emissions overall are projected to decrease significantly between 2016 and 2045, the rate of decrease near freeways and high-traffic roads is expected to be even greater.

In **FIGURE 34 - FIGURE 39**, the breakdown of EJ groups within freeway adjacent areas is compared with each group's concentration in the greater region, both for areas that incur decreases and increases in CO and $PM_{2.5}$ as a result of the Plan.

TABLE 46 Share of Households and Employment Within HQTAs and 500 Feet of Freeways and High-Traffic Roads

	2016 Base Year		2045 Baseline		2045 Plan	
	Household	Employment	Household	Employment	Household	Employment
Within 500 Feet of Freeways and High-Traffic Roads	5%	9%	5%	9%	5%	9%
High Quality Transit Areas (HQTAs; 2045 Plan)[1]	45%	54%	45%	52%	46%	55%
Overlap of Areas within HQTAs and 500 Feet of Freeways and High-Traffic Roads	3%	5%	3%	5%	3%	5%

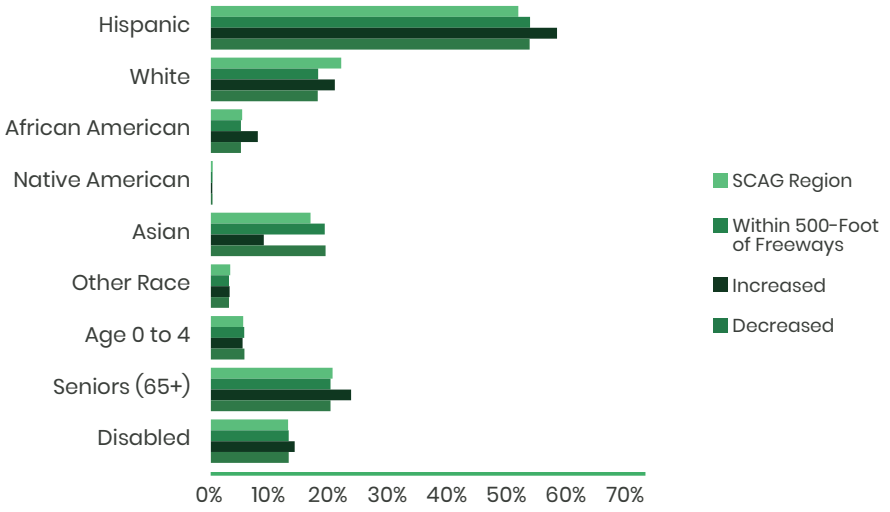
1. Extracted from 2045 plan year data of the Final Connect SoCal
Source: SCAG Socioeconomic Growth Forecast

TABLE 47 Emissions Along Freeways and High-Traffic Roads

Criteria Pollutant	Share of Emission within 500 Feet of Freeways and High-Traffic Roads			Emission Reductions 500 Feet of Freeways and High-Traffic Roads 500-Foot Freeways		Emission Reductions in the SCAG Region	
	2016 Base Year	2045 Baseline	2045 Plan	2016 Base Year to 2045 Baseline	2045 Baseline to 2045 Plan	2016 Base Year to 2045 Baseline	2045 Baseline to 2045 Plan
CO	53%	50%	49%	-71%	-7%	-69%	-6%
$PM_{2.5}$	55%	51%	51%	-10%	-5%	-2%	-4%

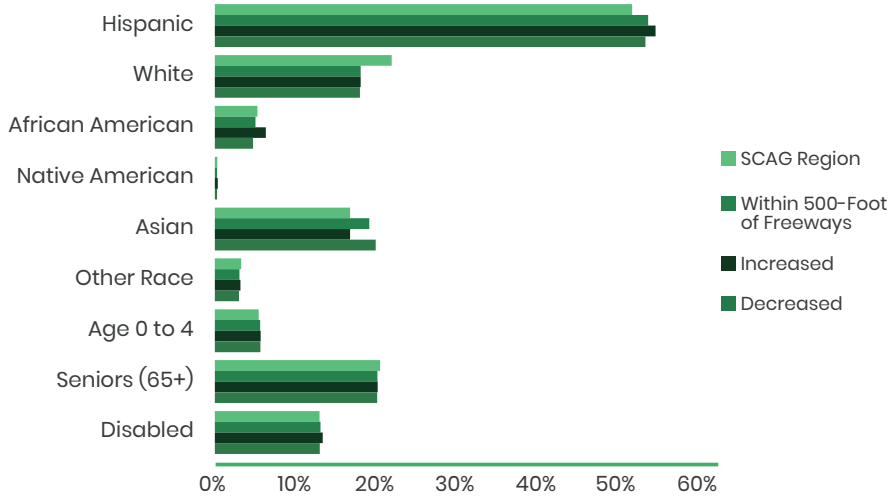
Source: SCAG Regional Travel Model

FIGURE 34 Breakdown of Population Along Freeways and High-Traffic Roads Impacted by CO Change



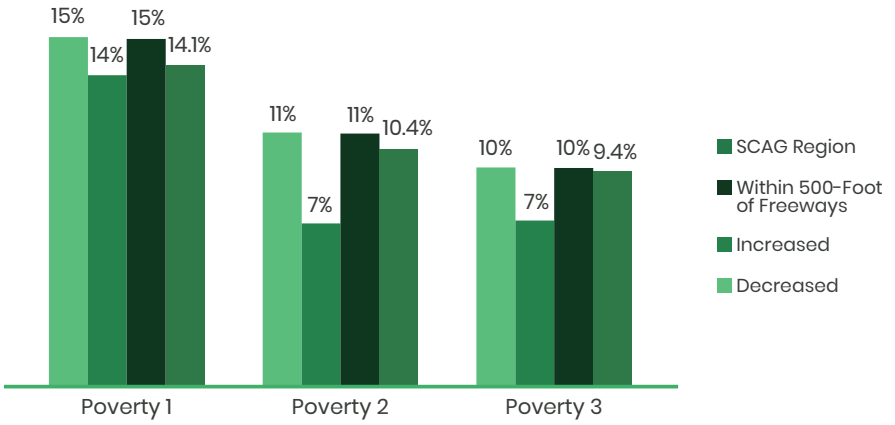
Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

FIGURE 35 Breakdown of Population Along Freeways and High-Traffic Roads Impacted by $PM_{2.5}$ Change



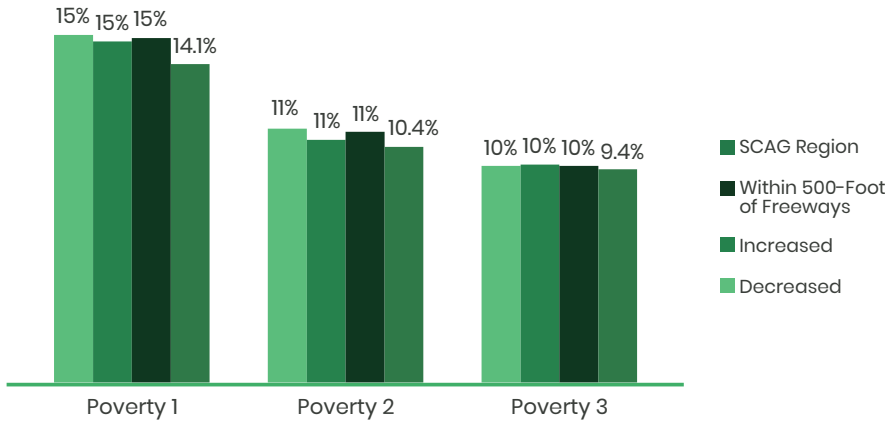
Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

FIGURE 36 Breakdown of Poverty Households Along Freeways and High-Traffic Roads Impacted by CO Change



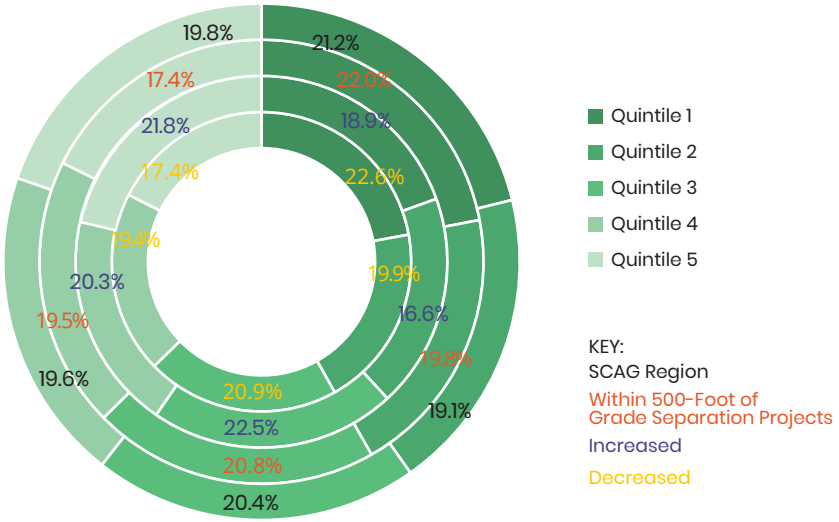
Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

FIGURE 37 Breakdown of Poverty Households Along Freeways and High-Traffic Roads Impacted by $PM_{2.5}$ Change



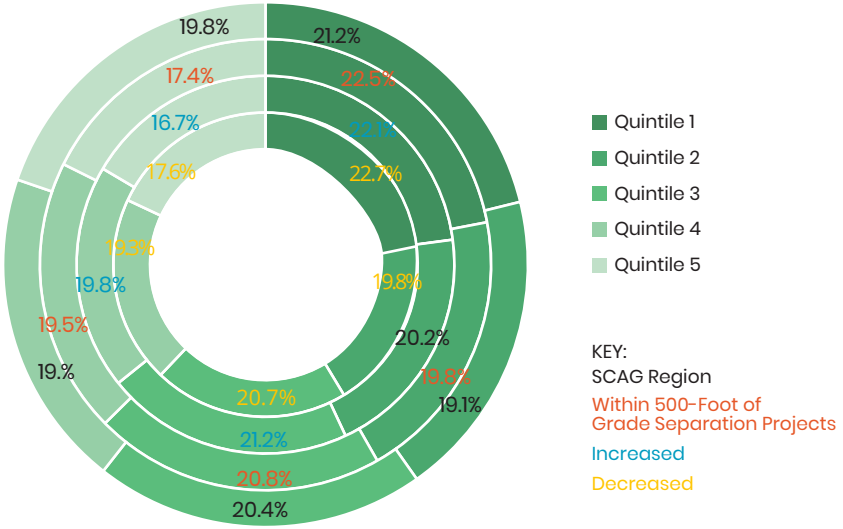
Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

FIGURE 38 Breakdown of Households Income Quintile Along Freeways and High-Traffic Roads Impacted by CO Change



Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

FIGURE 39 Breakdown of Households Income Quintile Along Freeways and High-Traffic Roads Impacted by $PM_{2.5}$ Change



Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

HOW WILL THIS IMPACT THE COMMUTE?

TRAVEL TIME SAVINGS & TRAVEL DISTANCE REDUCTIONS CI

Travel time and travel distance performance indicators are considered important in determining the impactful of the Plan to its residents. These indicators have a positive correlation with stress level—the higher the travel time and distance, the higher the stress level. Longer travel time and distance in automobiles may also impact our air quality and transportation infrastructures, which could result in additional operation and maintenance costs. Therefore, improving travel time and distance of residents is deemed important and should be considered as one of the top priorities. This analysis analyzes travel time and distance for each ethnicity and income group in the region and EJ boundaries. Overall, residents in the SCAG region will experience benefits from the Plan as a result of travel time and distance reduction.

METHODOLOGY

To determine if the Plan's impacts on travel time and travel distance are justly allocated, the distribution of total savings (benefits) across various demographic groups is compared with each group's usage of the transportation system, their share of the Plan's investments, and their funding of the system through gasoline, and sales taxes. Travel time is defined person-hour-traveled (PHT) and travel distance is defined as person-mile-traveled (PMT) in SCAG's regional travel demand model. GIS technologies were utilized to spatially estimate the PHT and PMT in each EJ boundary.

RESULTS

The Plan has yielded positive results in travel time and travel distance reductions for the region and EJ communities, specifically in less spending time on driving and more on transit; as such, more people will be using public transportation to reach their essential destinations (e.g. job, shopping, recreation, etc.) as the result of more integrated transit system. When assessing

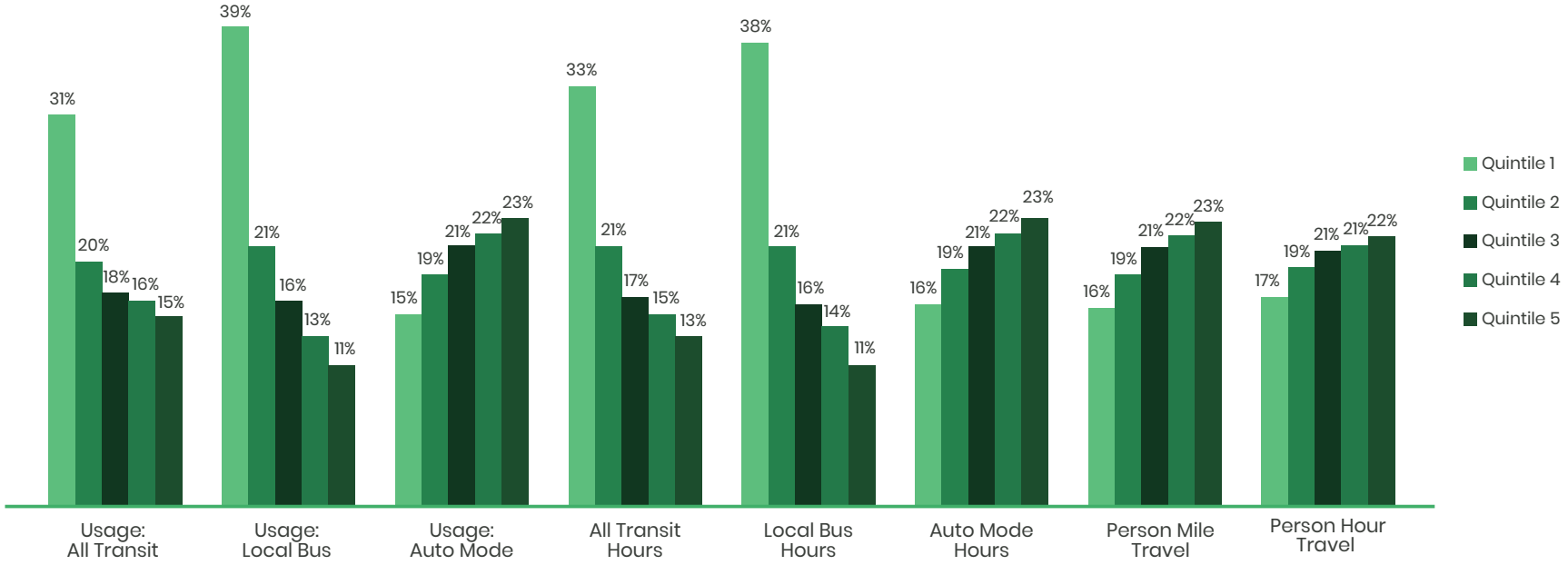
the EJ implications of the Plan, it is important to identify how these benefits are distributed across various communities—these communities are related to EJ populations as identified at the beginning of the report, which are EJA, DAC, and COC. To accomplish this, anticipated travel benefits resulting from the implementation of the Plan were determined for all trips and work trips both for transit and for automobile modes. This information was then linked with data obtained through the NHTS and SCAG's Household Travel Survey on mode usage by income and ethnicity to determine overall travel time and travel distance savings for various income quintiles and ethnicity groups.

FIGURE 40 and **FIGURE 41** present share of travel time and travel distance by income quintiles and ethnicity groups for automobiles, all public transportation options, and local bus. The existing usage of auto versus public transportation is distinguishable by lower- and higher-income groups. Lower-income groups (33 percent) have higher travel time and distance in public transportation than higher-income groups (13 percent); the opposite trend applies for auto. On the other hand, the minority population has a higher share of travel time and distance in public transportation than auto, specifically for Hispanic and African-American population; the opposite pattern is shown for White and Asian population.

FIGURE 42 and **FIGURE 43** present the improvements in travel time savings and person-mile reductions from the implementation of Connect SoCal's strategies as comparing between 2045 Plan and Baseline. **FIGURE 44** presents the breakdown of travel time savings and travel distance reductions across all study boundaries. Highlights among the figures include the following:

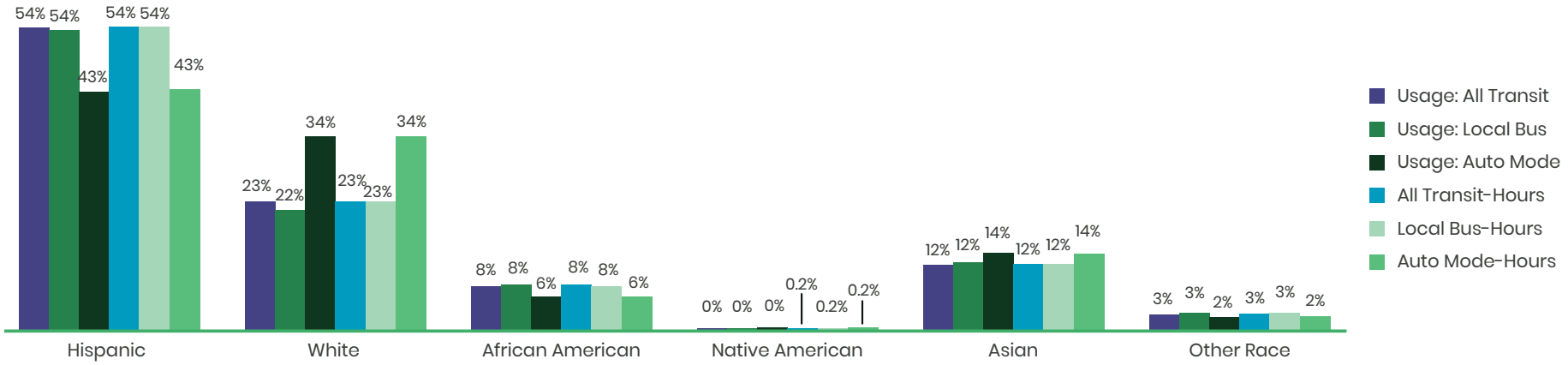
- The results have generally shown positive outcomes due to the improvements in the public transportation system—more traveling via transit and less driving across all income and ethnicity groups
- The lower-earning income groups (income quintiles 1 and 2) will likely capture more savings in travel time and reductions in travel distance in driving regardless of their lower usage in automobiles. Conversely, similar income groups will also receive benefits from the Plan's transit-related time savings
- The lower-earning income groups will likely receive greater overall person-mile travel reductions but will travel longer and further on local bus compared to higher-income groups (income quintiles 3 and 4). Alternatively, higher-income households will have a moderately better improvement in all transit mode time savings; similar income group will also likely receive the highest reduction in travel time, which is an improvement since they spend more time driving than the lower-income groups
- The share of travel time savings and travel distance reductions for minority population has similar improvements as indicated for lower-income groups, specifically with less time spent on driving and more on taking public transportation
- All EJ communities experience reductions in automobile usage such as travel time and distance as a result of the transportation and land use policies strategies in Connect SoCal. These improvements have encouraged more people to use transit, even more so in EJ communities compared to the overall SCAG region; the increase in aggregate overall transit use (travel time and distance) is moderately high in DAC and COC. However, the overall travel distance will likely have a minor increase in COC. Additional analysis is needed to further understand the impacts in these EJ communities. Additionally, other measures used in this report consider mode split and transit accessibility impacts. More information regarding transit can be found in the Transit Technical Report

FIGURE 40 Share of Travel Time and Distance by Income Quintiles (2016 Base Year)



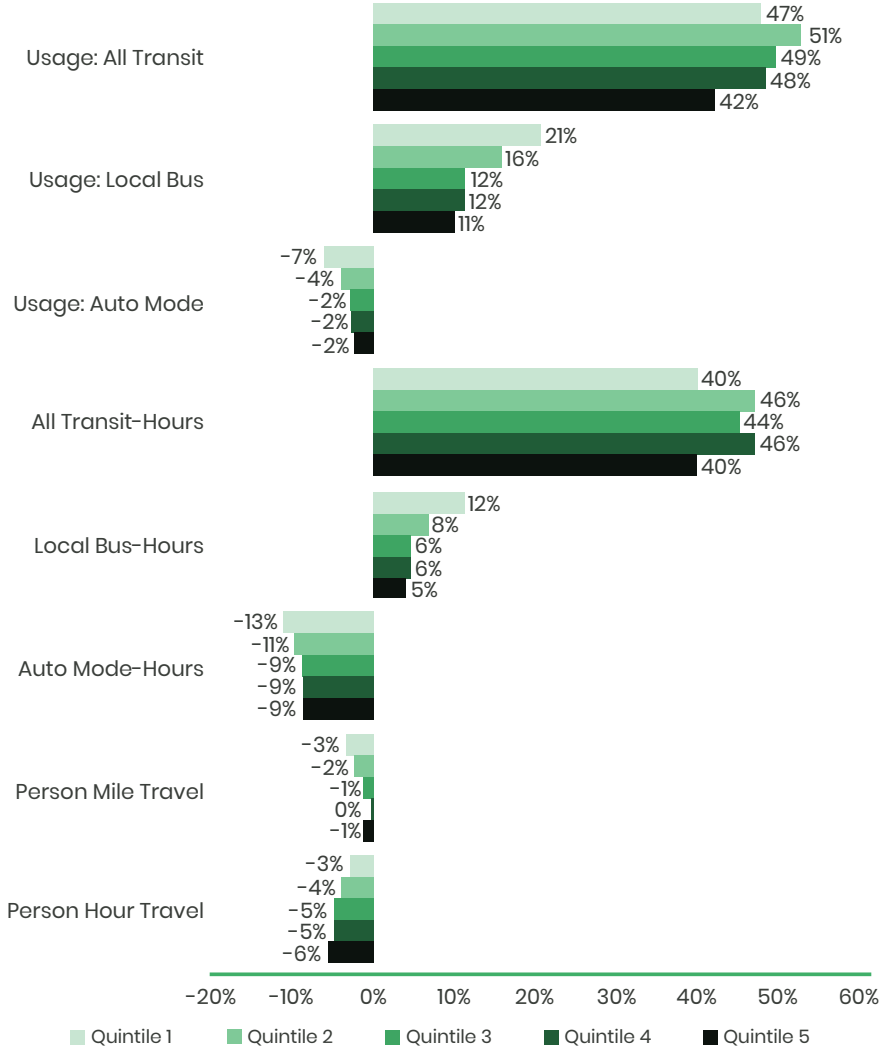
Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

FIGURE 41 Share of Travel Time and Distance by Ethnicity (2016 Base Year)



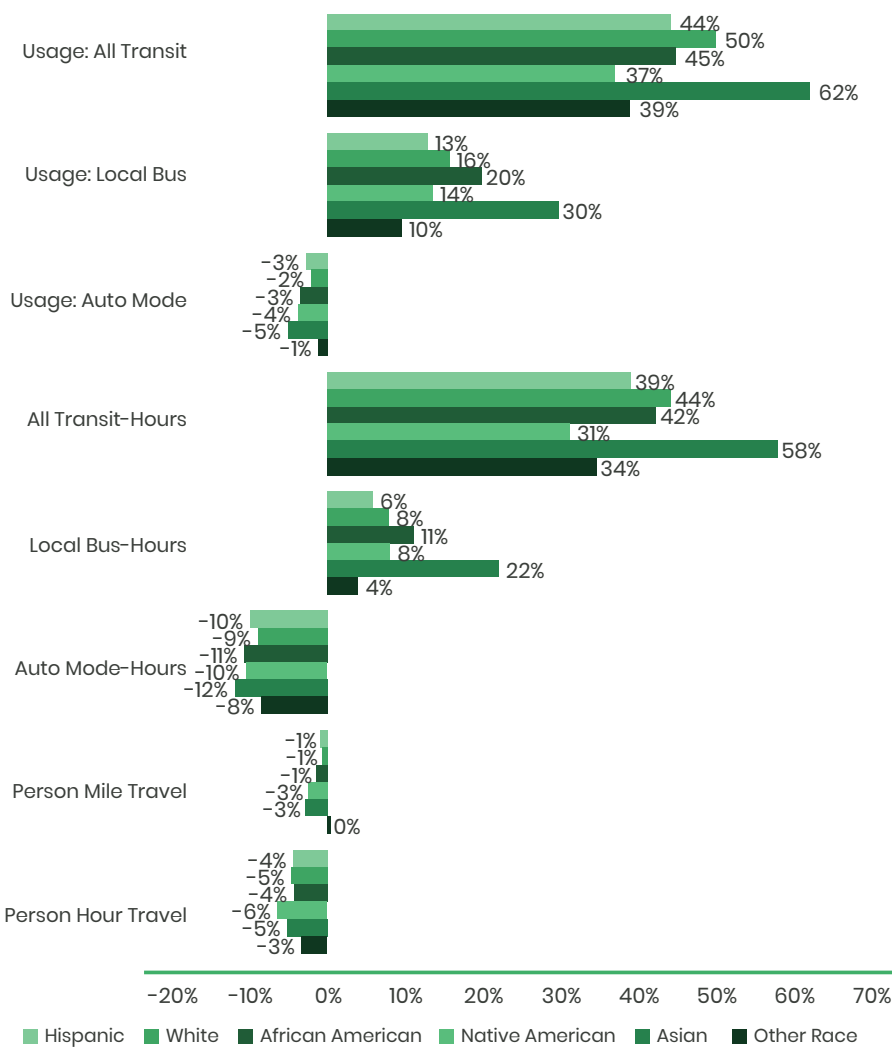
Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

FIGURE 42 Connect SoCal Improvement on Mobility and Person-Mile Travel by Income Quintile (2045 Plan vs. 2045 Baseline)



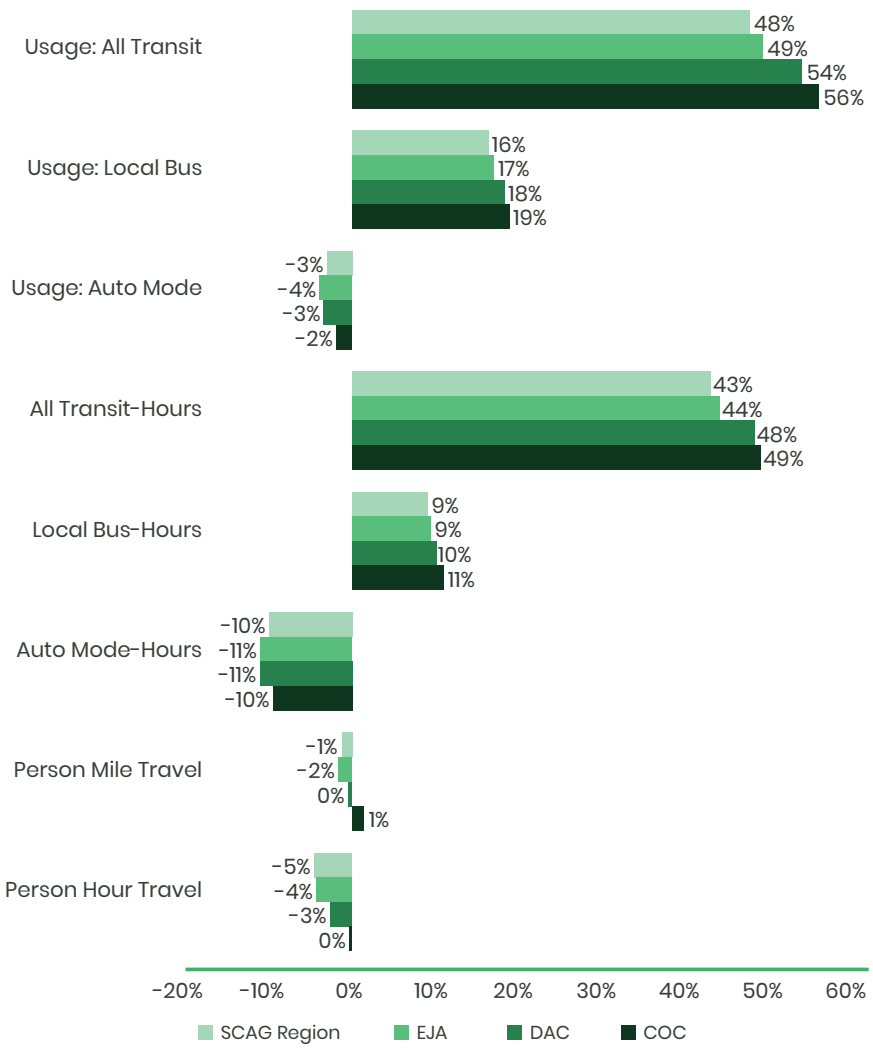
Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

FIGURE 43 Connect SoCal Improvement on Mobility and Person-Mile Travel by Ethnicity (2045 Plan vs. 2045 Baseline)



Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

FIGURE 44 Travel Time and Distance Improvement (2045 Plan vs. 2045 Baseline)



Source: SCAG Travel Demand Model and Socioeconomic Growth Forecast

RAIL-RELATED IMPACTS

SCAG examined rail related EJ impacts for the first time in its Connect SoCal, which provided detailed information on populations living in areas adjacent to railroads and grade separation projects. This section updates that analysis with new demographic data and provides information on considerations for local jurisdictions.

METHODOLOGY

- Estimate the distribution of EJ groups within the 500-foot of railroads.
- Estimate the distribution of EJ groups within 500-foot of grade separation projects.

RESULTS

The following table and figures present a comparison of the distribution of EJ demographic groups in the railroad adjacent areas with those in the greater SCAG region for Base Year 2016 and Plan Year 2045 planned projection year. As indicated in **TABLE 48** and **FIGURE 45 - FIGURE 50**, the share of EJ population groups within areas adjacent to railroad is higher than the regional average both in Base Year 2016 and Plan Year 2045.

TABLE 48 also presents the share of five income quintile households and the ethnic distribution within each income quintile within areas adjacent to railroads. It was observed that the share of lower income quintile households and minority populations is higher within areas adjacent to railroads than the regional average. It is projected that the share of EJ population groups in the areas adjacent to railroads will increase in 2045, under both Baseline and Plan scenarios, compared with Base Year 2016.

TABLE 48 Distribution of EJ Demographic Groups in the Railroad Adjacent Areas

	Within 500-Foot of Railroads			SCAG Region		
	2016 Base Year	2045 Baseline	2045 Plan	2016 Base Year	2045 Baseline	2045 Plan
Population						
Hispanic	63%	65%	65%	46%	52%	52%
White	19%	13%	12%	32%	22%	22%
African American	6%	4%	5%	6%	5%	5%
Native American	0%	0%	0%	0%	0%	0%
Asian	11%	14%	16%	13%	17%	17%
Other Race	2%	2%	2%	3%	3%	3%
Age 0 to 4	7%	6%	6%	6%	5%	5%
Seniors (65+)	11%	19%	19%	13%	21%	21%
Disabled	11%	13%	13%	11%	13%	13%
Households						
Poverty 1*	19%	17%	18%	15%	14%	14%
Poverty 2*	13%	13%	13%	10%	10%	10%
Poverty 3*	12%	11%	11%	10%	10%	9%
Quintile 1	25%	24%	25%	21%	21%	21%
Quintile 2	22%	21%	22%	19%	19%	19%
Quintile 3	22%	22%	21%	20%	21%	20%
Quintile 4	19%	18%	18%	20%	19%	20%
Quintile 5	13%	14%	14%	20%	20%	20%
Hispanic Quintile 1	13%	14%	14%	8%	10%	9%
White Quintile 1	6%	5%	4%	8%	6%	6%
African American Quintile 1	3%	2%	3%	3%	2%	2%
Native American Quintile 1	0%	0%	0%	0%	0%	0%
Asian Quintile 1	3%	3%	4%	2%	3%	3%
Other Race Quintile 1	0%	1%	0%	0%	1%	1%

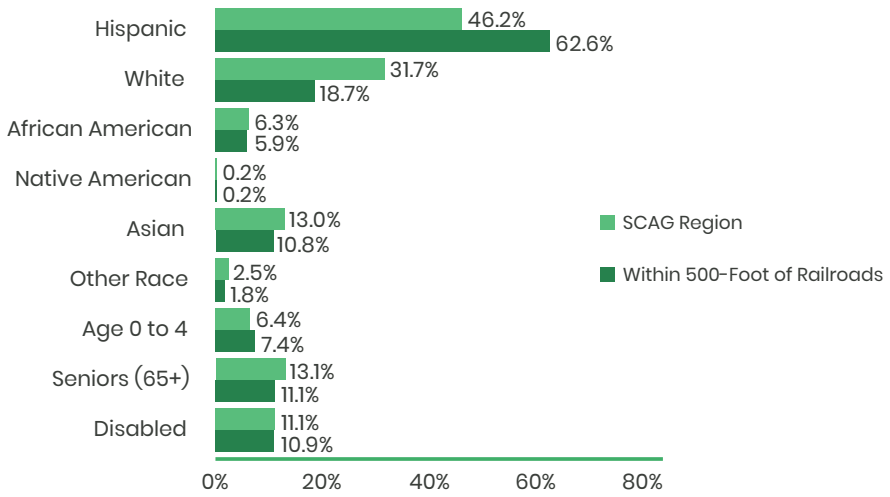
TABLE 48 Distribution of EJ Demographic Groups in the Railroad Adjacent Areas - Continued

	Within 500-Foot of Railroads			SCAG Region		
	2016 Base Year	2045 Baseline	2045 Plan	2016 Base Year	2045 Baseline	2045 Plan
Hispanic Quintile 2	13%	13%	14%	8%	10%	10%
White Quintile 2	5%	4%	4%	7%	5%	5%
African American Quintile 2	2%	1%	1%	2%	1%	1%
Native American Quintile 2	0%	0%	0%	0%	0%	0%
Asian Quintile 2	2%	2%	3%	2%	2%	2%
Other Race Quintile 2	0%	0%	0%	0%	0%	0%
Hispanic Quintile 3	12%	13%	12%	8%	10%	9%
White Quintile 3	6%	4%	4%	8%	6%	6%
African American Quintile 3	2%	1%	1%	2%	1%	1%
Native American Quintile 3	0%	0%	0%	0%	0%	0%
Asian Quintile 3	2%	3%	3%	2%	3%	3%
Other Race Quintile 3	0%	0%	0%	0%	1%	1%
Hispanic Quintile 4	9%	10%	9%	6%	7%	7%
White Quintile 4	6%	4%	4%	9%	7%	7%
African American Quintile 4	1%	1%	1%	1%	1%	1%
Native American Quintile 4	0%	0%	0%	0%	0%	0%
Asian Quintile 4	2%	3%	3%	3%	3%	4%
Other Race Quintile 4	0%	0%	0%	0%	1%	1%
Hispanic Quintile 5	4%	5%	5%	4%	5%	5%
White Quintile 5	5%	4%	4%	12%	9%	9%
African American Quintile 5	1%	1%	1%	1%	1%	1%
Native American Quintile 5	0%	0%	0%	0%	0%	0%
Asian Quintile 5	2%	4%	4%	3%	5%	5%
Other Race Quintile 5	0%	0%	0%	0%	1%	1%

**Poverty 1 = Household below poverty; Poverty 2 = Household 100%~149% of poverty level; Poverty 3 = Household 150%~199% of poverty level*

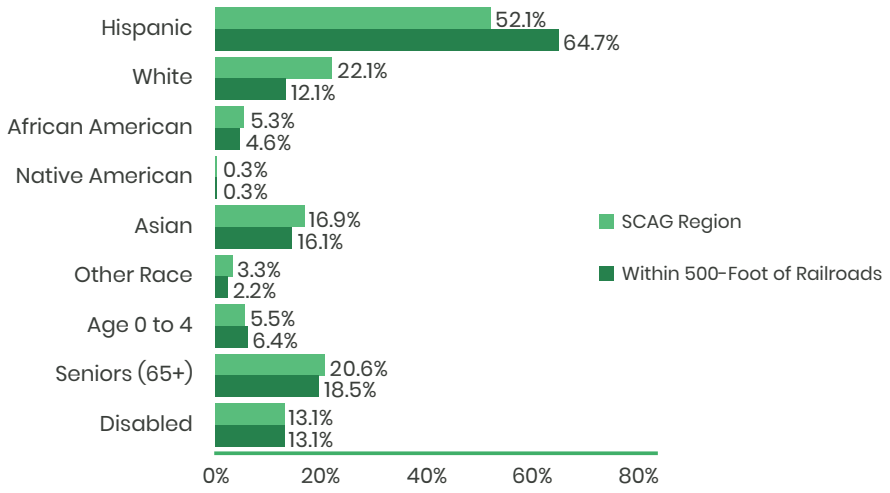
Source: SCAG Socioeconomic Growth Forecast

FIGURE 45 Breakdown of Population in the Railroad Adjacent Areas (Base Year 2016)



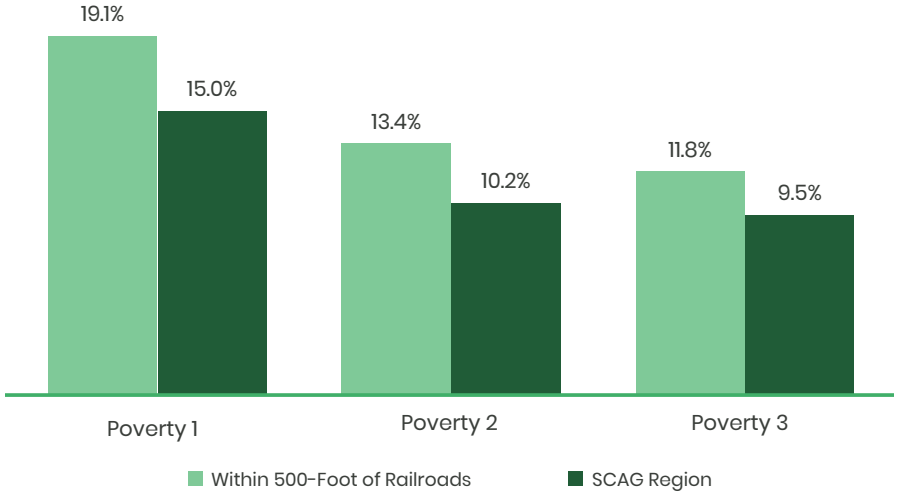
Source: SCAG Socioeconomic Growth Forecast

FIGURE 46 Breakdown of Population in the Railroad Adjacent Areas (2045 Plan)



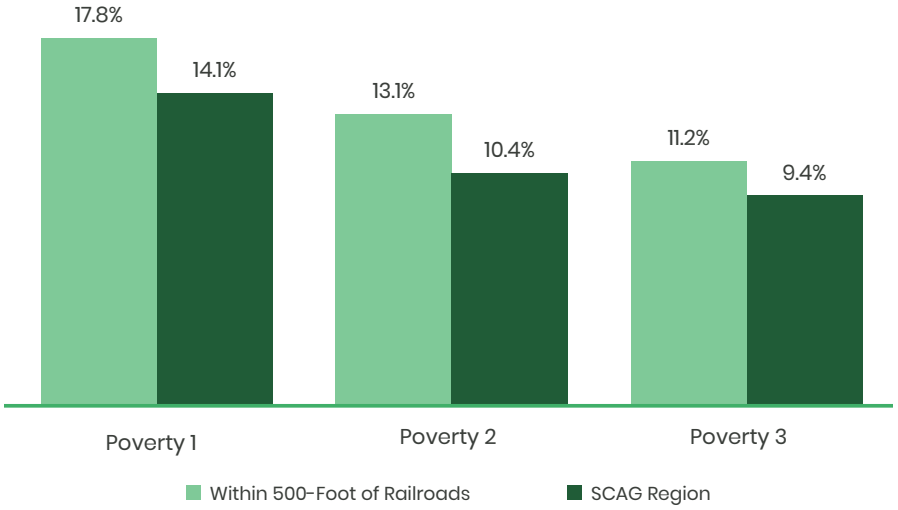
Source: SCAG Socioeconomic Growth Forecast

FIGURE 47 Breakdown of Poverty Households in the Railroad Adjacent Areas (Base Year 2016)



Source: SCAG Socioeconomic Growth Forecast

FIGURE 48 Breakdown of Poverty Households in the Railroad Adjacent Areas (2045 Plan)

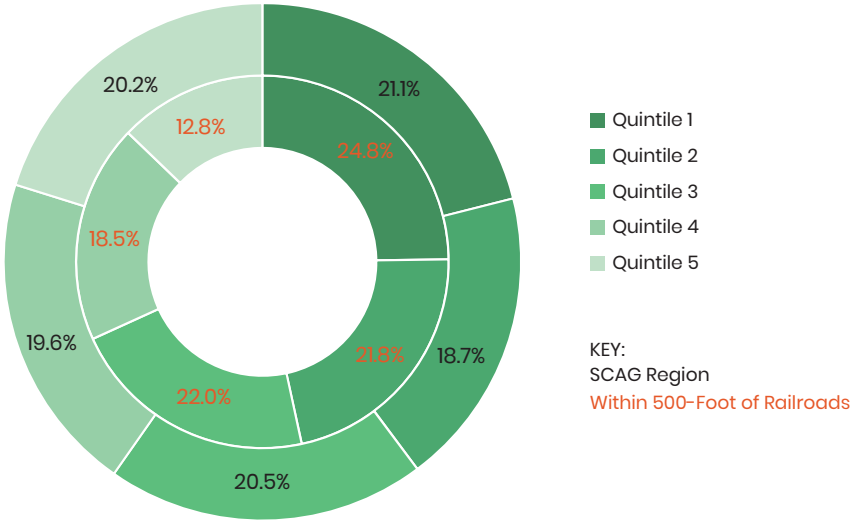


Source: SCAG Socioeconomic Growth Forecast

The following table and figures present a comparison of the distribution of EJ demographic groups in the areas adjacent to grade separation projects with those in the SCAG region for Base Year 2016 and for Plan Year 2045. As indicated in **TABLE 49** and **FIGURE 51- FIGURE 56**, there is a higher concentration of minority population overall in the areas adjacent to grade separation projects than the regional average.

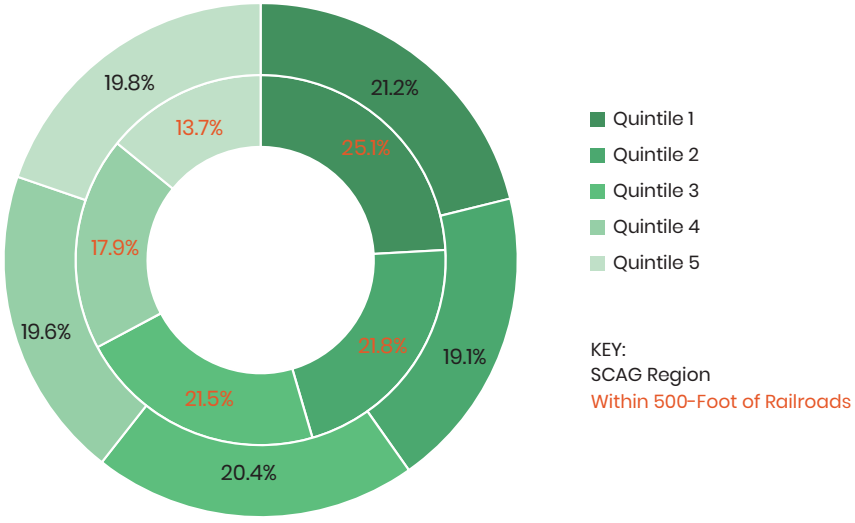
TABLE 49 also presents the share of five income quintile households and the ethnic distribution within each income quintile within areas adjacent to grade separation projects. It was observed that the share of lower income quintile households and minority populations is higher within areas adjacent to grade separation projects than the regional average. It is projected that the share of EJ population groups in the areas adjacent to grade separation projects will increase in 2045, under both Baseline and Plan scenarios, compared with Base Year 2016.

FIGURE 49 Breakdown of Households Income Quintile in the Railroad Adjacent Areas (Base Year 2016)



Source: SCAG Socioeconomic Growth Forecast

FIGURE 50 Breakdown of Households Income Quintile in the Railroad Adjacent Areas (2045 Plan)



Source: SCAG Socioeconomic Growth Forecast

TABLE 49 Distribution of EJ Demographic Groups in the Areas Adjacent to Grade Separation Projects

	Within 500-Foot of Grade Separation Projects			SCAG Region		
	2016 Base Year	2045 Baseline	2045 Plan	Base Year 2016	2045 Baseline	2045 Plan
Population						
Hispanic	67%	71%	72%	46%	52%	52%
White	21%	13%	13%	32%	22%	22%
African American	4%	5%	4%	6%	5%	5%
Native American	0%	0%	0%	0%	0%	0%
Asian	6%	8%	9%	13%	17%	17%
Other Race	2%	2%	2%	3%	3%	3%
Age 0 to 4	8%	6%	6%	6%	5%	5%
Seniors (65+)	11%	19%	16%	13%	21%	21%
Disabled	12%	13%	13%	11%	13%	13%
Households						
Poverty 1*	19%	16%	18%	15%	14%	14%
Poverty 2*	13%	13%	13%	10%	10%	10%
Poverty 3*	13%	12%	12%	10%	10%	9%
Quintile 1	24%	23%	24%	21%	21%	21%
Quintile 2	24%	23%	24%	19%	19%	19%
Quintile 3	22%	23%	22%	20%	21%	20%
Quintile 4	19%	18%	18%	20%	19%	20%
Quintile 5	11%	13%	12%	20%	20%	20%
Hispanic Quintile 1	13%	13%	14%	8%	10%	9%
White Quintile 1	7%	5%	5%	8%	6%	6%
African American Quintile 1	2%	2%	2%	3%	2%	2%
Native American Quintile 1	0%	0%	0%	0%	0%	0%
Asian Quintile 1	1%	1%	2%	2%	3%	3%
Other Race Quintile 1	0%	1%	0%	0%	1%	1%

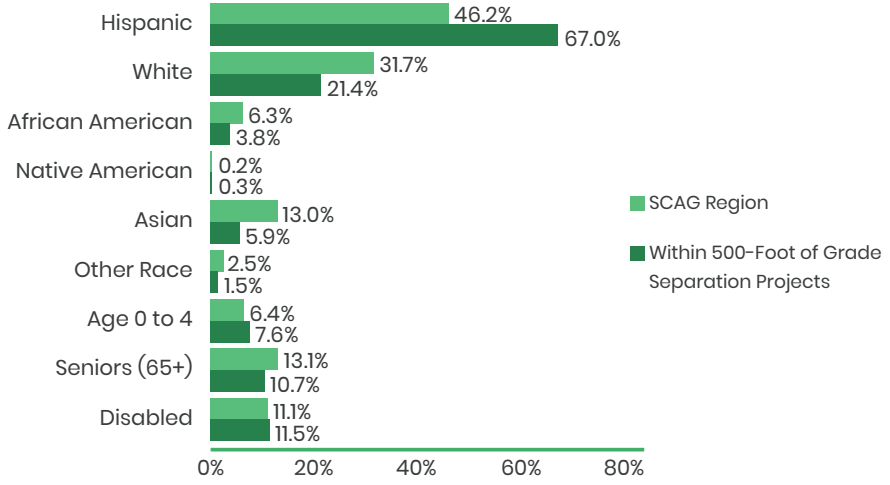
TABLE 49 Distribution of EJ Demographic Groups in the Areas Adjacent to Grade Separation Projects - Continued

	Within 500-Foot of Grade Separation Projects			SCAG Region		
	2016 Base Year	2045 Baseline	2045 Plan	Base Year 2016	2045 Baseline	2045 Plan
Hispanic Quintile 2	15%	15%	16%	8%	10%	10%
White Quintile 2	7%	5%	5%	7%	5%	5%
African American Quintile 2	1%	1%	1%	2%	1%	1%
Native American Quintile 2	0%	0%	0%	0%	0%	0%
Asian Quintile 2	1%	1%	2%	2%	2%	2%
Other Race Quintile 2	0%	0%	0%	0%	0%	0%
Hispanic Quintile 3	12%	14%	13%	8%	10%	9%
White Quintile 3	7%	5%	5%	8%	6%	6%
African American Quintile 3	1%	1%	1%	2%	1%	1%
Native American Quintile 3	0%	0%	0%	0%	0%	0%
Asian Quintile 3	2%	2%	2%	2%	3%	3%
Other Race Quintile 3	0%	0%	0%	0%	1%	1%
Hispanic Quintile 4	10%	11%	10%	6%	7%	7%
White Quintile 4	6%	4%	5%	9%	7%	7%
African American Quintile 4	1%	1%	1%	1%	1%	1%
Native American Quintile 4	0%	0%	0%	0%	0%	0%
Asian Quintile 4	2%	2%	2%	3%	3%	4%
Other Race Quintile 4	0%	0%	0%	0%	1%	1%
Hispanic Quintile 5	4%	6%	5%	4%	5%	5%
White Quintile 5	5%	4%	3%	12%	9%	9%
African American Quintile 5	1%	1%	1%	1%	1%	1%
Native American Quintile 5	0%	0%	0%	0%	0%	0%
Asian Quintile 5	1%	2%	3%	3%	5%	5%
Other Race Quintile 5	0%	0%	0%	0%	1%	1%

** Poverty 1 = Household below poverty; Poverty 2 = Household 100%~149% of poverty level; Poverty 3 = Household 150%~199% of poverty level*

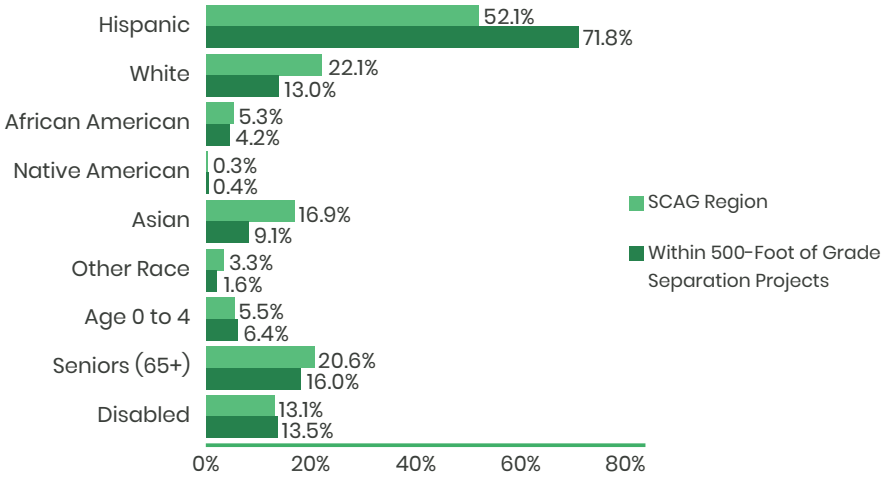
Source: SCAG Socioeconomic Growth Forecast

FIGURE 51 Breakdown of Population in the Areas Adjacent to Grade Separation Projects (Base Year 2016)



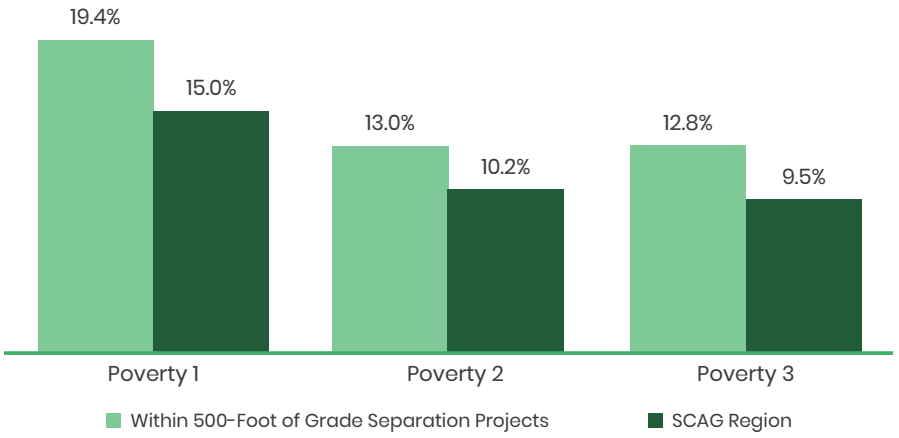
Source: SCAG Socioeconomic Growth Forecast

FIGURE 52 Breakdown of Population in the Areas Adjacent to Grade Separation Projects (2045 Plan)



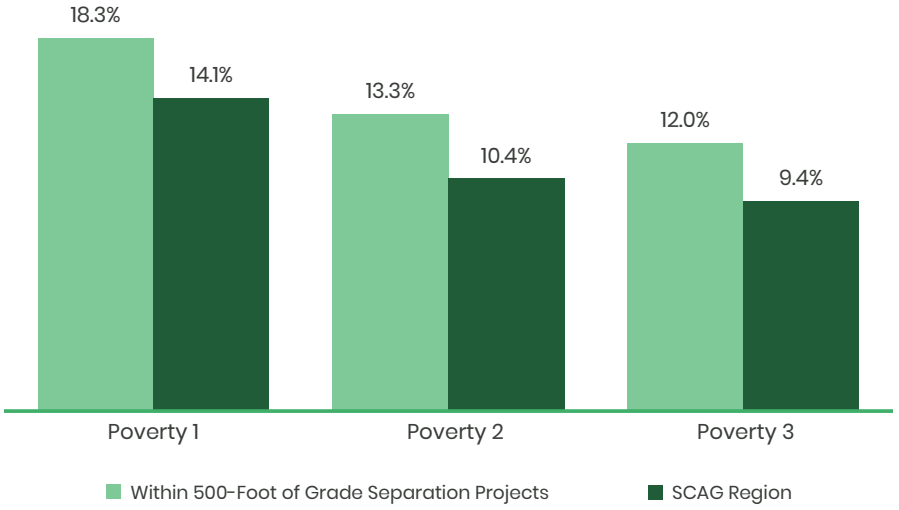
Source: SCAG Socioeconomic Growth Forecast

FIGURE 53 Breakdown of Poverty Households in the Areas Adjacent to Grade Separation Projects (Base Year 2016)



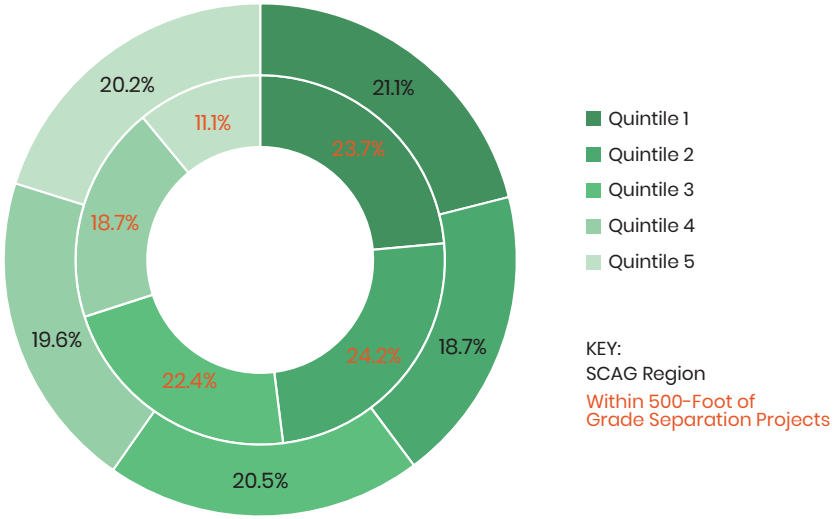
Source: SCAG Socioeconomic Growth Forecast

FIGURE 54 Breakdown of Poverty Households in the Areas Adjacent to Grade Separation Projects (2045 Plan)



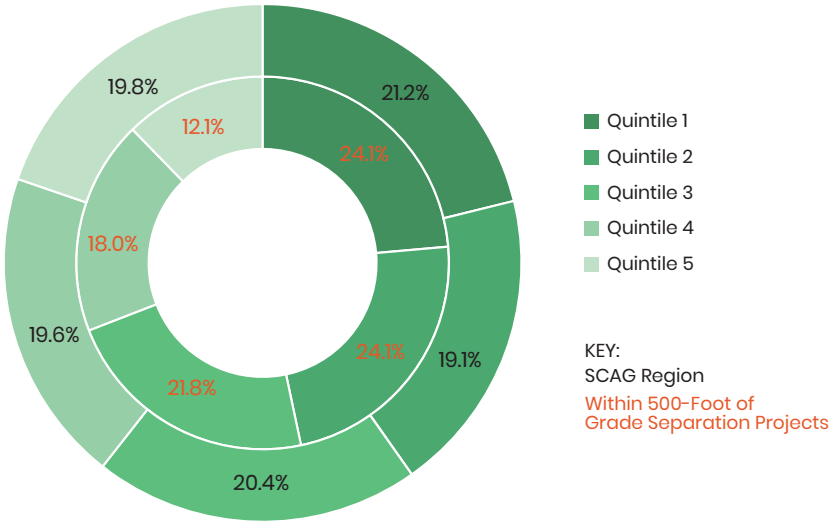
Source: SCAG Socioeconomic Growth Forecast

FIGURE 55 Breakdown of Households Income Quintile in the Areas Adjacent to Grade Separation Projects (Base Year 2016)



Source: SCAG Socioeconomic Growth Forecast

FIGURE 56 Breakdown of Households Income Quintile in the Areas Adjacent to Grade Separation Projects (2045 Plan)



Source: SCAG Socioeconomic Growth Forecast

SHARE OF TRANSPORTATION SYSTEM USAGE CI

METHODOLOGY

An important element in tabulating the benefits of the Plan is to identify how different socioeconomic groups are currently using the transportation system. In order to determine the existing level of system usage for different racial/ethnic groups and households by income, SCAG analyzed the 2009 National Household Travel Survey (NHTS). The NHTS is a household-based travel survey conducted periodically by the FHWA. The NHTS is the authoritative source of national data on the travel behavior of the American public. The dataset allows an analysis of daily travel by all modes, including characteristics of the people traveling, their households and their vehicles. The 2009 data includes 69,817 households and 160,758 persons, and the travel diary data includes a total of 642,292 trips. It is a disaggregated database that allows aggregation of any variable as well as cross-categorization of the data with other variables. With its fairly large sample size and key variables typically used for travel behavior analysis, the NHTS data is a valuable resource for analyzing travel patterns. With about 6,700 households and 15,000 individuals sampled in the SCAG region, the 2009 NHTS dataset provides valuable and sufficient observations to analyze both the demographic and travel characteristics of the local population. This dataset, along with SCAG's 2010 Household Travel Survey, is used as the basis for developing transportation system usage information for different modes and by income quintile and ethnicity. In addition, the NHTS provides information on the household characteristics and travel behavior of residents living within high-quality transit areas (HQTAs), which represent the half mile surrounding all rail transit stops and bus corridors that have peak headways of 15 minutes or less. The NHTS also provides information for the population living within one-quarter, and one-half miles of a rail transit stop, which are identified as Transit Oriented Communities (TOCs), and are important geography for the forthcoming Gentrification and Displacement section in this report.

RESULTS

Based on 2009 NHTS data, **TABLE 50** - **TABLE 51** present transportation mode usage in the SCAG region by income quintile and ethnicity for both work trips and all trips. Highlights include: the automobile (drive alone and carpool), which accounts for just under 80 percent of all trips, is the dominant transportation mode for work trips. The next most popular mode for work trips is bus (6.1 percent), followed by walking and biking (four percent). When looking at all trips, most bus and rail transit riders are lower income quintile households—the lowest two income quintile households combined account for 82 percent of bus riders and 58.3 percent of rail transit riders. However, the data indicates a more balanced usage distribution by income groups for passenger rail, walking, biking, and other modes. Furthermore, given the total number of trips, the bus is far more important than urban rail for low-income households for commuting purposes. Transportation system usage by mode for all trips is used to allocate Connect SoCal's investment costs, mobility and accessibility benefits. Because only the NHTS and SCAG's 2010 Household Travel Survey provides information about non-work trips, both data sets were applied to develop a hybrid version of system usage by mode for all trips. It should be noted that the appropriate and accurate statistics on shares of usage by ethnicity and income quintile are important because they directly affect EJ analysis outcomes. This area is recommended for further refinement and research. Highlights about all trips from the statistics included here indicate that active transportation, in particular, walking, becomes much more important for non-work trips. It jumps to over 14 percent from just about 2.5 percent for work trips. While accounting for 20 percent of total households, households in the lowest income quintile show less than 15 percent of total transportation system usage, and their share of the auto mode as the drivers is less than ten percent. On the other hand, usage of the transportation system by low-income households is disproportionately high in other modes, particularly bus, rail transit, passenger rail, walking, and biking. By ethnicity, Hispanics disproportionately use more bus and rail transit, and walk more often than their share of total households or population, while Non-Hispanic Whites use disproportionately higher auto and biking modes, which is similar to their mode usage for work trips. Information on transportation system usage by modes, by income quintile, and by ethnicity is shown in **FIGURE 57** and **FIGURE 58**. Since projected growth by ethnicity in the SCAG region shows a very different ethnic composition in the future than the distribution today, household projections by income quintile and ethnicity are utilized to adjust and derive the appropriate usage shares by modes for different ethnicity groups.

TABLE 50 Transportation Mode Usage in the SCAG Region by Income Quintile

	Auto Mode	Bus	Commuter Rail	Urban Rail	Non-Motorized	Others	Total Usage
Quintile 1	13.8%	45.7%	14.2%	33.1%	26.5%	1.6%	15.9%
Quintile 2	19.1%	29.4%	13.3%	17.0%	18.7%	11.0%	19.1%
Quintile 3	20.3%	11.4%	20.2%	24.4%	17.5%	9.9%	19.7%
Quintile 4	23.3%	6.3%	22.7%	15.1%	18.2%	25.6%	22.3%
Quintile 5	23.5%	7.3%	29.6%	10.4%	19.0%	51.8%	23.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Mode Share	86.9%	3.3%	0.1%	0.4%	9.3%	0.0%	100.0%

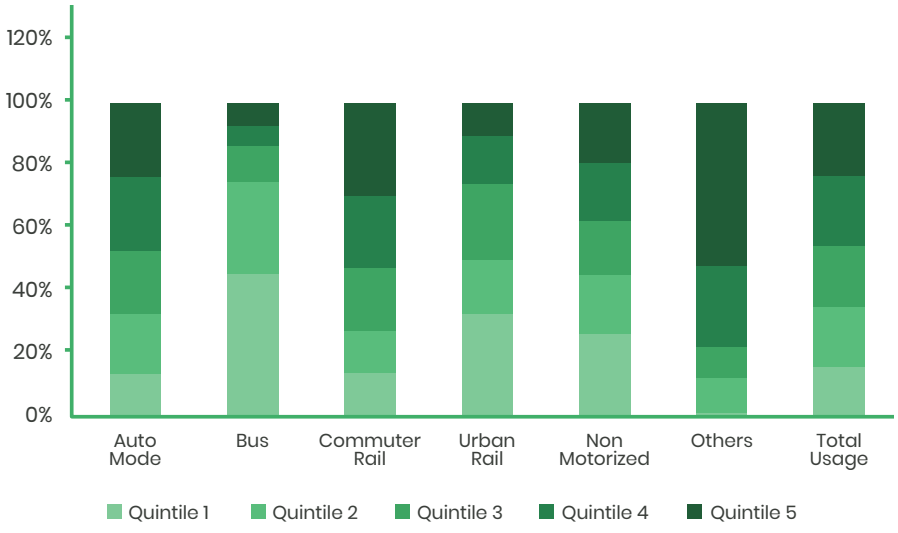
Source: 2012 Household Travel Survey, with 2016 Supplement. Processed by SCAG Modeling staff

TABLE 51 Transportation Mode Usage in the SCAG Region by Ethnicity

	Auto Mode	Bus	Commuter Rail	Urban Rail	Non-Motorized	Others	Total Usage	Household	Share of Income Tax Paid	Share of Retail & Gasoline Tax Paid
Hispanic	36.2%	41.3%	34.7%	39.4%	37.5%	29.6%	36.4%	37.2%	22.2%	33.7%
White	38.9%	34.1%	40.1%	35.9%	37.6%	44.3%	38.8%	38.0%	50.0%	41.0%
African American	6.9%	8.7%	6.7%	8.0%	7.5%	5.7%	7.0%	7.2%	4.8%	6.4%
Native American	0.3%	0.4%	0.3%	0.4%	0.4%	0.3%	0.3%	0.3%	0.2%	0.3%
Asian	15.1%	13.1%	15.7%	13.9%	14.6%	17.5%	15.1%	14.7%	20.1%	16.1%
Other Race	2.5%	2.4%	2.5%	2.4%	2.5%	2.6%	2.5%	2.5%	2.7%	2.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

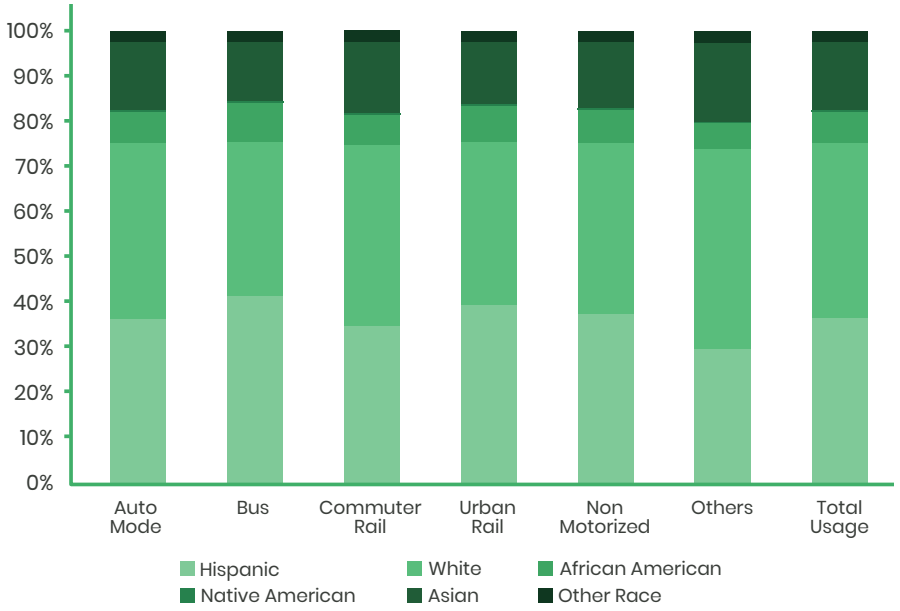
Source: 2012 Household Travel Survey, with 2016 Supplement. Processed by SCAG Modeling staff

FIGURE 57 Transportation Usage by Mode and by Income Quintile: All Trips



Source: 2012 Household Travel Survey, with 2016 Supplement. Processed by SCAG Modeling staff

FIGURE 58 Transportation Usage by Mode and by Ethnicity: All Trips



Source: 2012 Household Travel Survey, with 2016 Supplement. Processed by SCAG Modeling staff

HOW WILL THIS IMPACT TRANSPORTATION COSTS?

BENEFITS AND BURDENS

This section will compare the overall benefits of Connect SoCal, in terms of transportation improvements, with the overall burdens of paying for the Plan. Included in the discussion is a summary of results listing (1) a breakdown of revenue sources paid by each EJ population group for the Plan, (2) an analysis of who will be benefitting from Connect SoCal based on each groups' use of the transportation system and (3) a comparison of overall investments of the Plan versus who will be benefiting from these improvements.

CALIFORNIA SENATE BILL 1

The state's transportation system helps to move people and goods around and through the state. State funding primarily supports three segments:

- State Highways
- Local Streets and Roads
- Transit Operations

Senate Bill 1 (SB1), the Road Repair and Accountability Act of 2017, was signed into law on April 28, 2017. This legislative package invests $54 billion over the next decade to fix roads, freeways and bridges in communities across California and puts more dollars toward transit and safety. These funds will be split equally between state and local investments. SB1 increases state funding for these transportation segments from various state transportation taxes and fees, including gasoline excise taxes, diesel excise and sales taxes, and vehicle taxes and fees.

TABLE 52 and **FIGURE 59** present the tax and fee rate increases established by SB1. The legislation increases both gasoline and diesel taxes, while also creating new vehicle taxes and fees to fund transportation. Since the SB1 augmented state transportation funding by primarily increasing gasoline taxes, by 12 cents to 30 cents per gallon and also set a fixed excise tax of 17.3 cents, raising from current rate of 9.8 cents/gallon, replacing and eliminates the swap tax. As analyzed in previous 2016 RTP/SCS EJ Technical Report and further analysis below that the gasoline taxes are highly regressive and raise EJ concerns—lower income household and minorities are burdened disproportionally by gasoline taxes than those non-minorities and higher income groups. After the full implementation of SB1 taxes increase from July 2019, the two lower quintile households have seen their gasoline tax burdens rising to 5.3 percent and 3.0 percent of their adjusted gross income from 2.6 percent and 1.4 percent, respectively, in the pre SB1 era.

As indicated in the 2016 RTP/SCS EJ technical report, the equity issue inherent with a funding mechanism based on gasoline consumption, prices, and taxes can only be addressed and corrected by a mileage-based user fee transportation funding system. The California SB1 funding based on primarily the fuel taxes, while providing significant increase in funding for transportation system in the short term it took a wrong direction in addressing EJ concerns related to gasoline taxes and, in the longer term, remains vulnerable since it is based on tax base which will continue to shrink.

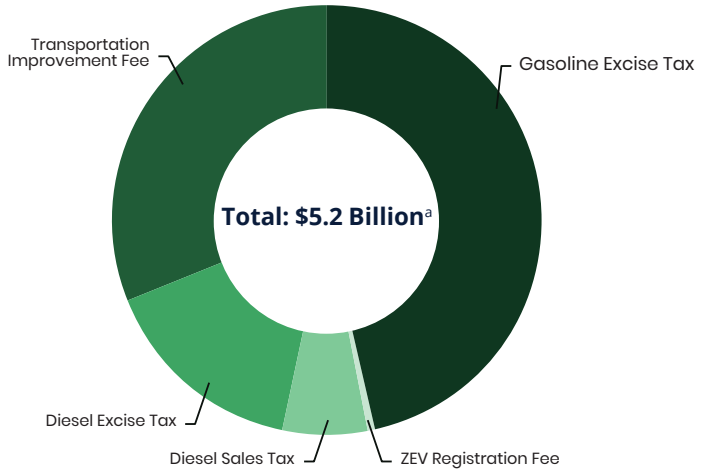
TABLE 52 SB1 Tax Fee Rate Increases

	Current Rates	New Rates[a]	Effective Date
Fuel Taxes[b]			
Gasoline Base Excise	18 cents	30 cents	November 1, 2017
Gasoline Swap Excise[c]	9.8 cents	17.3 cents	July 1, 2019
Diesel Excise[c]	16 cents	36 cents	November 1, 2017
Diesel Swap Sales	1.75 percent	5.75 percent	November 1, 2017
Vehicle Taxes And Fees[d]			
Transportation Improvement Fee	----	$25 to $175	January 1, 2018
Zev Registration Fee	----	$100	July 1, 2020

[a] *Adjusted for inflation starting July 1, 2020 for the gasoline and diesel excise taxes, January 1, 2020 for the Transportation Improvement Fee, and January 1, 2021 for the ZEV registration fee. The diesel sales taxes are not adjusted for inflation.*
[b] *Excise taxes are per gallon.*
[c] *Current rate set annually by the state Board of Equalization. The funding package converts the variable rate to a fixed rate.*
[d] *Per vehicle per year.*
ZEV = zero-emission vehicle.

Source: Figure 1 from "Overview of the 2017 Transportation Funding Package," Mac Taylor, Legislative Analyst, LAO June 2017

FIGURE 59 SB1 Transportation Revenue Increases



[a] *Reflecccts average annual increase over the next ten years.*

Source: Figure 2 from "Overview of the 2017 Transportation Funding Package," Mac Taylor, Legislative Analyst, LAO June 2017

CONNECT SOCAL REVENUE SOURCES IN TERMS OF TAX BURDENS CI LU

METHODOLOGY

In order to estimate the share of funding that minority and low-income groups will pay for the Plan, SCAG looks at how each group contributes to the region's sales, gasoline and income tax revenue that will fund Connect SoCal.

The Bureau of Labor Statistics' (BLS) Consumer Expenditure Survey (CEX) consists of two surveys, the Quarterly Interview Survey and the Diary Survey, which provide information on the buying habits of American consumers, including data on their expenditures, income, and consumer unit characteristics (families and single consumers). The CEX is important because it is the only federal survey to provide information on the complete range of consumers' expenditures and incomes, including the socioeconomic characteristics of those consumers. It is used by policymakers to examine the impact of policy changes on economic groups, by businesses and academic researchers studying consumers' spending habits and trends and by other federal agencies. Most importantly, the CEX is used to regularly revise the Consumer Price Index's market basket of consumer goods and services, which is the primary indicator for inflation in the United States.

SCAG uses CEX survey data to assess regional expenditures by taxable sales category and adjusted gross income. In particular, the tabulation showing the share of aggregate expenditures by income quintile is used to estimate transportation funding contributions (i.e. taxes paid) by income quintile.

TABLE 53 presents taxable sales and expenditures shares by income quintile in 2016 for the SCAG region, using data collected by the California Board of Equalization, California Department of Fee and Administration, and Franchise Tax Board. Households in the SCAG region spent $20,439 million at service (gas) stations in 2016. The lowest income quintile's share of gasoline consumption—90 percent of service station sales are gasoline—was just under 9.5 percent, while households in the highest income quintile accounted for more than 30 percent of gasoline sales. In terms of expenditures on motor vehicle and parts purchases, the lowest income quintile accounted for just 7.3 percent of all motor vehicle and parts sales, while top income quintile households account for over 35 percent of sales. This is not surprising because many low-income households cannot afford the cost of vehicle ownership including maintenance, insurance and the purchase of gasoline. In fact, the CEX indicates that households in the lower-income quintiles predominately owned used and older cars. This situation has implications in terms of fuel efficiency—low-income households pay proportionally more on gasoline and gasoline taxes than more affluent households that normally own newer vehicles that are more fuel efficient and allow them to travel further on the same amount of gasoline.

A mileage-based user fee transportation funding system could correct the equity issue inherent with a funding system based on gasoline consumption, prices, and taxes. Different funding sources (i.e., income taxes, property taxes, sales, fuel, etc.) can impose disproportionate burdens on lower-income and minority groups. Sales and gasoline taxes, which are the primary sources of funding for the region's transportation system, were evaluated for the purposes of this analysis. The amount of taxes paid was analyzed to demonstrate how tax burdens fall on various demographic groups. As in previous EJ appendices, Connect SoCal EJ analysis examined in detail the incidence and distribution of the region's burden of taxation.

TABLE 53 Taxable Sales in the SCAG Region by Retail Categories in 2016 and Shares by Income Quintile (in $1,000s)

Type of business	Number of Outlets	Taxable Transactions	Percent				
			Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Motor Vehicle and Parts Dealers	18,313	39,914,893,134	7.3	13.8	19.5	24.1	35.3
Home Furnishings and Appliance Stores	24,264	14,165,285,292	7.2	12.3	16.8	21.8	41.9
Building Material and Garden Equipment and Supplies Dealers	8,022	15,155,346,587	8.4	11.8	14.4	20.5	44.9
Food and Beverage Stores	16,513	12,567,660,011	10.4	13.6	17.1	23.4	35.4
Gasoline Stations	4,264	20,439,965,004	9.4	14.8	20.0	25.5	30.2
Clothing and Clothing Accessories Stores	61,500	21,061,767,968	9.5	12.9	16.9	21.7	39.0
General Merchandise Stores	17,625	23,214,766,069	8.8	12.9	16.6	22.6	39.1
Food Services and Drinking Places	52,279	38,232,195,160	8.6	11.8	16.0	23.4	40.1
Other Retail Group	157,485	27,154,587,615	7.0	13.5	21.0	22.1	36.3
Total Retail and Food Services	**360,265**	**211,906,466,840**	**8.8**	**12.9**	**16.6**	**22.6**	**39.1**
All Other Outlets	**208,538**	**92,231,059,200**	**7.0**	**13.5**	**21.0**	**22.1**	**36.3**
Total All Outlets	568,803	304,137,526,040	8.8	12.9	16.6	22.6	39.1

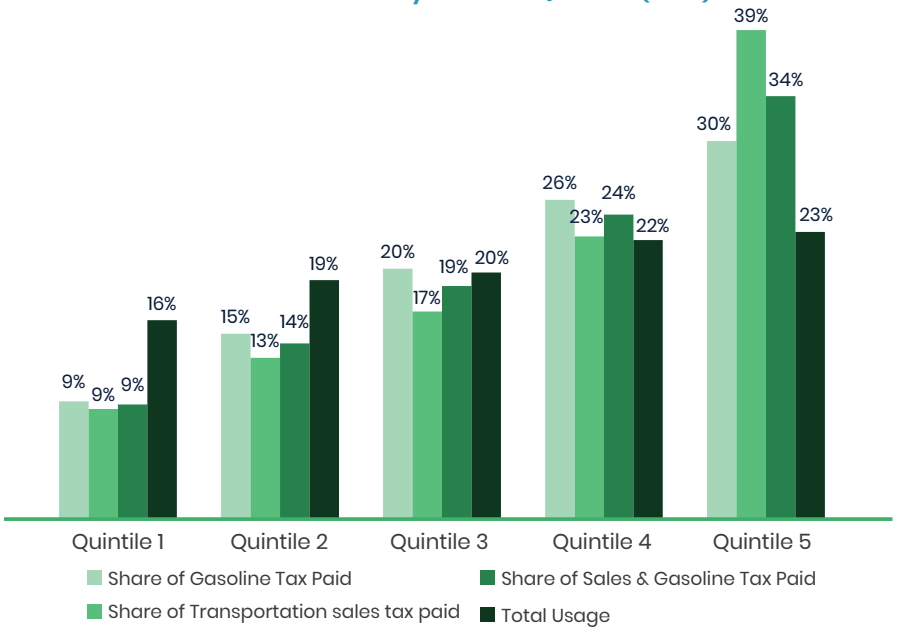
Source: California Department of Tax and Fee Administration

RESULTS

This analysis includes a comparative examination of the amount of taxes paid (sales tax, gasoline tax, and income tax) by the five respective income groups and for each racial and ethnic minority group. **FIGURE 60 - FIGURE 62, TABLE 54**, and **TABLE 55** indicate that taxes paid as a percent of each group's adjusted gross income puts the heaviest burden on lower-income groups. This is the so-called "regressive" nature of the excise gasoline taxes and retail sales taxes levied primarily on consumer durable and non-durable goods that make up the necessities of daily living.

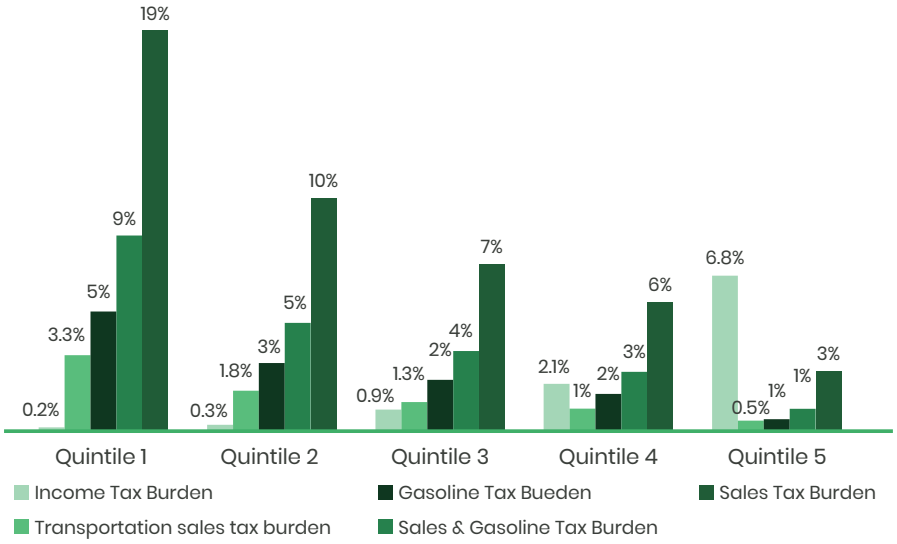
TABLE 55 shows that the lower quintile groups (Quintile 1 and Quintile 2) are anticipated to pay a respective 5.1 percent and 8.3 percent of their adjusted gross income on regional sales tax for transportation and gasoline taxes. By comparison, the higher quintile groups (Quintile 4 and 5) are anticipated to pay 1.5 percent and 2.1 percent of their adjusted gross income on all regional sales tax for transportation purposes and gasoline taxes, respectively. Although the lower income quintile groups pay a larger percentage of their income on taxes than other quintiles, their contribution of the total share of sales tax for transportation purposes and gasoline taxes is the smallest of the group at 9.2 percent for Quintile 1 and 14 percent for Quintile 2. Quintile 4 and Quintile 5, in contrast, pay 24.3 percent and 33.8 percent of the total sales tax for transportation and gasoline taxes in the region. Thus, those with limited financial means will not pay a disproportionate amount of overall taxes under the Plan, compared with their usage of the transportation system and their shares of RTP/SCS investments.

FIGURE 60 Share of Taxes Paid by Income Quintile (2016)



Source: 2016 California Taxable Sales, California Department of Tax Fee and Administration
Table 24A--Fuel (Excise) Taxes, Gasoline Tax Statistics by Fiscal Year, 1923-1924 to 2014-15, State Board of Equalization 2015-16 Annual Report
California Income Tax Returns Statistic for 2016, California Franchise Tax Board
Consumer Expenditure Survey, 2016, Bureau of Labor Statistics

FIGURE 61 Tax Burdens by Income Quintile: Income, Sales and Gasoline Tax (2016)



Source: 2016 California Taxable Sales, California Department of Tax Fee and Administration
Table 24A--Fuel (Excise) Taxes, Gasoline Tax Statistics by Fiscal Year, 1923-1924 to 2014-15, State Board of Equalization 2015-16 Annual Report
California Income Tax Returns Statistic for 2016, California Franchise Tax Board
Consumer Expenditure Survey, 2016, Bureau of Labor Statistics

TABLE 54 Income Tax Return Analysis for the SCAG Region: 2016 Tax Year

	All Tax Returns	Adjusted Gross Income Quintile Ranges	Total Adjusted Gross Income	Total CA Income Tax Assessed	% of Total Adjusted Gross Income	% of Total Tax Assessed	Tax Assessed as % of Gross Income
Quintile 1	1,459,654	Up to $13,977	$11,911,090	$18,838	2.00%	0.06%	0.16%
Quintile 2	1,459,654	$13,978-$27,238	$32,948,620	$88,864	5.53%	0.30%	0.27%
Quintile 3	1,459,654	$27,239-$47,218	$59,122,625	$557,451	9.93%	1.90%	0.94%
Quintile 4	1,459,654	$47,219-$88,918	$104,324,823	$2,160,683	17.52%	7.37%	2.07%
Quintile 5	1,459,654	$88,918 & Above	$387,285,942	$26,478,302	65.03%	90.36%	6.84%
	7,298,270		$595,593,100	$29,304,136	100.00%	100.00%	4.92%

Source: California Francise Tax Board (FTB)

TABLE 55 Tax Burden Analysis for the SCAG Region: Income Tax, Retail Tax, and Gasoline Tax (2016)

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Total
Total Adjusted Gross Income ($1,000)	11,911,090	32,948,620	59,122,625	104,324,823	387,285,942	595,593,100
Income Tax Assessed ($1,000)	18,838	88,864	557,451	2,160,683	26,478,302	29,304,136
Share of Adjusted Gross Income	2.0%	5.5%	9.9%	17.5%	65.0%	100.0%
Share of Income Tax Assessed	0.1%	0.3%	1.9%	7.4%	90.4%	100.0%
Income Tax Burden	0.2%	0.3%	0.9%	2.1%	6.8%	
Estimated Gasoline Tax Paid (Effective rate as of 07/01/2019)						
State Excise Tax ($0.473)	332,031,167	522,772,476	706,449,292	900,722,847	1,066,738,431	3,528,714,213
Federal Excise Tax ($.184)	129,162,230	203,361,809	274,813,255	350,386,900	414,968,015	1,372,692,210
Sales Tax on Gasoline	165,519,362	260,604,953	352,168,856	449,015,291	531,774,972	1,759,083,435
Total Tax Paid on Gasoline	626,712,759	986,739,238	1,333,431,403	1,700,125,039	2,013,481,418	6,660,489,857
Share of Gasoline Tax Paid	9.4%	14.8%	20.0%	25.5%	30.2%	100.0%
Gasoline Tax Bueden	5.3%	3.0%	2.3%	1.6%	0.5%	
Taxable Sales & Sales Tax						
Estimated Taxable Sales	26,764,102,292	39,233,740,859	50,486,829,323	68,735,080,885	118,917,772,682	304,137,526,040
Estimated total Sales Tax Paid	2,305,650,542	3,379,874,091	4,349,295,341	5,921,329,802	10,244,424,569	26,200,574,345
Share of Sales Tax Paid	8.8%	12.9%	16.6%	22.6%	39.1%	100.0%
Sales Tax Burden	19.4%	10.3%	7.4%	5.7%	2.6%	
Estimated total transportation sales tax paid	398,237,549	583,780,043	751,220,831	1,022,746,432	1,769,441,836	4,525,426,690
Share of Transportation sales tax paid	8.8%	12.9%	16.6%	22.6%	39.1%	100.0%
Transportation sales tax burden	3.3%	1.8%	1.3%	1.0%	0.5%	
Combined Sales & Gasoline Tax for transportation purpose						
Estimated Sales & Gasoline Tax Paid	1,024,950,308	1,570,519,281	2,084,652,233	2,722,871,471	3,782,923,254	11,185,916,547
Share of Sales & Gasoline Tax Paid	9.2%	14.0%	18.6%	24.3%	33.8%	100.0%
Sales& Gasoline Tax Burden	8.6%	4.8%	3.5%	2.6%	1.0%	

Source: 2016 California Taxable Sales, California Department of Tax Fee and Administration
Table 24A--Fuel (Excise) Taxes, Gasoline Tax Statistics by Fiscal Year,, 1923-1924 to 2014-15, State Board of Equalization 2015-16 Annual Report
California Income Tax Returns Statistic for 2016, California Franchise Tax Board
Consumer Expenditure Survey, 2016, Bureau of Labor Statistics

TABLE 56 and **FIGURE 62** look at projected taxes by race and ethnicity and indicate that tax burdens are expected to fall more heavily on non-minority groups, with Non-Hispanic Whites paying 49 percent of the income taxes and 39.7 percent of retail and gasoline taxes through the year 2040.

CONNECT SOCAL INVESTMENTS VS. BENEFITS CI LU

METHODOLOGY

The transportation investment strategy of Connect SoCal will have a large impact on future travel options for low-income and minority communities. In terms of EJ, disproportionate allocation of resources for various investments can indicate a pattern of discrimination. Such was the case in the landmark civil rights class action lawsuit Labor/Community Strategy Center v. Los Angeles County Metropolitan Transportation Authority (MTA) in October 1996. The lawsuit, which eventually led to a court-ordered Consent Decree, charged that MTA's investment and service priorities disproportionately allocated resources to rail transit modes over bus ridership, an expenditure pattern discriminatory to low-income and minority communities.

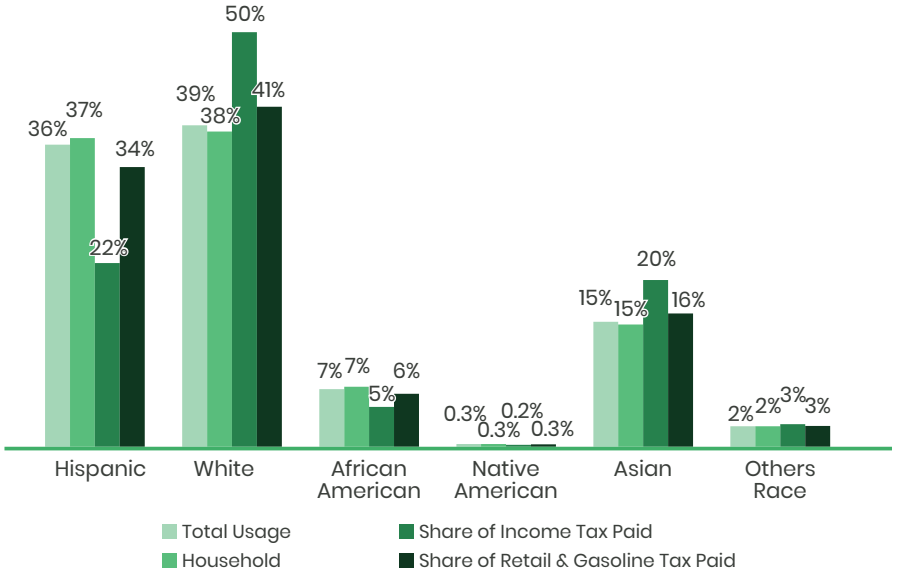
As a regional MPO, SCAG aims to identify and address Title VI and other EJ implications of its planning processes and investment decisions. This analysis intends to determine where Connect SoCal is putting its investments and whether resources are being allocated equitably. Connect SoCal utilized a benefit assessment method that considered to what extent various socioeconomic groups were receiving value from existing and funded transportation investments. SCAG compared the total share of transportation funding borne by low-income households against other income groups. In this

TABLE 56 Projected RTP/SCS Funding Share by Ethnicity (2016-2045 Average)

	Share of Household	Share of Income Tax Paid	Share of Retail & Gasoline Tax Paid
Hispanic	37.2%	22.2%	33.7%
White	38.0%	50.0%	41.0%
African American	7.2%	4.8%	6.4%
Native American	0.3%	0.2%	0.3%
Asian	14.7%	20.1%	16.1%
Other Race	2.5%	2.7%	2.5%
Total	100.0%	100.0%	100.0%

Source: SCAG

FIGURE 62 Share of Households and Taxes Paid by Ethnicity (2016-2045 Average)



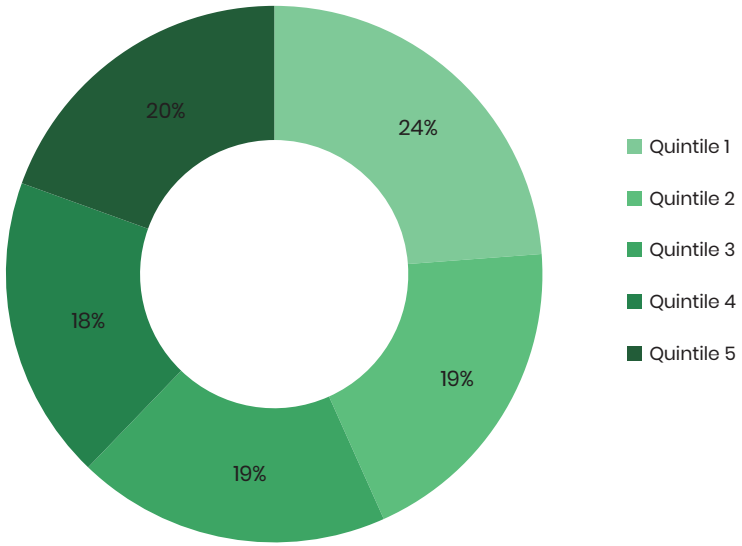
Source: SCAG

analysis, SCAG reported expenditure distribution in several ways. First, SCAG estimated the share of total Plan expenditures allocated to each category of household income. This was done by summing expenditures on each type of mode (bus, rail transit, passenger rail, highways/arterials, and HOV/HOT lanes). These expenditures were then allocated to income categories based on each income group's use-share of these modes.

RESULTS

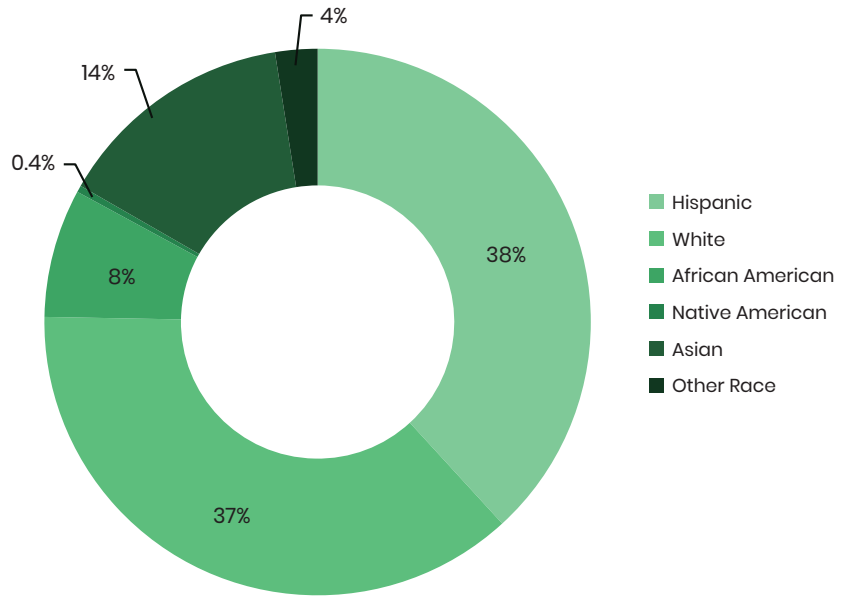
FIGURE 63, Transportation Investments by Income Quintile, presents the findings for share of total investments, which looks at the raw dollars and compares the amount of transportation investments spent on low-income and high-income households. The results revealed that about 24 percent of Plan investments will be allocated to the lowest quintile group (Quintile 1 - as compared with the group's system usage of just under 16 percent), while 20 percent will be invested for the highest income category (Quintile 5), whose transportation system usage totals 23 percent. In other words, transportation investments will go to modes that are most likely to be used by lower-income households. **FIGURE 63**, Transportation Investments by Ethnicity, evaluates the distribution of transportation investments for various racial/ethnic groups. The current analysis for Connect SoCal reveals that Plan investments will be distributed equitably on the basis of system usage for all racial and ethnic minority groups. For Hispanics, the share of Plan investments (38 percent) is close to this group's share of system usage (36 percent); for Whites, the share of Plan investments is at 37 percent, while their system usage is 39 percent; for African-Americans, the share of Plan investments (8 percent) is in line with their system usage (7 percent), and the same can be said for Asian/Pacific Islanders, whose usage (15 percent) of the transportation system is in line with their share of investments (14 percent).

FIGURE 63 Connect SoCal Transportation Investments by Income Quintile



Source: SCAG

FIGURE 64 Connect SoCal Transportation Investments by Ethnicity



Source: SCAG

GEOGRAPHIC DISTRIBUTION OF TRANSPORTATION INVESTMENTS CI

METHODOLOGY

One method for assessing the distribution of benefits associated with Connect SoCal is to tabulate and summarize the share of physical improvements for active transportation, transit, and highway-related projects throughout the region, and specifically for areas that have a high concentration of low-income and minority population. This analysis measures the actual mileage of improvements in the form of new bike lanes, transit lines, and highway mile improvements, and then summarizes the share of these improvements for each of the areas of concern described earlier in this report.

RESULTS

By 2045, there will be an additional 1,000 miles of highway projects as a result of Connect SoCal. These projects include improvements to mixed-flow highway lanes, Express or High Occupancy Toll lanes (HOT), general toll lanes, and carpool or High Occupancy Vehicle lanes (HOV).

TABLE 57 shows the breakdown of investments by highway type at the regional level, and includes a summary of improvements for each area of concern individually. Examining projects in the region as a whole, 47 percent of the physical improvements for highways will occur in mixed-flow corridors. The largest share will go to express lanes, which will receive 29 percent of the total physical improvements. HOV lane improvement accounts 24 percent of highway investment. When summarizing total improvements by area of concern, 50 percent of the region's total improvements by miles will be in EJA. Within EJA, the largest share of investments also goes to express lanes (53 percent). For the other subareas, 38 percent and 18 percent of the region's mile investments will fall in DAC and COC, respectively.

In terms of mileage investments for transit lines, roughly 4,700 miles of transit-related projects will be built by 2045. From **TABLE 58**, the largest investment will be for local bus lines (38 percent). Rapid bus lines will incur 22 percent of all transit mileage investments, while light rail and express bus lines will count for 13 percent and 10 percent, respectively. For the region's areas of concern, 64 percent of the Plan's transit line investments will occur in EJA, 42 percent will fall in DAC, and 25 percent in COC area.

The Plan will also double the current number of miles of bike lanes from 5,100 miles in 2016 to 9,100 miles in 2045, an increase of 80 percent.

TABLE 59 and **FIGURE 65** display the breakdown of new bike lanes in the region's areas of concern, where the share of miles will increase from 2016 faster than the regional average for all subareas. DAC enjoys the largest rate of increase from existing conditions in 2016, with 204 percent growth. COC and EJA will also see a large increase from current levels, where bike miles will grow by 187 percent and 162 percent, respectively. **EXHIBIT 34** illustrates the current infrastructure and planned improvements for bike lanes as a result of the Plan.

TABLE 57 RTP Highway Mileage Share by Type

Project Type	SCAG Region	EJ	DGA	COC
Express	29%	53%	46%	11%
HOV	24%	42%	21%	16%
Mixed-Flow	47%	52%	41%	23%
SCAG Region	100%	50%	38%	18%

Source: SCAG

TABLE 58 RTP Transit Mileage Share by Mode

Mode	SCAG Region	EJ	DGA	COC
Local Bus	38%	60%	31%	26%
Express Bus	10%	31%	18%	5%
Rapid Bus	22%	73%	52%	31%
BRT	3%	79%	65%	48%
Heavy/Light Rail	13%	77%	58%	43%
Metrolink	1%	71%	63%	32%
High Speed Rail	13%	72%	52%	7%
SCAG Region	100%	64%	42%	25%

Note: Mileage calculation does not include transit projects for service improvement

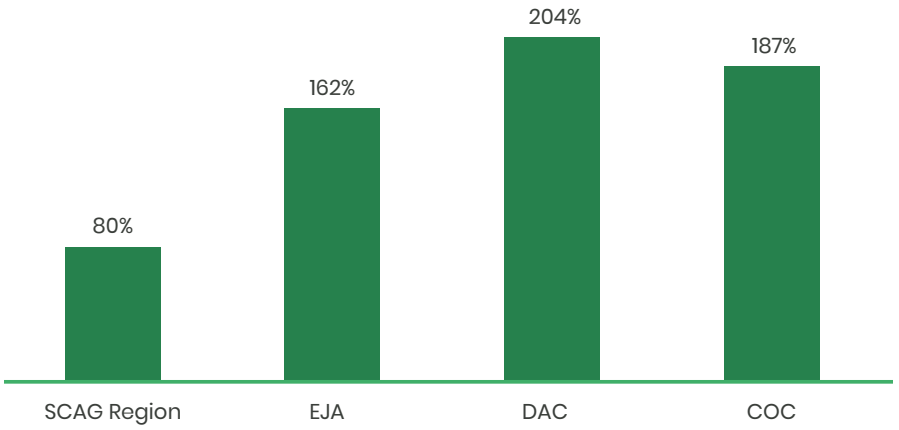
Source: SCAG

TABLE 59 Bicycle Mileage Shares by 2045

	Existing	Proposed	Existing	Proposed	Increased
SCAG Region	5,074	9,117	100%	100%	80%
EJA	2,085	5,464	41%	60%	162%
DAC	936	2,841	18%	31%	204%
COC	541	1,550	11%	17%	187%

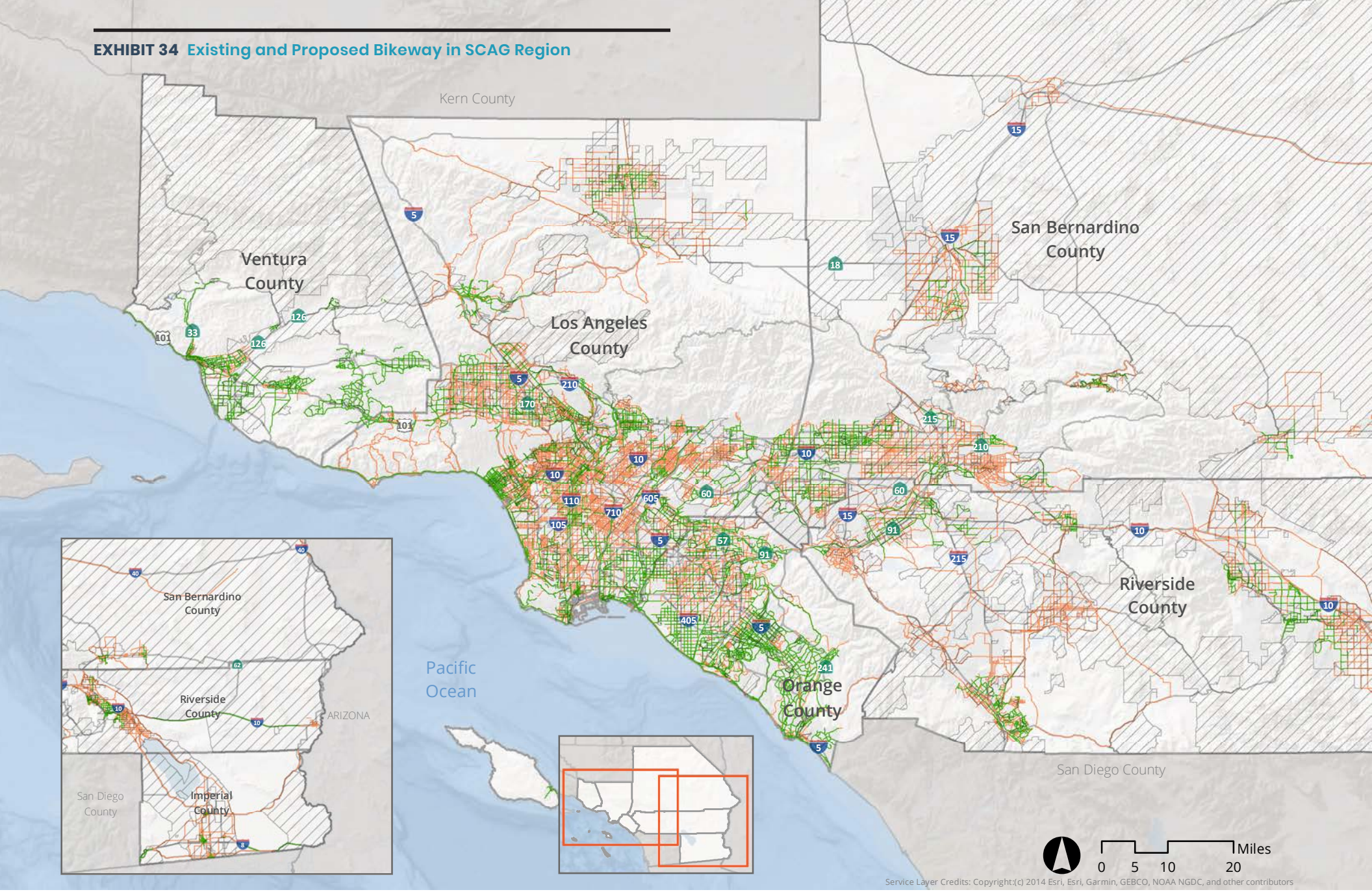
Source: SCAG

FIGURE 65 Bicycle Mileage Increased From 2016 to 2045 Plan



Source: SCAG and local jurisdictions

EXHIBIT 34 Existing and Proposed Bikeway in SCAG Region



Source: SCAG, 2019

IMPACTS FROM FUNDING THROUGH MILEAGE-BASED USER FEES CI

METHODOLOGY

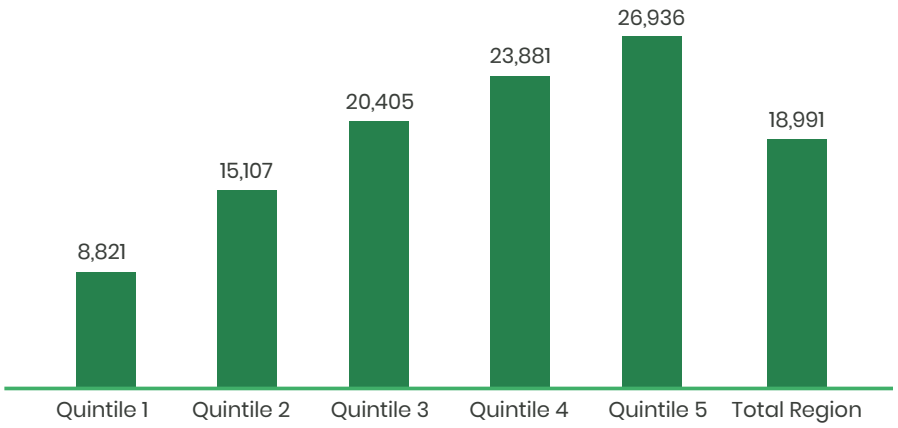
This analysis is based on the funding strategy in Connect SoCal, which recommends the implementation of a mileage-based user fee as a long-term replacement to the gasoline tax. The Plan calls for a mileage-based user fee of about $0.025 (in 2019 dollars) per mile beginning in 2030 and indexed at a rate of 2.4 percent to maintain purchasing power. The implementation of this strategy requires actions of both the California State Legislature and Congress and is consistent with recommendations from two national commissions to improve the financial sustainability of the nation's transportation system. This funding strategy was included in the 2012 and 2016 RTP/SCS and has since gained additional statewide traction due to the successful implementation of the California Road Usage Charge Pilot Program. In 2014, the California Legislature passed Senate Bill (SB) 1077 (DeSaulnier) directing California to conduct a pilot program to study the feasibility of a road charge as a replacement to the gas tax. The pilot began in 2016, and over 5000 participants drove over 37 million miles during the nine-month program. The initial pilot explored multiple mileage reporting methods and found that 86 percent of participants were satisfied by their chosen method, and 85 percent were satisfied with the pilot overall. The next planned pilot will focus on reducing administrative costs through pay-at-the-pump technologies.

RESULTS

With the Plan's recommendation of an alternative funding strategy, it is important to assess the potential impacts of a mileage-based user fee on low-income communities. This will be done by contrasting the current combined federal and state gasoline excise tax of $0.657 per gallon, of which the state portion increases yearly with inflation, with the implementation of a mileage-based user fee of $0.025 per mile (in 2019 dollars) beginning in 2030. **FIGURE 66** shows the average annual VMT per household by income quintile in 2016, which was derived from the 2009 National Household Travel Survey and post-processed to account for changes from 2009 to 2016. As demonstrated previously, households in Quintile 1 and 2 use transit, carpooling, and active transportation more frequently than households with higher incomes due to these modes' lower relative cost. It makes sense, then, that the number of miles driven annually would rise as incomes climb from Quintile 1 to Quintile 5. This is true as well when looking at Average Daily VMT (**FIGURE 67**). Because the gasoline tax is a charge on the quantity of gasoline purchased, the same trend is largely seen for average household gasoline taxes paid in 2016 (**FIGURE 68**). When looking at the gasoline taxes paid per mile for 2016, however, a different trend emerges. **FIGURE 69** demonstrates that households in the lowest earning quintiles (Quintiles 1 and 2) pay a higher rate per mile than middle income households (Quintile 3). This can largely be explained because lower income households tend to own older cars that are less fuel efficient than their newer counterparts, which are normally 15 to 20 percent more fuel efficient than the general auto fleet.

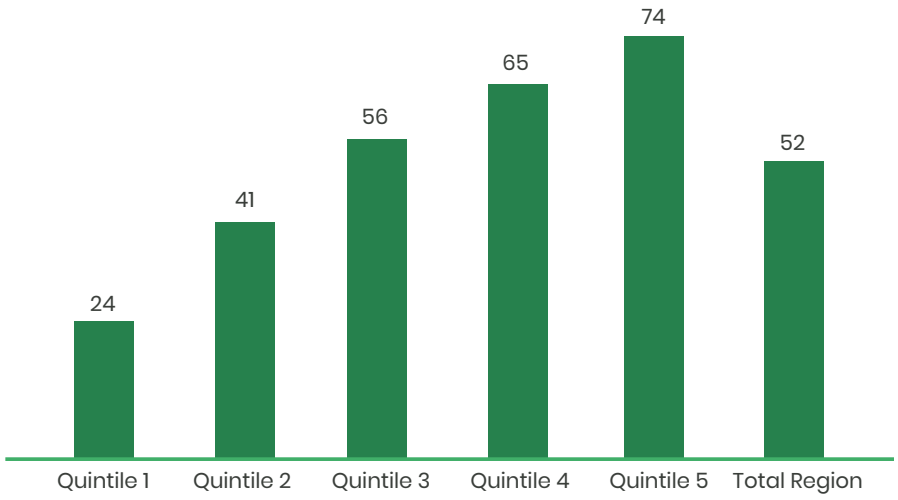
With the cost per mile for low-income households in 2016 under the gasoline tax higher than the proposed mileage-based user fee of $0.025 (assumed to start in 2030), it appears that lower income households would fare better under a mileage-based user fee from an equity perceptive. Looking towards the future, state gasoline taxes will rise with inflation and could potentially continue to climb to maintain the nation's aging infrastructure. From an equity perspective, the gasoline tax and the mileage-based user fee are similar in nature because they are both regressive—lower income households will pay a disproportionately higher percentage of their income compared to what is paid by higher income groups for both a gasoline tax and a mileage-based user fee. The mileage-based user fee is less "regressive" than the gasoline tax, however, because it allows lower income households to pay the same price per mile as other groups, whereas the gasoline tax does not. It also removes the advantages that middle- and higher-income households have due to their access to relatively new and more fuel-efficient vehicles and promotes more equity in the funding of the region's transportation system.

FIGURE 66 Average Annual VMT per Household by Income Quintile



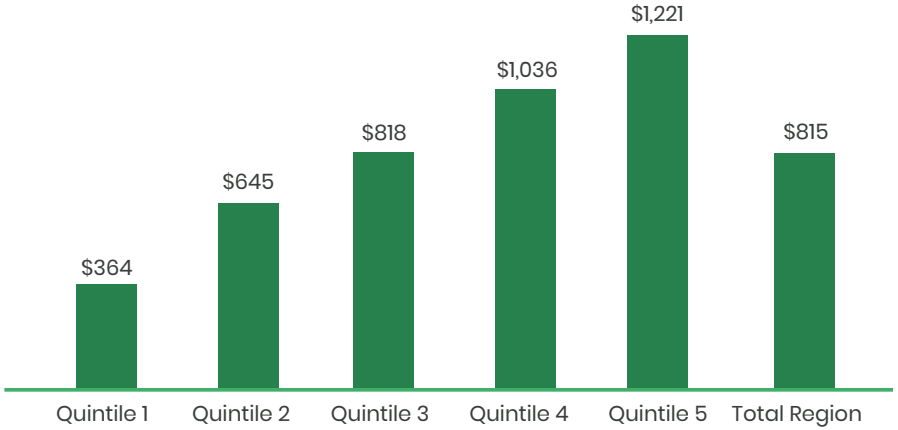
Sources: SCAG, 2009 National Household Travel Survey, California State Board of Equalization, California Franchise Tax Board, Bureau of Labor Statistics

FIGURE 67 Average Daily VMT in Miles by Income Quintile



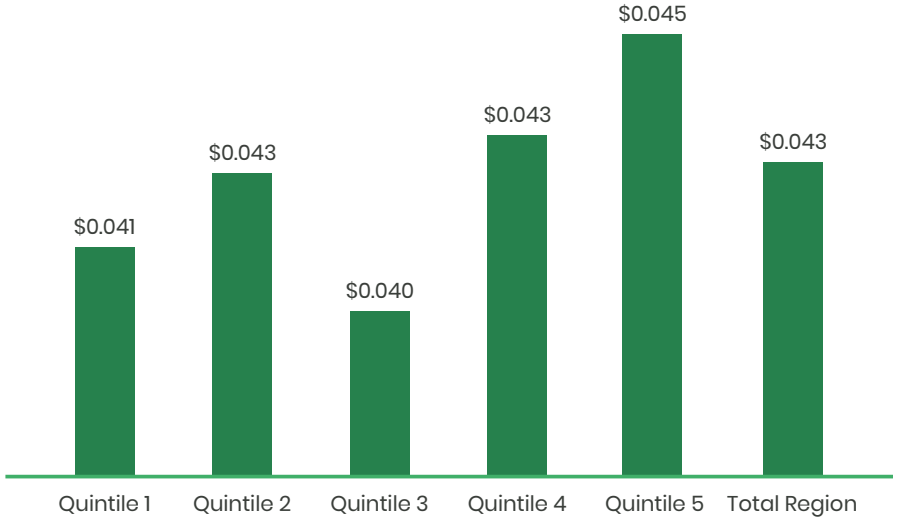
Sources: SCAG, 2009 National Household Travel Survey, California State Board of Equalization, California Franchise Tax Board, Bureau of Labor Statistics

FIGURE 68 Average Household Gasoline Taxes in 2016



Sources: SCAG, 2009 National Household Travel Survey, California State Board of Equalization, California Franchise Tax Board, Bureau of Labor Statistics

FIGURE 69 Gasoline Tax per Mile in 2016



Sources: SCAG, 2009 National Household Travel Survey, California State Board of Equalization, California Franchise Tax Board, Bureau of Labor Statistics

EJ TOOLBOX

Building on the foundation of the 2012 RTP/SCS and 2016 RTP/SCS, SCAG is committed to provide a toolbox of recommended strategies and resources to address potential impacts to EJ Areas, Disadvantaged Communities, Communities of Concern, and other EJ related communities. The toolbox presents optional policy recommendations that may be effective in addressing EJ impacts after a comprehensive review of impacts and consultation with all stakeholders. These recommendations were identified through a review of literature, recent planning activities, and input from stakeholders as part of the EJ outreach process.

With the passage of SB 1000, which requires local jurisdictions with disadvantaged communities to develop a separate EJ Element or incorporate EJ policies and goals throughout their General Plan, this toolbox can also function as a resource document for local jurisdictions when developing EJ-related goals and policies and EJ community organizations when advocating for solutions for EJ-related community issues. Disadvantaged communities are defined as the top 25 percent scoring areas from CalEnviroScreen along with other areas with high amounts of air pollution and low populations. The SB535 Disadvantaged Communities map and various resources can be found at the California Environmental Health Hazard Assessment (OEHHA) webpage.

The format of this EJ Toolbox follows the organization of Connect SoCal EJ Technical Report Performance Measures with consideration of the Governor's Office of Planning and Research's (OPR's) required contents in EJ Elements and includes the applicable General Plan Element icons used throughout the EJ report. This EJ Toolbox also draws from many sources, especially OPR's General Plan Guidelines and California EJ Alliance and PlaceWork's SB 1000 Implementation Toolkit.

The EJ Toolbox is meant to be a dynamic document that will change with time and the landscape of EJ. SCAG will continue to collect input from local jurisdictions, community-based organizations, and other EJ stakeholders on an ongoing basis to ensure this toolbox is relevant and accurate after the adoption of Connect SoCal in April 2020.

These recommended practices and approaches can be developed into policies and strategies based on the user's/reader's needs. All recommendations are optional and up to the discretion of the user/reader. Recommendations incorporating or referring to compliance with existing regulations are for informational purposes only and do not supersede existing regulations.

HEALTHY, SAFE, AND SANITARY HOUSING H LU

Promoting healthy, safe, and sanitary homes requires three components: housing conditions, housing affordability, and land-use compatibility. Households living in EJ areas could potentially face disproportionately higher housing in poor condition, burdens of housing costs, and proximity to pollutant sources near their homes. These conditions can lead to unsafe housing, gentrification, and displacement. The following recommended practices and approaches can be considered to reduce these impacts in addition to many more provided in the resources section listed below.

Recommended Practices and Approaches:

- Establish protections for low-income renters, including requiring 60-day notice for rent increases and funds/programs that focus on outreach, information, and enforcement of tenant protection laws
- Create requirements to promote the construction of affordable housing in conjunction with market-rate development in disadvantaged communities
- Include rent control policies in disadvantaged communities
- Create a local housing trust fund that leverages developer fees and other fees to fund new affordable housing projects
- Consider anti-displacement strategies like inclusionary zoning, rent stabilization policies, no net loss of affordable housing (within ½ mile of public investments), incentive rezoning regulations that fund inclusionary housing, jobs-housing linkage fees or foreclosure assistance
- Consider replacement housing policies to minimize the displacement

of low-income residents from demolished or converted units

- Provide public education and/or materials to educate residents on potential hazards that can lead to unhealthy housing conditions and encourage residents to take action
- Consider mitigation, non-profit, and grant funding opportunities for local community-oriented businesses
- Explore the applicability of community land trusts to preserve local land ownership
- Adopt policies that incentivize the creation of affordable housing and energy efficient housing near amenities such as parks, schools, transit, and jobs
- Create homeowner assistance programs to assist low income families to purchase homes or prevent foreclosures
- Consider community-based ownership options, such as co-ops, to encourage ownership opportunities in areas with low homeownership rates
- Consider policies that protect and preserve mobile homes and mobile home parks as it is often a primary housing option in many disadvantaged and rural communities
- Consider co-locating affordable housing near transit, jobs centers, and other essential services
- Consider additional anti-displacement strategies like:
  - Adopt local hire policies and training/apprenticeship programs for new transportation, housing, and real estate investments that are targeted to low-income residents
  - Provide small business disruption funds to support local businesses in communities that are seeing new infrastructure investment
  - Support programs and policies that incentivize local purchases (e.g., bicycle friendly business districts, farmer's markets, walkable commercial centers near neighborhoods, etc.)
  - Adopt participatory budgeting for major transportation and transit-supportive infrastructure, with an emphasis on allowing historically marginalized groups to determine how best to allocate revenues to address their concerns
- Consider policy examples provided in various resources listed below

Additional Resources:

- The Partnership for Working Families, Policy & Tools: Community Benefits Toolkit [22]
- Los Angeles Alliance for a New Economy, LAX Community Benefit Agreement[23]
- Urban Displacement Project[24]
- Anti-Eviction Mapping Project[25]
- CARB, Developing a New Methodology for Analyzing Potential Displacement (2017)[26]
- Los Angeles Regional and Open Space Park District, Displacement Avoidance Strategy[27]
- Additional Anti-Displacement Strategies[28]
- SCAG, Mission Impossible? Meeting California's Housing Challenge (2016)

22 Partnership for Working Families. Policy & Tools: Community Benefits Toolkit.
23 Gross, J, LeRoy, G., & Janis-Aparicio, M. (2005). LAX Community Benefit Agreement.
24 Zuk, M., & Chapple, K. (2015). Urban Displacement Project.
25 Anti-Eviction Mapping Project.
26 California Air Resources Board. (2017). Developing a New Methodology for Analyzing Potential Displacement.
27 Los Angeles Regional and Open Space Park District. (2019). Displacement Avoidance Strategy.
28 Strategic Growth Council (2018) "FY 2017-2018 AHSC Program Guidelines"

ACCESS TO ESSENTIAL SERVICES AND FACILITIES CI CO LU OS

Many EJ communities do not have adequate access to a wide range of necessary facilities such as parks, schools, shopping, public transit and employment. The lack of access to these essential services can lead to a variety of EJ-related issues. The following recommended practices and approaches can be considered to reduce these impacts.

Recommended Practices and Approaches:

- Coordinate provision of public services to disadvantaged communities and areas of newly permitted development so that provision of any given service does not stimulate development that significantly hinders the local jurisdiction's ability to provide other services at uniform levels
- Ensure the equitable distribution of beneficial public facilities, prioritizing new facilities in traditionally underserved areas
- Increase access to diverse, high-quality parks, green space, recreational facilities, and natural environments for traditionally underserved communities
- Encourage transit providers to establish and maintain routes to jobs, shopping, schools, parks, and healthcare facilities that are convenient to low-income and minority populations
- Restrict sensitive public facilities, such as schools and hospitals, from being located near infrastructure industrial facilities or high-volume roadways that hose a hazard to human health and safety
- Increase awareness of accessibility and proximity to key destinations from active transportation and transit infrastructure, i.e. through wayfinding, public education, etc.
- Provide a range of quality recreational facilities that are well maintained, have adequate lighting, signage, hours of operation, and represent the multi-ethnic and multi-cultural needs of the community
- Promote park and facility design that discourages vandalism, deters crime, provides natural surveillance, and creates a safe and comfortable environment
- Require new infill development projects to provide mini parks in infill areas to increase the number and accessibility of parks
- Permit homeowners' associations to manage mini parks, formative parks, and neighborhood parks, so long as parks are publicly accessible and well maintained
- Consider and minimize any direct impacts on land values and existing housing that might occur through land acquisition and development in low income areas
- Encourage safe routes to schools and parks from residential areas
- Partner with transit agencies to ensure that parks and recreational facilities are accessible to low-income and minority populations
- Consider providing free or reduced fare transit passes for youth and low-income residents living hear transit
- Consider providing Vision Zero (VZ) funding that incentives cities to incorporate and implement VZ policies
- Consider providing funding that helps low-income individuals buy low- or zero-emission cars
- Expand affordable, local e-bike and e-scooter share programs
- Expand bicycle, pedestrian and road safety awareness programs such as Go Human

ACTIVE LIVING, ACTIVE TRANSPORTATION, AND PHYSICAL ACTIVITY CI LU S

Residents living in disadvantaged communities may face barriers to leading active lifestyles due to the lack of access to active transportation networks which can limit physical activity. The following recommended practices and approaches can be considered to reduce these impacts.

Recommended Active Transportation & Public Health Practices and Approaches:

- Increase awareness of the connection between health and physical

activity by providing public education programs or materials about environmental health impacts to help residents make informed decisions about their health and community so they can be empowered to take action

- Facilitate pedestrian and bicycle access to parks, open space, and other essential services in EJ communities through infrastructure investments and improvements
- Encourage and sustain linear parks to connect neighborhoods and communities
- Partner with local school districts, non-profit organizations, and community-based organizations to offer bicycle education and traffic safety training. Improve access by providing bicycles, helmets and related equipment for lower income families and promoting joint use of school properties for parks and recreational facilities
- Partner with local educational institutions and/or community-based organizations to promote active transportation choices
- Adopt and institutionalize complete pedestrian network plans that allows for safe travel between all areas and destinations of the community
- Adopt and implement complete streets policies requiring jurisdictions to design streets that are safe and accessible for all modes of travel. Complete streets designs include traffic-calming measures as well as reallocation of street space to people walking and bicycling
- Adopt and implement Vision Zero Policies to create safer streets for all users
- Develop or update transportation infrastructure, such as sidewalks, bicycle lanes, and street lighting to encourage active transportation within communities
- Fund measures that help improve air quality in neighboring homes, schools, and other sensitive receptors like limit siting of new sensitive uses, such as playgrounds, daycare centers, schools, residences, or medical facilities, within 500 feet of freeways and 500 feet of warehouses and other industries with heavy volume of traffic to make it healthier and safer for residents to walk and bicycle recreationally or to local destinations
- Engage with local private industry to strengthen public-private partnerships like a shared micro-mobility (bike/scooter share) program[29]
- Consider using checklists similar to Riverside County's Healthy Development Checklists[30] to develop complete streets and healthier communities when reviewing new development projects
- Encourage Safe Routes to School (SRTS) walk audits that include EJ hazards checklists that include analyzing canopy, urban heat island threat, air quality, flood drainage, etc.
- Consider walking/biking infrastructure using materials that lowers urban heat island affects as well as urban forestry to better encourage the health and safety of users in hotter climates
- Consider funding the development of SRTS Countywide plans

Recommended Food Access Practices and Approaches:

- Prioritize healthy food supplies in economic development efforts, especially in areas where a healthy food supply, farmer's market or community garden is not located within a walkable distance (i.e. half to a quarter mile away)
- Encourage the development of healthy food establishments in food swamps which are areas with a high-density of establishments selling high-calorie fast food and junk food, relative to healthier food options[31]
- Expand the number of low-income Community-Supported Agricultural models to increase fresh food access in low-income areas,

29 Examples of shared micro-mobility program are Santa Monica Bike Share, Long Beach Bike Share, and Bay Area Bike Share
30 Riverside University Health System (RUSH), Healthy Development Checklist
31 Cooksey-Stowers (2017) "Food Swamps Predict Obesity Rates Better Than Food Deserts in the U.S.

while fairly compensating farmers for their products[32]

- Restrict the location and amount of fast food restaurants and other food retailers that promote low-nutrient-dense foods through land use and other controls, especially near sensitive land uses
- Set up school- or community-based programs that integrate gardening and nutrition, and make the connection between healthy food choices and locally-grown fresh produce

Additional Resources:

- California Healthy Places Index (HPI)

CLIMATE VULNERABILITY AND RESILIENCY LU S

Climate change already impacts all communities in California but EJ communities can potentially suffer disproportionately higher adverse impacts when EJ is not considered during the planning process. Extreme heat, flooding, wildfire, drought, and sea-level rise are hazards that can harm people and present risk to the built and natural environment. The following recommended practices and approaches can be considered to reduce these impacts in addition to many more provided in the resources section.

Recommended Practices and Approaches:

- Support measures for extreme heat resiliency and adaptation like encourage more urban greening and forestry to increase tree and vegetation cover, create cool/green roofs, reduce impervious surfaces, use cool pavements and provide cooling centers with reliable power sources especially in low income and minority communities that don't have access
- Coordinate emergency response and transportation resources available to vulnerable communities and populations
- Measure climate vulnerability for local communities, including EJ communities, through a process called a vulnerability assessment[33] to better understand climate change impacts and develop adequate climate resiliency and adaptation plans
- Adopt and institutionalize climate resiliency and adaptation plans to help manage the growing effects of climate change and identify and response to health impacts for all communities, especially EJ communities
- Expand access to renewable energy, increase energy efficiency, and promote resilient design in the built environment
- Encourage land uses that support resiliency and adaptation to climate change like promoting infill, mixed-use, and higher density development, promote greater linkage between land uses and transit to decrease GHG, encourage active transportation over driving, etc.
- Develop renewable energy supply to support adaptation to climate change and improve resiliency in the face of increase hazards
- Require new developments in and near flood-prone areas to use permeable paving, rain gardens, and other low-impact development strategies to slow down floodwaters and promote groundwater infiltration especially in EJ communities who have less economic opportunity to move out of flood-prone areas
- Encourage the preservation of native vegetation in wildland areas and in constructed landscapes to reduce vulnerability to extreme heat and wildfire associated with climate change
- Support increased resilience for transportation, particularly for persons with limited mobility such as retrofitting existing transportation infrastructure, constructing new infrastructure using resilient materials and design features, developing evacuation plans for persons with limited mobility including how to obtain vehicles and drivers in an emergency situation, etc.

32 American Planning Association. (2012). Planning for food access and community-based food systems: A national scan and evaluation of local comprehensive and sustainability plans.

33 California Natural Resources Agency. Adaptation Planning Guide.

- Increase awareness of the effect humans have on the environment and encourage individuals and organizations to modify habits and operations that cause degradation to the environment and contribute to climate change
- Partner and fund local community based organizations to host environmental justice tours to better understand challenges in the community and serve as a platform to discuss solutions
- Create a County/City advisory council on climate resiliency/ environmental justice and climate disaster preparedness that includes appointed community members

Additional Resources:

- California Department of Public Health, California Building Against Resilience Against Climate Effects (CALBRACE) Initiative[34]
- California Air Pollution Control Officers Association, Model Policies for Greenhouse Gases in General Plan (2009)[35]

ROADWAY AND AVIATION NOISE IMPACTS

CI LU N S

Low-income and minority populations can more likely be found living in subpar housing closer to freeways and airports which can have disproportionately adverse noise impacts. The following recommended practices and approaches can be considered to reduce these impacts.

Recommended Roadway Noise Practices and Approaches:

- As part of the appropriate environmental review of local project, conduct a project specific noise evaluation and identify and implement applicable and appropriate mitigation like incorporating noise barriers (i.e. sound walls, berms, walls and fences, and thick plantings of trees and shrubs)
- Employ land use planning measures, such as zoning and restrictions on development to ensure that future development is compatible with adjacent transportation facilities
- Minimize impacts to noise-sensitive land uses and new roadway lanes, roadways, rail lines, transit centers, park-and-ride lots, goods movement corridors, and other new noise-generating facilities by considering acoustical site design (i.e. arrangement of buildings by capitalizing on site's natural shape and contours), acoustical architectural design (i.e. considerations of building height, room arrangement, window placement, etc.), acoustical construction methods (i.e. consideration of building materials and techniques to reduce noise transmission through walls, windows, doors, ceilings, and floors), and noise barriers
- Construct roadways, where appropriate and feasible, so that they are depressed below-grade of the existing sensitive land uses to create an effective barrier between the roadway and sensitive receptors
- Discourage noise-sensitive development where the ambient noise levels already exceed jurisdictional noise level standards
- Incorporate noise reduction features for items such as, but not limited to, parking and loading areas, ingress/egress point, HVAC units, and refuse collection areas, during site planning to mitigate anticipated noise impacts on affected noise sensitive land uses
- Encourage road diets and other strategies to reduce vehicle speeds on roads to minimize auto noise impacts

Recommended Aviation Noise Practices and Approaches:

The primary objective of noise compatibility and mitigation efforts is to minimize the number of people exposed to frequent and/or high levels of airport noise capable of disrupting noise-sensitive activities (e.g. sleep, work). Measures of exposure include sound levels and duration. Some recommended aviation noise practices and approaches to mitigate exposure include:

34 California Department of Public Health. California Building Against Resilience Against Climate Effects (CALBRACE) Initiative.
35 California Air Pollution Control Officers Association. (2009). Model Policies for Greenhouse Gases in General Plan.

- Consider providing voluntary sound insulation to eligible residential units, located within the noise contours of 65+ dBA CNEL, especially in EJ areas
- Minimize impacts to noise-sensitive land uses, including residences, schools, hospitals, and childcare facilities, and airports by considering acoustical site design (i.e. arrangement of buildings by capitalizing on site's natural shape and contours), acoustical architectural design (i.e. considerations of building height, room arrangement, window placement, etc.), acoustical construction methods (i.e. consideration of building materials and techniques to reduce noise transmission through walls, windows, doors, ceilings, and floors), and noise barriers
- Encourage implementation of airport mitigation monitoring or airport noise mitigation plans in affected populations, like low-income or minority communities, to monitor disproportionately adverse impacts, if any, and properly avoid or mitigate it

AIR QUALITY AND POLLUTION EXPOSURE IMPACTS CI LU S

Exposure to air pollutants can result in many serious health issues like premature deaths and lifelong asthma and respiratory problems. This becomes an EJ issue when there is a disproportionate share of low-income and minority populations living near freeways and heavily traveled corridors, especially near port and logistics activities. The following recommended practices and approaches can be considered to reduce these impacts in addition to many more provided in the resources section.

Recommended Practices and Approaches for Local Jurisdictions:

- Identify and assess existing air quality conditions for communities, especially EJ communities, and exposure risks by using tools, like the California Air Resources Board's Pollution Mapping Tool, EPA's Toxic Release Inventory, or CalEnviroScreen, to develop appropriate mitigation and strategies to combat the adverse impacts of air pollution
- Consider policies that can help reduce air pollution exposure like restricting number of pollution sources specifically in EJ communities, creating monitoring systems or requirements to ensure pollution or exposure can be contained, or partnering with local air management districts or community organizations to outreach to residents and gather input to establish mitigation monitoring programs
- Adopt ordinances that can help ameliorate or remove an existing source of pollution from communities like an amortization ordinance, which authorizes a process for public agencies to remove a targeted polluting land use from a community
- Devise strategies to reduce traffic emissions like speed reduction in neighborhood streets such as roundabouts and speed dumps, traffic signal synchronization, or speed limit reduction on high-speed roadways
- Utilize urban design to reduce air pollution including:
  - Increase vegetation for pollution dispersion
  - Create land use patterns that encourage active transportation or use of public transit (please see the Active Living, Active Transportation, and Physical Activity Section for more recommended policies)
  - Restrict certain heights of buildings to avoid creating pockets of pollution buildup along street corridors
  - Implement complete streets principles especially in EJ communities
  - Provide effective buffer spaces like sound walls or landscaping between highly-traveled corridors or roadways and sensitive land uses
- Encourage compact development in appropriate locations for more efficient use of land to help reduce air pollution caused by vehicle use
- Recognize and actively promote and adopt policies to create a multimodal transportation system that reduces solo driving
- Require construction of new buildings to provide healthier indoor air quality with indoor high-efficiency filtration
- Require that all new access roads, driveways, and parking areas serving

new commercial and industrial development be constructed with materials that minimize particulate emissions and are appropriate to the scale and intensity of use

- Consider using the California Air Resources Board's (CARB) Community Air Protection Program (CAPP) as a resource to reduce exposure in communities most impacted by air pollution
- Consider mitigation measures from the Connect SoCal Final PEIR to reduce substantial adverse effects related to greenhouse gas emissions including integrating green building measures consistent with CALGreen (California Building Code Title 24), local building codes and other applicable laws into project design, reducing emissions resulting from projects through implementation of project features, project design, or other measures as described in Appendix F of the State CEQA Guidelines, include off-site measures to mitigate project emissions, etc. (for more details, please refer to Connect SoCal Final PEIR PMM-GHG-1)

Recommended Practices and Approaches for EJ Community Groups and Stakeholders:

- Recognize and actively advocate for program and policies that create a multimodal transportation system that reduces solo driving which reduces air pollution
- Be familiarized with programs from EPA, CARB and SCAQMD that can help combat impacts from localized air pollution
- Be familiarized AB 617 and programs developed because of AB 617 which focuses on community level air pollution
- Actively advocate for restricting construction of new housing and schools near freeways and high-traveled roadways or other high-pollutant generating land uses

There are also several strategies used across the nation to reduce the harms of pollution in and around schools. As documented in the U.S. Environmental Protection Agency's (EPA) Best Practices for Reducing Near-Road Air Pollution Exposure at Schools, some efforts include:

- Upgrading filtration systems used in classrooms
- Locating air intakes away from pollution sources
- Providing training to school staff and students on indoor air quality and ventilation
- Avoiding strenuous activities, such as physical education class and sports, during peak traffic times
- Reducing car and bus idling, upgrade and electrify bus fleets, and encourage active transportation like walking and biking to school
- Considering improvements to site layout, such as locating classrooms further from the roadway.
- Considering installation of solid and/or vegetative barriers

Local air districts, local jurisdictions and project sponsors may voluntarily implement measures adopted by ARB designed to attain federal air quality standards for $PM_{2.5}$ and eight-hour ozone. Should organizations volunteer to implement ARB measures as mitigation, the following ARB measures can be considered:

- Require clean fuels and reduce petroleum dependency
- Pursue near-term advanced technology demonstration and deployment such as:
  - Zero emissions heavy-duty trucks
  - Tier 4 marine engine repowers and replacements
  - Tier 4 and zero emissions railyard equipment
- Pursue long-term advanced technology measures
- Consider conducting corridor-level analysis for proposed projects in areas where air quality impacts may be concentrated among EJ communities
- Project sponsors should consider identifying the EJ impacts of each project. In consultation with the affected community, mitigation measures can be identified to best address the project's impacts
- Participate in statewide and regional discussions seeking to balance

multiple policy objectives affecting air quality and the siting of transit-oriented development.

Additional Resources:

- California Air Resources Board (CARB), Air Quality and Land Use Handbook: A Community Health Perspective (2005), and technical supplement, Strategies to Reduce Air Pollution Exposure near High-Volume Roadways (2017)[36]
- South Coast Air Quality Management District (2005) Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning[37]

IMPACTS OF ROAD PRICING MECHANISMS CI

Some potential solutions to air pollution and congestion management can lie within a successful road pricing program. SCAG considers road pricing programs in the context of regional travel, and there are a variety of road pricing programs that are being explored; including corridor/facility pricing, mileage-based user fees, and cordon pricing. Current express lane programs are developed and managed by County Transportation Commissions and are based on corridor level policies consistent with regional operations.[38] Agencies within the region, including SCAG, are incorporating EJ considerations into research on and planning for innovative road pricing concepts.[39] EJ concerns and applicable tools will vary greatly from one jurisdiction/community to another due to different impacts and needs.

Recommended Practices and Approaches:

- Continue to engage and involve important parties like businesses, truckers, residents, and environmental organizations throughout planning and implementation, when assessing impacts and devising road pricing policies to improve transportation accessibility and congestion in the community
- Incorporate equity considerations across all income groups and communities during the development of road pricing mechanisms
- Adjust mitigation of negative impacts on EJ communities to reflect the specifics of the pricing program and local conditions

Additional Resources:

- National Cooperative Highway Research Program Report 686. Road Pricing Perceptions and Program Development[40]
- Transform, Pricing Roads, Advancing Equity Report
- SCAG, Mobility Go Zone & Pricing Feasibility Study

COMMUNITY OUTREACH AND ENGAGEMENT

Community outreach and engagement is an essential step in identifying and addressing EJ community concerns. Community involvement in the planning decision-making process can produce effective and meaningful policies that can help improve an array of EJ-related issue areas. The following recommended practices and approaches can be considered.

Recommended Practices and Approaches:

- Encourage public outreach plans that engage community based organizations with relationships to diverse residents, health departments, and schools to assist in assessing strategies to create these outreach plans
- Anticipate any barriers when developing an effective public outreach plan by looking at the demographics in the area (i.e. language access,

36 California Air Resources Board (CARB), Air Quality and Land Use Handbook: A Community Health Perspective (2005), and technical supplement, Strategies to Reduce Air Pollution Exposure near High-Volume Roadways.
37 South Coast Air Quality Management District. (2005). Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning.
38 For more information on express lane corridor planning see OCTA 91 Express Lanes and the RCTC 91 express lanes extension.
39 For example, see the SCAG, Mobility Go Zone & Pricing Feasibility Study, and Transform, Pricing Roads, Advancing Equity Report.
40 National Cooperative Highway Research Program. (2011). Report 686 - Road Pricing: Perceptions and Program Development.

age, and educational attainment)

- Promote capacity building, which increases the skills of community residents to participate in their local decision-making process, by providing relevant and effective training and workshops to better inform residents
- Consider making public meetings and workshop more accessible and convenient for residents like holding events in public venues that are easy to get to (via transit or other methods of transportation), providing child care or food, and distributing materials and details far enough in advance to allow sufficient time for interested residents to plan for, review, and comment
- Consider developing partnerships between local jurisdictions and community based organizations to encourage better engagement with the community
- Consider using different methods of education and engagement, depending on the applicability of the methods, like community-based participatory research, community benefits agreements, community events, design charrettes, door-to-door canvassing, focus groups, interactive workshops, online and mobile engagement, open houses, participatory budgeting, surveys, and tours
- Engage and support community groups to follow project development at all levels in the process

Additional Resources:

- Institute of Local Government, Technology, Tools, and Techniques to Improve Public Engagement[41]

OTHER POLICY RECOMMENDATIONS FOR EJ IMPACTS

After extensive outreach, other input received from SCAG's EJ Working Group and Connect SoCal outreach workshops are provided below:

- Improve safety at transit stations
- Provide infrastructure for electric vehicles in disadvantaged communities along heavily traveled corridors
- Create resources and training opportunities for the new jobs that will be created as a result of changing times and innovative technology
- Increase access to ownership of clean vehicles (old or new) by addressing barriers like monetary funds or limited infrastructure
- Expand passenger vehicle replacement with cleaner vehicles such as electric vehicles or plug-in hybrid electric vehicles
- Consider developing and supporting a daily/weekly informational forecast report to local communities and residents on impacts areas like noise or air pollution
- When developing funding programs/criteria, consider using different types of formulas that could include a range of criteria related to EJ impacts (as opposed to making it competitive based) for local jurisdictions with EJ populations that are allocated EJ-related planning and project funding

41 Institute of Local Government. Technology, Tools, and Techniques to Improve Public Engagement.

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