APPENDIX S

Scenario Development Report
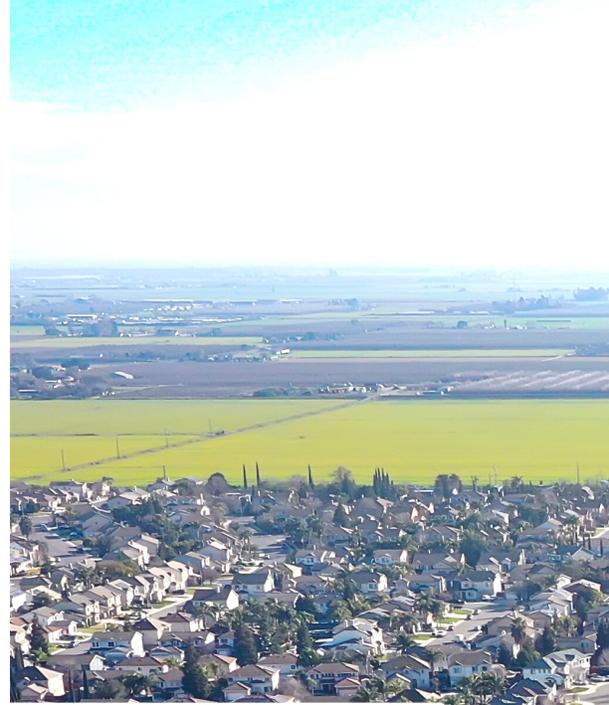
CHAPTER 1. INTRODUCTION

1.1 - Report Purpose

The purpose of the Scenario Development report is to provide an overview of the scenarios process that accompanied SJCOG's 2022 RTP/SCS. It includes discussions of scenario assumptions and performance as well as a complete summary of public engagement performed during the scenarios phase of the RTP/SCS.

This report is organized in five sections. Section 1 provides an overview of the project, and RTP/SCS context. Section 2 provides an explanation of external factors, state statutes, and other considerations that informed scenario creation. Sections 3 and 4 provide an overview of the scenarios process from a technical and engagement perspective, respectively. Finally, Section 5 provides an overview of how the preferred scenario was developed and how it meets the region's goals.

1.2 - What is an SCS?

Under California Senate Bill 375 (Steinberg, Chapter 728, 2008 Statutes), the Regional Transportation Plan (RTP) must include a Sustainable Communities Strategy (SCS) which aims to integrate planning for growth and housing with long-range transportation investments, including goals for reducing greenhouse gas emissions for cars and light trucks.

Coordinating the development of these two key long-range planning documents recognizes that land use planning and regional transportation investments are intrinsically linked and should arrive at complementary recommendations in order to continue to meet ambitious greenhouse gas emissions targets.

1.2.1 - Land Use

Land use decisions, such as what type of development occurs and to what extent, are

made at the local level; each jurisdiction's general and/or specific plans use locally-generated priorities to provide guidance on future growth. The scenario planning process uses general and specific plans as key guiding documents for shaping what is possible in any future scenario. While land use planning is directed at a local level, a jurisdiction's development patterns often impact regional connections, for private, commercial, and public use.

1.2.2 – Transportation

The funding scale at which most transportation projects require, necessitates that regionally-significant transportation decisions are made and managed by a number of different local and federal agencies. Historically, transportation infrastructure is also held to a more rigorous set of accountability standards, such as meeting environmental regulations set by the state and federal government. For this reason, regionally-significant transportation projects must produce defensible outcomes and improvements to the overall region which includes how the infrastructure improvement will benefit/complement new or existing residential and commercial development.

CHAPTER 2. SCENARIO CONTEXT

Land use and transportation decision-making for the RTP/SCS is evaluated using scenario planning. Scenarios allow planners to test the impacts of land use policies (general plan designations, zoning, etc.) and transportation investments (roadway improvements, public transit investments, etc.) based on an assumed set of future conditions such as expected population and employment growth. Scenarios are updated every four years to accompany each RTP/SCS cycle. As part of this update, it is useful to also consider recent newly enacted state regulations as well as emerging or potential external trends.

2.1 - State Regulatory Considerations

Alongside identifying local and regional priorities, the scenario development process is designed to be adaptive and responsive to new and emerging regulations that may challenge existing assumptions to how the region grows. The ongoing updates in policies and emerging trends is another reason why monitoring and updating scenarios every four years is necessary to keeping regional growth goals on target and relevant.

Policy updates to project level mitigation and housing production were the two key regulatory contexts from which scenarios were developed.

2.1.1 - Project Level Mitigation

Senate Bill 743

The 2013 passage of Senate Bill 743 (SB 743) was developed to address a range of issues that relate to combating climate change, but

the most significant in terms of the regulatory context was its provision of an alternative to evaluating projects and their environmental impact. Rather than evaluating projects by the impact on level of service (LOS), SB 743 updated California Environmental Quality Act (CEQA) guidelines to evaluate vehicle miles traveled (VMT, per capita) which allows projects to be assessed in their contributions/mitigation toward regional targets.

2.1.2 - Housing legislation

Accessory Dwelling Units (ADUs)

In 2019, Governor Newsom passed a set of ADU related policies with the goal of both creating incentives and reducing process barriers to stimulate more housing production, particularly housing that could be available for low-to-moderate-income households to rent. The following five bills are summarized below:

- **Assembly Bill 68 (AB 68):** AB 68 directly addresses existing land use and permitting obstacles by minimizing the discretionary review process, expedite approval timelines, as well as removing parking requirements for new ADU buildings.

- **Assembly Bill 881 (AB 881:** AB 881 further clarifies the state's rules to make ADUs easier to build, by: allowing garages to be converted into ADUs; eliminating the requirement of ADUs to be owner-occupied; reducing the criteria that can be used to prevent ADUs from being built.

- **Assembly Bill 670 (AB 670):** AB 670 reduces barriers for homeowners within Homeowner Associations (HOAs) by

reducing unreasonable restrictions for ADUs development in single-family zones that are often enforced through an HOA's covenants, conditions and restrictions or rules and regulations.

- **Assembly Bill 671 (AB 671):** AB 671 intends to ultimately pass along affordability to potential ADU *renters* by requiring local jurisdictions to create a plan for providing homeowners incentives for constructing ADUs.

- **Senate Bill 13 (SB 13):** SB 13 removes impact fees and the requirement that the ADU must be owner-occupied immediately upon completion, allowing property owners to create new housing that could be immediately available to renters.

Senate Bills 9 (SB 9) and 10 (SB 10)

The 2020-2021 passage of Senate Bills 9 (SB 9) and 10 (SB 10) provided two key strategies to creating new housing production from both small-scale residential development and through streamlining local jurisdictional processes through California Environmental Quality Act (CEQA) provisions.

Senate Bill 9, the California Housing Opportunity & More Efficiency (HOME) Act, expands the successful approach of Accessory Dwelling Units (ADUs) and creates efficiencies for homeowners to create a duplex or subdivide an existing lot in residential areas.

Senate Bill 10 allows cities the option to make it easier to build housing that is affordable and accessible to transit, jobs, and amenities through bypassing CEQA processing and litigation when they upzone to allow small

apartment buildings of up to 10 per parcel in high-quality transit areas and urban infill areas.

Both SB 9 and SB 10 expand opportunities for housing production while respecting local control for implementation. The goal being to stimulate modest yet impactful development that addresses California's housing shortage.

Changes to RHNA

The Regional Housing Needs Allocation (RHNA) is a periodic, state-mandated process that requires jurisdictions to assess and develop a plan to address their forecasted housing needs by both number of units as well as affordability within their General Plan. A successful scenario development process depends on understanding and integrating the forecasted housing (and employment) needs and allocating future development to meet those benchmarks in any practical scenario. California's 2017 Housing Package included two key bills, Assembly Bill 1771 (AB 1771) and Senate Bill 828 (SB 828), that directly impacted RHNA and subsequently the scenario development process.

AB 1771 adds an additional RHNA objective to increase access to areas of high opportunity for lower-income residents, while avoiding displacement and affirmatively furthering fair housing. SB 828 prohibits the prior underproduction of housing in a city or county from the previous cycle and stable population numbers in a city or county from the previous cycle from being used as a justification for reduction in share of regional housing need.

2.2 – External Trends

External trends include a range of emerging or potential future challenges that are outside of our ability to directly control. Despite a great deal of uncertainty around these trends, they are still important to consider within a scenarios process because they may make it difficult to implement the SCS and achieve San Joaquin County's California Air Resources Board (CARB) greenhouse gas emissions targets. By directly addressing and considering these trends within the scenarios process, we can better ensure that the policies and investments contained in the RTP/SCS will be durable no matter how or when external trends unfold in San Joaquin County.

External Trend #1: Transportation Technology

Transportation technologies refer to the application of automation, electrification, and other technologies to private, freight, and public transportation. Future impacts considered included electrification of the private vehicle fleet as well as adoption of autonomous vehicle technologies for private use, freight, and public transportation.

Potential Positive Impacts:
- Electric cars will become increasingly compatible and necessary for autonomous driving technologies to function resulting in rapid adoption of electric vehicles and cycling-out of gas powered vehicles.

- Autonomous vehicle technology could make more efficient use of existing roads resulting in additional capacity on existing roads, though this is likely to be short-lived due to induced demand.

- Autonomous vehicle technology for public transport reduces operating costs for transit providers while increasing reliability and speed.

Potential Challenges:
- More tolerable commutes could mean longer commute distances, more vehicles on the road, and more driving.

- With more tolerable commutes due to automated driving, valley residents could easily choose to live further away from work, school, or shopping.

- If more people can reasonably commute to the Bay Area, then San Joaquin County could become even more desirable, further exacerbating the valley's housing crisis.

Scenario Development Considerations:
- To address this trend, scenarios should seek to balance trip productions and attractions, i.e. housing and jobs.

- Find opportunities to build out mixed use general plan designations in aging commercial corridors, or to add a commercial component to unbuilt, mostly residential specific plans in the region.

External Trend #2: Climate Migration

Climate-induced migration includes considerations of climate change impacts in the Central Valley as well as impacts that may drive domestic and international migration. The extent to which climate change induces migration will be the result of federal policy and the severity of climate impacts. Shifts in the earth's climate over the next century are likely to shift agriculture and temperate climates northward while sea level rise and more severe flooding could drive people,

especially the most economically vulnerable, from coastal cities.

Potential Positive Impacts:
- Higher than expected rates of population growth in the valley could provide stimulus to certain sectors of the economy.

- Arriving climate migrants are likely to have lower incomes and lower rates of auto ownership which will make them more likely to ride public transportation.

Potential Challenges:
- Arriving migrants will have lower incomes than average San Joaquin County residents. Building housing to meet their needs while balancing other regional priorities like farmland protection will be a challenge.

- It will be difficult to recoup enough revenue to maintain and expand infrastructure strained by rapid growth. In particular, creative solutions to funding the expansion of water and sewer infrastructure will be needed to accommodate increased demand.

Scenario Development Considerations:
- Explore scenarios that include land-efficient strategies for greenfield development in logical locations. Consider re-thinking planned development envisioned in the region's specific plans.

- Look for opportunities to put higher density housing near public transportation.

External Trend #3: The E-Economy

The e-economy trend includes three separate but related emerging trends: shopping, working, and attending school from home.

Adoption of telecommuting, for example, has accelerated during the COVID-19 pandemic and is expected to remain popular even after in-person work environments are deemed safe. A recent survey of over 1,000 commuters found that 86% of respondents would work from home at least some of the time even without COVID-19 restrictions[1]. If the desire for telework remains high even after the pandemic subsides, it could have a major impact on where people choose to live and how often they commute to their place of work.

Potential Positive Impacts:
- More people working or attending school while in their homes could mean more business for commercial areas near residential neighborhoods benefiting small town or neighborhood "main streets".

- If people never return to a traditional in-person office or school setting, decreases in work and school-based trips observed during the pandemic could continue long-term.

- Office and commercial vacancies created by more remote work and shopping could create opportunities for residential development in certain parts of the region.

Potential Challenges:
- Telecommuting could mean long-lasting vacancies in places with high concentrations of office uses, such as downtown Stockton.

- The combination of delivery services and working from home could reduce the need for transit trips, causing transit ridership to plummet.

- Continued online shopping could further deteriorate the state of commercial real estate leaving large numbers of commercial vacancies.

- There may be an increased desire for larger residential units to accommodate working or schooling from home.

Scenario Development Considerations:
- Take advantage of underutilized properties for residential development in aging commercial corridors.

- Revitalize neighborhood and small town "main streets".

- Expand the variety of middle housing types to accommodate desire for larger residential units.

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[1] Will COVID-19 Permanently Alter Teleworking and Commuting Patterns? Kittelson & Associates, 2020.
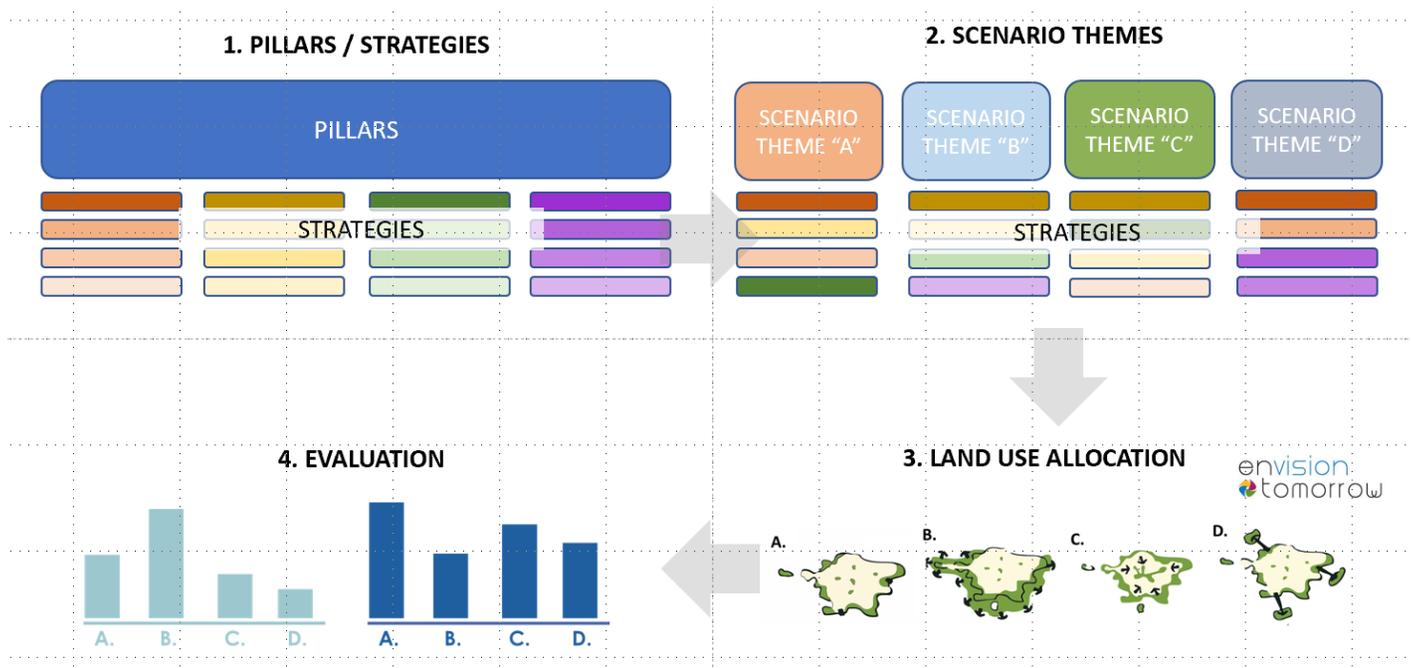
FIGURE 1: SCENARIO DEVELOPMENT PROCESS

CHAPTER 3. SCENARIO DEVELOPMENT PROCESS

The scenario development process combines technical analysis with public outreach. Chapters 3 and 4 provide an overview of both elements, respectively. Each chapter covers the technical and public engagement aspects of scenario pillars and strategies, scenario theme development, land use allocation, and scenario evaluation. This process is summarized in the following graphic.

3.1 – Pillars / Strategies

3.1.1 - Scenario Pillars

Six scenario "pillars" form the first organizing principle of the 2022 RTP/SCS scenarios process. Their role is to provide the initial framework within which SCS strategies would be developed. They are summarized below:

Housing Production: This pillar intends to address housing market forces such as affordability, production, housing mix, and density. Potential actions developed within this pillar could include: streamlining the approval process to reduce costs; establishing a housing trust fund; developing a regional housing project list; and expediting the development approval process.

Jobs & Economy: This pillar intends to address economic, job, and industry trends. Potential actions developed within this pillar could include: encouraging new companies to locate in the region; improving public transit

options for job access; and promoting workforce training programs.

Vibrant Neighborhoods: This pillar intends to address public health, social, and economic prosperity at the neighborhood level. Potential actions developed within this pillar could include: improving sidewalks, pedestrian safety and walkability; improving bike lanes; and expanding public transit service or frequency.

Transportation (In & Out Commutes): This pillar intends to address the forces that impact local and regional commuting patterns and capacity. Potential actions developed within this pillar could include: building roads and/or lanes to improve job access; investing in port, rail, airport, and trucking routes; implementing congestion pricing or toll lanes.

Technology & AV Adoption: This pillar intends to address external forces such as emerging technologies and autonomous vehicle adoption. Potential actions developed within this pillar could include: investing in high speed internet infrastructure; investing in public transit technologies; and managing the adoption of connected and autonomous vehicles.

Climate Impacts: This pillar intends to address regional and global challenges related to climate change and major climate events. Potential actions developed within this pillar could include: encourage preservation of agricultural and natural resources; and investing in projects that promote energy and water conservation.

3.1.2 - Scenario Strategies
RTP/SCS strategies represent actions that SJCOG and its partners (cities, non-profits, advocacy groups, trade organizations, etc.)

could undertake to help implement the RTP/SCS. In all, 27 RTP/SCS Strategies were developed based on suggestions from subject matter experts in the fields of transportation, land use planning, public health, and economic development, including input from the RTP/SCS working group. More information on how strategies were developed and evaluated can be found in the *public engagement* section of this report.

Once RTP/SCS strategies were defined, they underwent a qualitative and quantitative evaluation to gauge their performance in a range of future conditions using a tool called TrendLab+. TrendLab+ is a scenario planning tool developed by Fehr & Peers for forecasting effects of disruptive economic and transportation trends and emerging technologies like autonomous vehicles. For the 2022 SJCOG RTP/SCS, TrendLab+ was calibrated and modified to measure the impact of strategies in three assumed futures across four metrics: vehicle miles traveled (VMT), transit ridership, greenhouse gas emissions (GHG), and housing costs.

3.1.2.1 - Futures
Three futures were developed in TrendLab+, based on the three external factors summarized in section 2.2: Transportation Technology, Climate Migration, and the E-Economy. Developing futures in TrendLab+ involves making informed estimates of future conditions across a range of categories such as land use, pedestrian investments, and AV adoption. It should be acknowledged that there is substantial subjectivity involved in the development of futures – they should be viewed as "what if" tests, rather than predictions.

Future conditions were estimated across the following categories:

Category	Factor (Changes Relative to Today)	Climate Migration		Transportation Tech		E Economy	
		2035	**2050**	**2035**	**2050**	**2035**	**2050**
Land Use	residential and/or employment density	-15%	-15%	-15%	-20%	3%	5%
	distance among major origins and destinations	5%	10%	15%	25%	0%	0%
	countywide jobs/housing balance	-10%	0%	-10%	-15%	5%	10%
	jobs/housing balance in adjacent counties	10%	20%	5%	10%	-5%	-10%
Ped, Bike Nets	ped and bike network enhancements	-10%	0%	3%	5%	5%	10%
Employment	countywide employment	5%	10%	3%	5%	5%	10%
	employment in adjacent counties	5%	15%	10%	20%	-5%	-10%
Income	SJ county income	-15%	-10%	5%	15%	5%	10%
	income in adjacent counties	10%	20%	5%	10%	5%	10%
Transit Funding	transit investment in SJ county	0%	5%	3%	5%	-10%	-15%
	transit investment in surrounding counties	5%	10%	3%	5%	-10%	-15%
Avs	level of adoption of fully autonomous vehicles	0%	0%	30%	50%	20%	30%

Category	Factor (Changes Relative to Today)	Climate Migration		Transportation Tech		E Economy	
		2035	2050	2035	2050	2035	2050
Telecommute	percent working from home on average day	0%	0%	5%	5%	20%	30%
EV	Electrification %	20%	30%	60%	75%	30%	45%
Market Factors	Housing Production Factor	-30%	-20%	-15%	-20%	-5%	-10%
	Housing Subsidy Factor	-5%	5%	-15%	-10%	-5%	-10%

FIGURE 2: FUTURES ANALYSIS IN TRENDLAB+

3.1.2.2 - Metrics

TrendLab+ is capable of estimating impacts to the following metrics based on user-provided inputs (telecommute percentage, electrification, funding, etc.) discussed above. These metrics are summarized below:

Vehicle Miles Traveled (VMT): TrendLab+ estimates VMT based on localized travel model data and research-based relationships between VMT and factors entered by the user such as density and distance between origins and destinations.

Transit Ridership: TrendLab+ uses relationships between transit investment, AV adoption, and employment growth to estimate general impacts to transit ridership

GHG Emissions: The base version of TrendLab+ was customized to add functionality for tracking GHG impacts from transportation and residential development. These estimates rely on a standard estimate of CO_2e per VMT, discounts for electrification, and building-level emissions estimates based on housing mix.

Housing Cost: Like GHG emissions, housing cost was another metric added to the base version of TrendLab+. This crude estimate of housing

cost given future conditions used user-provided assumptions related to housing mix, the level of housing subsidy, and the efficiency of housing production to gauge impacts to housing cost.

Based on user inputs and metric assumptions, TrendLab+ provides an estimate of impacts across the four indicators in the three futures identified in Futures section with no strategies applied. These impacts, shown below, are summarized in terms of overall impact in 2050 relative to the year 2021. As the figure below shows, each future condition creates a radically different landscape within which to test the 27 RTP/SCS strategies discussed in section 3.1.2.
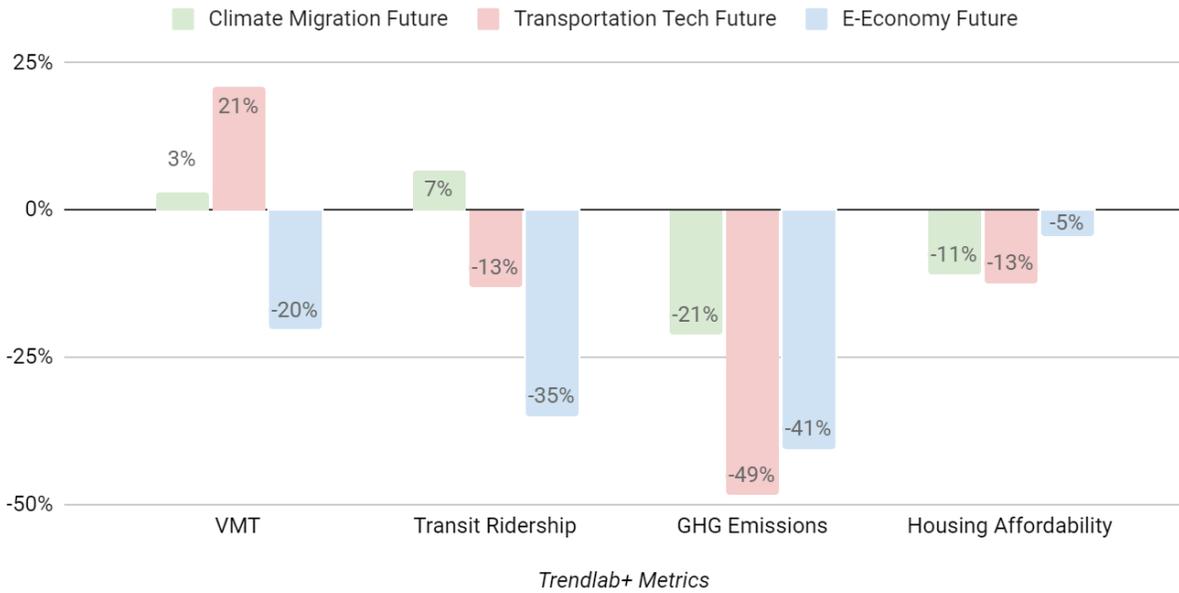
FIGURE 3: CHANGE IN SELECTED METRICS IN 2050, RELATIVE TO 2021

3.1.2.3 - Strategy Evaluation

Following the initial evaluation of futures described above, the final step in the strategy evaluation process was to test strategies in isolation against the external impacts from the three futures. This was done by adding strategy impacts to each future and measuring outcomes across the four metrics, then comparing those outcomes to the baseline outcomes summarized in the section 3.1.2.2.

Based on these results, each strategy was given a 1-5 score for each metric, within each future. The summary of these results is shown in the table below.
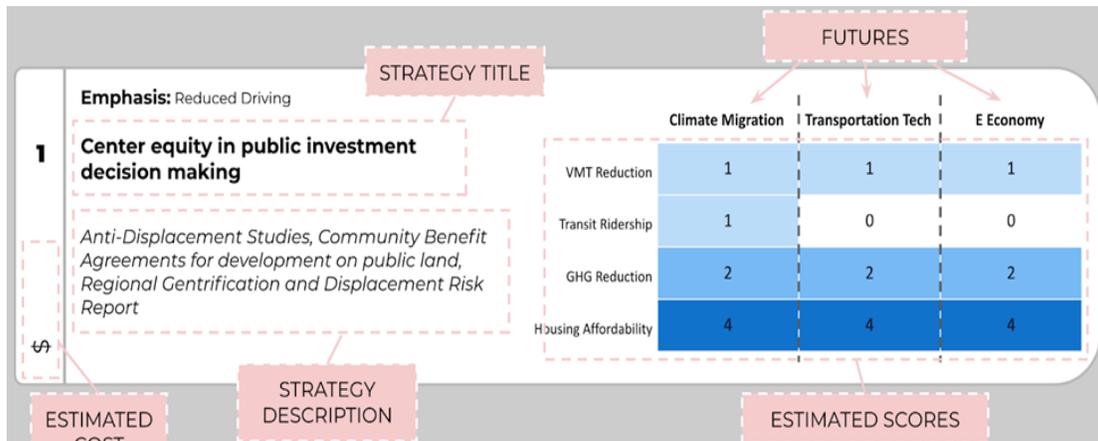

FIGURE 4: RTP/SCS STRATEGY EVALUATION SUMMARY

3.2 – 2022 RTP/SCS Scenario Themes

The next step on the scenario development process for the 2022 RTP/SCS was the development of four scenario "themes" to guide the land use allocation process. Scenario themes are primarily qualitative and broadly lay out the characteristics of housing and employment growth throughout the region.

Scenarios Comparison
Growth Location

FIGURE 5: SAN JOAQUIN COUNTY PRIORITY GROWTH AREAS

3.2.1 - Priority Growth Areas

Scenario themes were also guided by a general assertion of the location of growth within the region. To accomplish this prior to land use allocation, the SJCOG region was divided into a series of four Priority Growth Areas (PGAs): "Established Neighborhoods and Centers," "Urban Arterials," "High Quality Transit Areas," and "New Growth Areas." Describing scenario themes in terms of which PGAs would see the most growth, helped explain and differentiate scenario themes.

3.2.2 - Scenario Theme Overview
A. Stay the Course

In this scenario, the region does not change course and makes investments based on the last regional plan. Growth occurs primarily in new growth areas identified in the region's General or Specific Plans and transportation focus investments in managed lanes, ACE Rail, enhanced bus rapid transit.

Prioritized strategies and policies:

- Prioritize projects that make more efficient use of the existing road network
- Prioritize large employer recruitment
- Improve access to safe and convenient walking and biking options
- Prioritize projects that improve and expand access to public transit
- Prioritize expanding the roadway network

B. Remake Centers & Corridors

Traditional employment centers and aging commercial corridors are remade into residentially-focused neighborhoods. Growth is focused on urban arterials, existing neighborhoods, and job centers. Transportation focus investments in transit and bike/ped for infill locations along existing arterials, improvements/maintenance to local arterials to facilitate new types of development.

Prioritized strategies and policies:

- Encourage infill development
- Promote a broader range of housing types
- Develop a regional trust fund dedicated to addressing housing issues.

- Prioritize "complete streets" projects throughout the region

- Prioritize projects that improve and expand access to public transit

C. 20-Minute Neighborhoods

Planned new growth areas are redesigned to accommodate a greater mix of uses and modes. Commercial uses develop in traditionally residential areas. This scenario provides a broader range of daily destinations close to home and prioritizes transportation investments in transit and bike/ped for new growth locations that furthers internal circulation in these neighborhoods.

Prioritized strategies and policies:

- Develop a regional trust fund dedicated to addressing housing issues.

- Invest in high-speed internet infrastructure

- Promote adoption of electric vehicles

- Improve access to safe and convenient walking and biking options

- Prioritize "complete streets" projects throughout the region

D. Commuter Villages

Household and employment growth is incentivized in urban arterials near existing and planned regional rail stations and near existing and planned high quality transit hubs. Transportation priorities will reinforce transit-oriented development by focusing on first mile/last mile connections to transit hubs (rail and bus transfer hubs).

Prioritized strategies and policies:

- Prioritize projects that improve and expand access to public transit

- Manage the adoption of private connected and autonomous vehicles

- Promote autonomous technologies for public transit

- Encourage development near transit

- Promote adoption of electric vehicles

3.2.3 – Scenario Themes and Futures

Another dimension of the scenario themes was their envisioned performance relative to futures. How each scenario theme was intended to address each future is summarized below:

A. Stay the Course

Scenario A performs best in a future with high AV adoption because it already includes many transportation investments that will help to manage broad AV use. These include managed lanes and expansion of the roadway network.

B. Remake Centers and Corridors

Scenario B was envisioned to best address the climate migration and e-economy futures. With respect to climate migration, this scenario would provide more housing in transit-rich areas, making it more advantageous if large numbers of lower income households move to the region. If telecommuting continues, scenario B would also make good use of underutilized commercial lands in the region's commercial corridors.

C. 20 Minute Neighborhoods

This scenario would likely perform best in a future with high telecommute and learn-from-home rates. This is due to its relatively large unit sizes and re-imagined specific plan areas to include a broader range of services.

D. Commuter Villages

Scenario D would perform best in a future with high AV adoption because by locating development near high quality transit, it provides a viable alternative to auto commutes. Similarly, it would perform worse in a future with high rates of telecommuting because it assumes continued interregional commuting.

How well does each scenario address each future? (1-5 Score)	A. Stay the Course	B. Remake Centers and Corridors	C. 20 Minute Neighborhoods	D. Commuter Villages
Climate Migration Future	3	5	3	4
Transportation Tech Future	5	3	4	5
E-Economy Future	2	5	5	2

FIGURE 6: SCENARIO PERFORMANCE BY STRATEGY

STRATEGY COMPARISON

Ⓐ STAY THE COURSE	Ⓑ REMAKE CENTERS & CORRIDORS	Ⓒ 20-MINUTE NEIGHBORHOODS	Ⓓ COMMUTER VILLAGES
• Prioritize Projects that Make More Efficient Use of the Existing Road Network	• Encourage infill development	• Develop a regional trust fund dedicated to addressing housing issues.	• Prioritize Projects that Improve and Expand Access to Public Transit
• Prioritize Large Employer Recruitment	• Promote a Broader Range of Housing Types	• Invest in High Speed Internet Infrastructure	• Manage the Adoption of Private Connected and Autonomous Vehicles
• Improve access to safe and convenient walking and biking options	• Develop a regional trust fund dedicated to addressing housing issues.	• Promote adoption of electric vehicles	• Promote Autonomous Technologies for Public Transit
• Prioritize Projects that Improve and Expand Access to Public Transit	• Prioritize "complete streets" projects throughout the region	• Improve access to safe and convenient walking and biking options	• Encourage development near transit
• Prioritize Expanding the Roadway Network	• Prioritize Projects that Improve and Expand Access to Public Transit	• Prioritize "complete streets" projects throughout the region	• Promote adoption of electric vehicles

FIGURE 7: TOP STRATEGIES ASSOCIATED WITH EACH SCENARIO THEME

3.2.4 – Scenario Themes and Strategies

The final element of scenario themes was the reunification of themes with the 27 strategies developed during an earlier phase of the project. Evaluation of the strategies was used during a deliberative process with project stakeholders. The resulting top strategies are summarized below. For a more detailed description of how strategies were assigned back to scenarios, see the *Public Engagement* section of this document.

3.3 – Land Use Allocation

The third step in the scenario development process is land use allocation. Land use allocation is one component of a land use and transportation scenario. It refers to the spatial distribution of urban development across a region to simulate expected future population and employment growth. Land use allocations differ based on the densities, locations, and mixes of development used to reach

forecasted population and employment growth totals, called "control totals".

The resulting land use allocations can also be evaluated across a range of performance metrics, which can then form the basis for scenario choosing, and ultimately a preferred scenario and land use allocation. They are also used in conjunction with travel demand models with varying transportation network assumptions to assess the VMT and greenhouse gas emissions implications of a complete land use and transportation scenario.

3.3.1 – Control Totals

Control totals for the 2022 RTP/SCS were provided by the University of the Pacific's Center for Business and Policy Research (CBPR). The tables below summarize the household and employment controls derived from the CBPR forecasts. They also provide comparison to the 2046 totals by jurisdiction for each of the four alternative scenarios. In order

to maintain consistency with the forecast, no jurisdiction received a deviation of more than 10% from their allotted 2046 forecast. Note that the estimates for 2046 were interpolated by SJCOG's land use consultant, Cascadia Partners, to correspond with the RTP/SCS horizon year.

With respect to the employment forecast, it should also be noted that CBPR's original forecast was provided using Bureau of

Economic Analysis (BEA) definitions for jobs, which include home-based jobs. For the purposes of alignment with travel demand model assumptions, CBPR's BEA-based employment figures were converted to Bureau of Labor Statistics (BLS) jobs using 2015 BLS estimates and CBPR's BEA growth rates. A complete summary of the household and employment forecasts from which these control totals were derived can be found in *Appendix A*.

Scenario Household Totals by Jurisdiction	2015	Forecast (2046)	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)
ESCALON	2,561	3,054	3,019	2,860	3,049	2,752
LATHROP	5,397	18,931	18,929	17,005	18,971	19,799
LODI	22,177	27,995	27,945	27,777	27,994	27,352
MANTECA	23,126	37,458	37,604	36,298	37,479	37,996
RIPON	5,003	7,273	7,143	6,905	7,274	7,148
STOCKTON	92,273	109,602	109,402	118,720	109,512	109,553
TRACY	25,069	39,052	39,202	39,381	39,047	41,336
Mountain House CDP	4,124	13,319	13,376	12,925	13,203	12,540
Unincorporated	43,333	47,559	47,648	42,387	47,764	45,724
County Total	**223,063**	**304,243**	**304,268**	**304,258**	**304,292**	**304,199**

FIGURE 8: HOUSEHOLD FORECAST AND SCENARIO ALLOCATIONS BY JURISDICTION, UNIVERSITY OF THE PACIFIC / CASCADIA PARTNERS

Scenario Employment Totals by Jurisdiction	2015	Forecast (2046)	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)
ESCALON	1,629	2,001	2,087	2,064	2,017	1,908
LATHROP	7,566	13,192	13,167	14,386	13,170	14,503
LODI	21,695	26,082	26,024	25,990	26,291	27,017
MANTECA	17,289	22,670	22,319	23,930	22,850	24,301
RIPON	3,688	4,782	4,837	5,124	4,887	4,871
STOCKTON	105,561	137,202	137,426	138,179	137,321	133,594
TRACY	23,809	39,564	39,554	39,663	39,694	39,898
Mountain House CDP	487	3,100	3,066	3,236	3,203	3,156
Unincorporated	49,005	63,083	63,176	59,075	62,236	62,263
County Total	**230,729**	**311,675**	**311,657**	**311,648**	**311,670**	**311,511**

FIGURE 9: EMPLOYMENT FORECAST AND SCENARIO ALLOCATIONS BY JURISDICTION, UNIVERSITY OF THE PACIFIC / CASCADIA PARTNERS

3.3.2 – Scenario "Painting"

The scenario themes described in the previous section were converted to GIS-based land use allocations using Envision Tomorrow, a land use scenario planning software that has been used by SJCOG for RTP/SCS land use allocation since 2014. Envision Tomorrow is an open-source GIS-based scenario tool that uses ArcGIS and an associated series of Microsoft Excel spreadsheets to allocate employment and population at various densities to taxlots. For more information about Envision Tomorrow, visit www.EnvisionTomorrow.org.

Development Types

Creating a scenario in Envision Tomorrow, often called "painting" requires trained users to apply land use place types or "development types" to parcels to represent land use change. Development types include detailed information related to the physical and financial characteristics of land use including density, mix of uses, household incomes, and job types. A full list of development types used in the SJCOG 2022 RTP/SCS can be found in *Appendix A*.

Building Prototypes

Development types consist of building pro-forma spreadsheets called building prototypes. These spreadsheets provide detailed
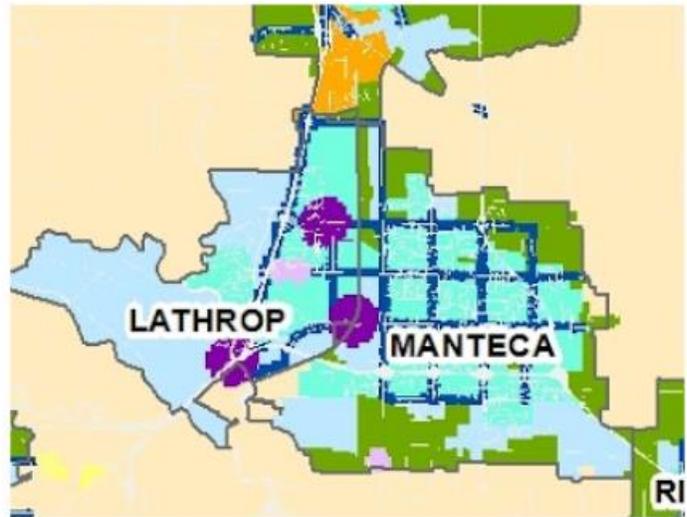
FIGURE 10: PRIORITY GROWTH AREAS

information on the physical and financial characteristics of individual buildings including construction costs, heights, setbacks, and unit sizes. When scaled up to development types, they allow Envision Tomorrow to report a range of performance indicators.

3.3.3 – Guiding Datasets for Painting

Several guiding datasets were used to inform scenario painting. These guiding datasets were applied to all scenarios to varying degrees, with the intent of creating equitable and sustainable land use allocations that also meet the region's goals for the sixth cycle of RHNA and the GHG reductions targets set by the California Air Resources Board (CARB). These guiding datasets are summarized below.

Priority Growth Areas

Priority Growth Areas (PGAs) is a land use context classification developed by SJCOG's land use consultants, Cascadia Partners. This classification bins the entire SJCOG region into a set of unique growth areas. As described in previous sections, scenario themes provide guidance for scenario painting by specifying which types of PGAs should receive the most growth in each scenario.

Areas of Opportunity

The California Tax Credit Allocation Committee (TCAC) maintains and annually updates an "areas of opportunity" dataset for every census tract in the state. This dataset combines measures of educational access, environmental health, and economic opportunity into a single index. This dataset is critical to the Regional Housing Needs Allocation (RHNA) process in that it highlights areas where low income housing can reverse historic patterns of segregation. This dataset was used in painting to target areas of housing growth, particularly higher density multifamily housing which tends to be more affordable. Using this dataset ensures consistency with the RHNA process which also takes the TCAC dataset into consideration as a way to distribute housing need.

Low VMT areas

Areas of below average regional residential VMT were estimated using the UrbanFootprint

% of Regional Avg. Residential VMT per Capita

<= 50%

50 - 85%

85 - 100%

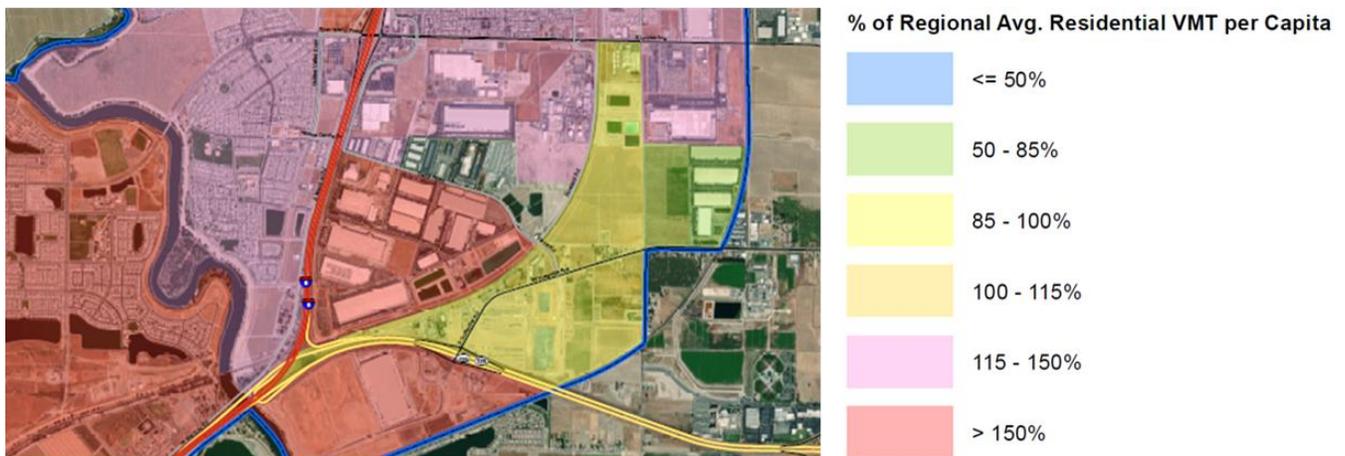100 - 115%

115 - 150%

> 150%

FIGURE 11: VMT PER CAPITA, URBANFOOTPRINT / CASCADIA PARTNERS

transport module[2]. This dataset is important because it highlights areas of the region where residents drive relatively little today. By targeting growth in these areas, it is likely that future residents will exhibit similar travel behavior. Areas below 100% of regional VMT per capita, shown in yellow, green and blue in the map below, were targeted to varying degrees as all four scenarios were created.

Jobs-Housing Balance

Jobs-housing balance was estimated using the Census ACS and the Bureau of Labor Statistics data. Jobs-housing balance matters because areas with optimal balance (J-H ratio of 1.2 – 2.8[3]) tend to produce shorter trips and lower VMT. Areas with high concentrations of jobs relative to households (ratio of 1.2 or greater) were considered good candidates for additional housing growth.

High Quality Transit Areas

Encouraging jobs and housing growth within ½ mile of transit stations with frequent service or high-capacity transit is a proven strategy to reduce auto trips and increase transit ridership. SJCOG maintains a dataset that catalogs HQTAs within the region. This data set was used to focus growth, to varying degrees, across the four scenarios.

General and Specific Plans

General and specific plans are critical components of realistic RTP/SCS scenarios because they ultimately represent local land use authority. As part of the scenario development process, a comprehensive GIS dataset was compiled that not only maps each general and specific plan in the region, but also provides estimates of maximum build-out capacity for residential development. Using this dataset, it was possible to identify parcels throughout the region that are significantly underbuilt relative to the maximum

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[2]https://urbanfootprint.com/wp-content/uploads/2019/07/Transportation-Module-Methodology.pdf

[3]Peng Z-R. The Jobs-Housing Balance and Urban Commuting. Urban Studies. 1997.
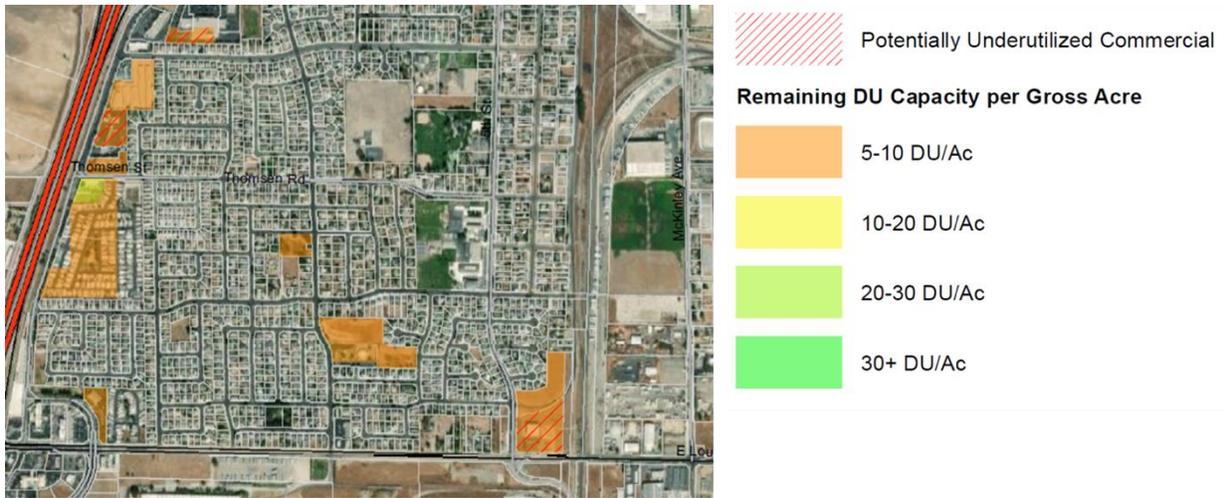
FIGURE 12: EXCESS GENERAL PLAN CAPACITY, CASCADIA PARTNERS

housing capacity allowed by the General Plan. This guiding layer was also used to ensure that none of the scenarios deviated radically from what general and specific plans currently allow.

3.4 – Scenario Evaluation

The final step in the scenario development process is scenario evaluation. Envision Tomorrow allows for the reporting of dozens of performance metrics, from the density of new development, to the average water and energy use of new households and places of employment. In addition to indicators

FIGURE 13: SCENARIO REPORT CARD EXAMPLE

developed by Envision Tomorrow, scenarios were also aggregated to traffic analysis zones (TAZs) and provided to SJCOG's modeling staff to estimate VMT and greenhouse gas emissions.

The cumulative results of the travel demand model, emissions model, and Envision Tomorrow, were summarized into scenario "report cards". The image below provides an example, which includes narrative description of the scenario (based on its theme), VMT and GHG metrics, selected Envision Tomorrow indicators, and a map of new development locations.
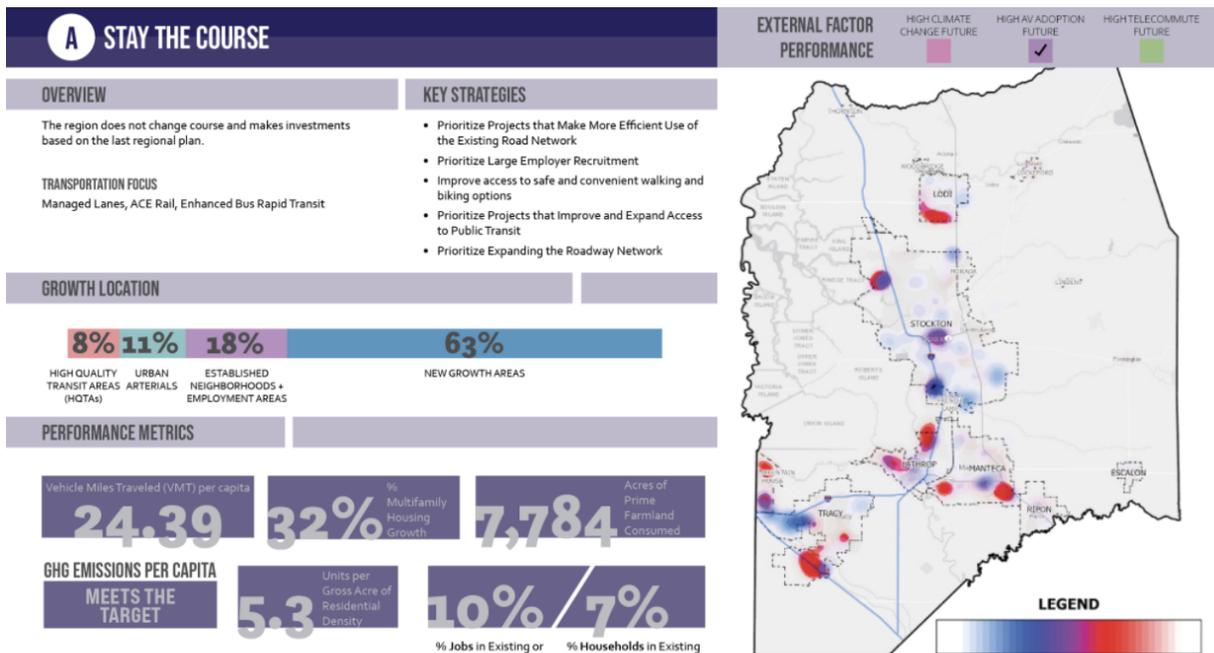
A detailed description of how scenario evaluation was used to select the preferred hybrid scenario, see the *Public Engagement* section. For a complete summary of evaluation metrics, see *Appendix A*.

CHAPTER 4. PUBLIC ENGAGEMENT PROCESS

4.1 – Engagement Methods

Public engagement is a critical aspect of SJCOG's 2022 RTP/SCS scenario planning process, and for that reason, SJCOG has distinguished this effort as its own project during this cycle- *Envision 2050*. Key objectives of the *Envision 2050* project are to educate and engage the San Joaquin region in a scenario planning effort that embraces future uncertainty from outside forces such as climate impacts, housing affordability, autonomous vehicles, and others.

The *Envision 2050* outreach and engagement strategy was informed by *Principles for Public Participation* and key activities developed with core tenets of *Public Participation Principles in Practice*- as outlined in SJCOG's 2016, State

and Federally compliant, Public Participation Plan (PPP).

Engagement consultants worked with SJCOG staff to develop the following set of outcomes and goals that built on areas of opportunity based on lessons learned from previous RTP/SCS outreach cycles as well as in response to the existing public health precautions due to COVID-19:

- Raise general awareness about the RTP/SCS process and engage residents through meaningful public outreach and engage local partners to inform plan development.

- Develop an adaptive, innovative, and actionable plan with clear implementation strategies that are in coordination with the RTP/SCS community-based organization mini grantees.

- Create and conduct a COVID-safe outreach plan.

- Develop actionable strategies that prioritize outreach to rural and Spanish-speaking communities.

- Develop a communications plan.

- Maintain clarity and transparency about how input is used in the decision-making process.

- Develop and maintain a stakeholder database to categorize and track the level of involvement for all potential stakeholders involved in the scenarios process.

The scenario development process utilized three key outreach and engagement strategies to capture public and stakeholder

input, including: conducting focus groups, facilitating charrettes in seven separate RTP/SCS Working Group meetings, and deploying an online survey for broad public input. More detail on the purpose and process of these strategies can be found in the following sections.

The timeline below shows how the public engagement process informed the scenario development and punctuated key milestones throughout the process. The engagement process spanned roughly a year, starting in November 2020 and wrapping up in October 2021.

Focus Groups

The primary objective of the focus groups was convening harder-to-reach community members to listen and discuss key priorities and concerns when thinking of the future. Community organizational partners from the *SJCOG Mini-Grantee Program* helped co-facilitate and recruit participants to the five (5) virtual focus groups conducted between April and May 2021.

The Mini-Grantee Program was an initiative to build more meaningful partnerships with community-based organizations, particularly those serving historically underrepresented communities. Community based organizations

PUBLIC ENGAGEMENT + SCENARIO DEVELOPMENT PROCESS

2020		2021									
NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT

- MINI-GRANTEE ONBOARDING
- FG RECRUITMENT
- FOCUS GROUPS (5 total)
- METROQUEST SURVEY DEVELOPMENT
- METROQUEST SURVEY OPEN (June 30 - August 31)

Identifying priorities + developing strategies | Developing scenario themes | Evaluating scenario themes + priorities | Evaluating + comparing scenario performance | Arriving at a Preferred Scenario

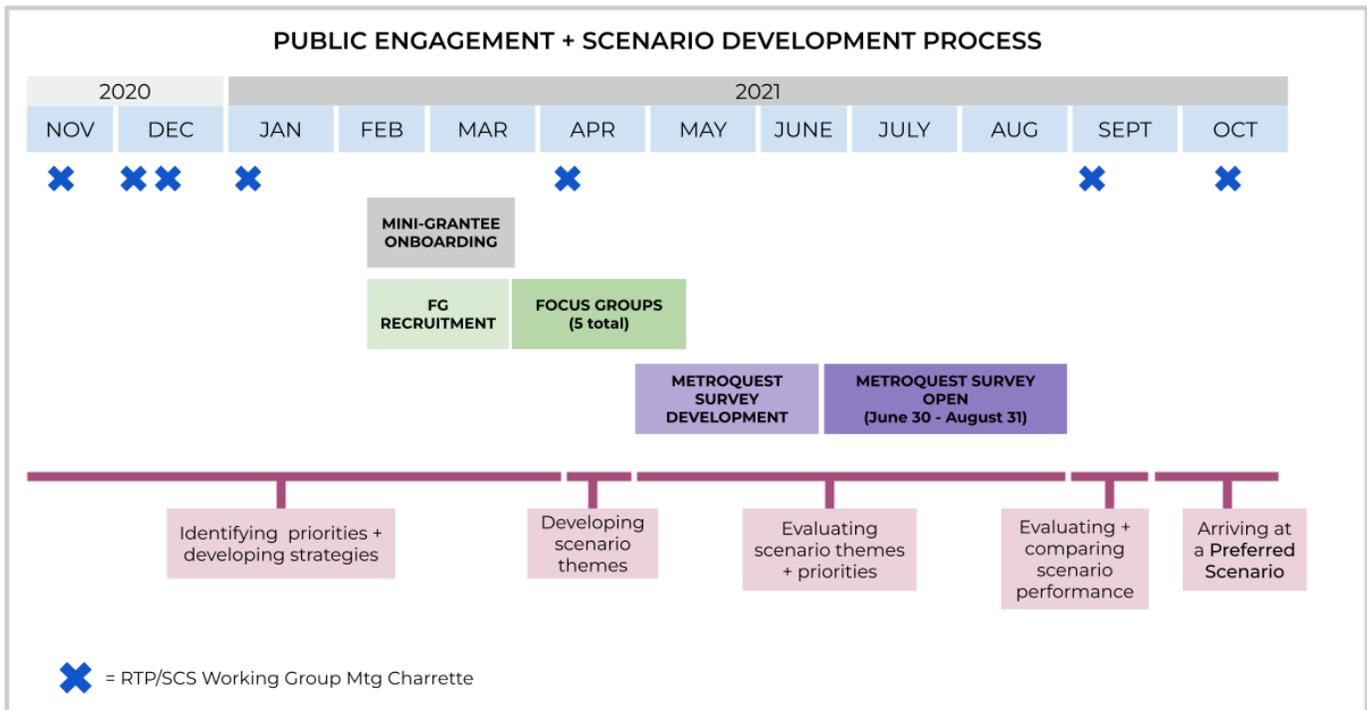✖ = RTP/SCS Working Group Mtg Charrette

FIGURE 14: PUBLIC ENGAGEMENT + SCENARIO DEVELOPMENT PROCESS TIMELINE

(CBOs) were invited through a low-barrier process to apply as a mini-grantee, upon

which they would receive up to $5,000 to fund staffing, materials, etc. towards *Envision 2050* outreach activities. All mini-grantee organizations participated in a kick-off meeting, helping co-create and refine outreach strategy as well as learn more about the purpose and goals of scenario planning. In addition, mini-grantees were invited to share their expertise and capacity for assisting with outreach to priority communities, both for general public outreach (i.e. promoting the MetroQuest survey) as well as for recruiting participants for the focus groups. The 2022 RTP/SCS cycle participating organizations included: Little Manila Rising, New Genesis Housing Development, REACH Public Health Advocates, Stockton Baptist Church & School, Grassroots Childcare Cooperative, and Central California Youth Academy.

RTP/SCS Working Group

The Regional Transportation Plan and Sustainable Community Strategy (RTP/SCS) Working Group is an advisory group for the SJCOG planning process. The role of the group is to provide direction and make recommendations to SJCOG staff, SJCOG standing committees, and the SJCOG policy board in its development and ultimate adoption of the 2022 RTP/SCS.

As the principal advisory group to the planning process, this body's input and recommendations will be vital to the success of the first update to a long-range transportation plan that integrates combined land use and transportation strategies, impacts to farmland and open space, and regional housing needs of residents at all income levels. Working Group members are representatives of jurisdictional partner agencies, transportation, economic development, public health, and community based organizations, particularly those serving historically underrepresented communities and communities disproportionately affected by environmental impacts.

All Working Group meetings were conducted remotely and facilitated members through seven (7) charrettes throughout the scenario development process. Meeting dates and links to meeting details can be found below:

2022 RTP/SCS Working Group Meeting Charettes

1. Charrette #1 – November 10, 2020
2. Charrette #2 – December 2, 2020
3. Charrette #3 – December 16, 2020
4. Charrette #4 – January 9, 2021
5. Charrette #5 – April 13, 2021
6. Charrette #6 – September 7, 2021
7. Charrette #7 – October 6, 2021

MetroQuest Survey

The MetroQuest platform was used as the primary tool for gathering broad public input on top regional priorities, scenario themes, and their respective strategies. The online survey was developed in both English and Spanish and open to the public for two months, between June 30th-August 31st. SJCOG staff and mini-grantee partners deployed both virtual and some in-person outreach strategies to promote the survey, including an incentive for participants to enter an optional raffle to win a $50 gift card. The survey was shared through SJCOG's social media platforms as well as through pop-up notifications on the SJCOG website.
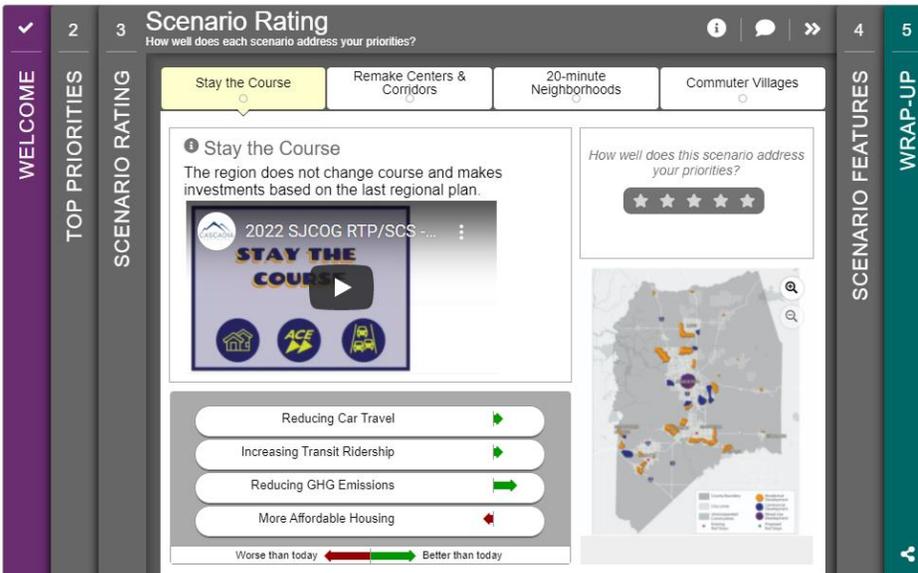
FIGURE 15: SCREENSHOT OF ENVISION 2050 METROQUEST ONLINE SURVEY

The MetroQuest survey and promotional postcard was developed with a "postcards from the future" theme. Each scenario theme was described in both a narrative storytelling format as well as through performance metrics and example strategies.

A complete summary of the MetroQuest survey components and promotional pieces can be found in *Appendix B*.

4.2 - Engagement at Key Scenario Development Stages

The following sections describe key phases of scenario development, the engagement process and stakeholders involved, and the outcomes and impacts engagement influenced on the scenario development process.

FIGURE 16: SCENARIO "POSTCARD FROM THE FUTURE" EXAMPLE (ENGLISH, SPANISH)

4.2.1 - Pillars & Strategies

At the outset of the 2022 RTP/SCS process, SJCOG developed six scenario "pillars" (Housing Production, Jobs & Economy, Vibrant Neighborhoods, Transportation (In & Out Commutes), Technology & AV Adoption, and Climate Impacts) which served as the first organizing principle and initial framework for developing SCS strategies.

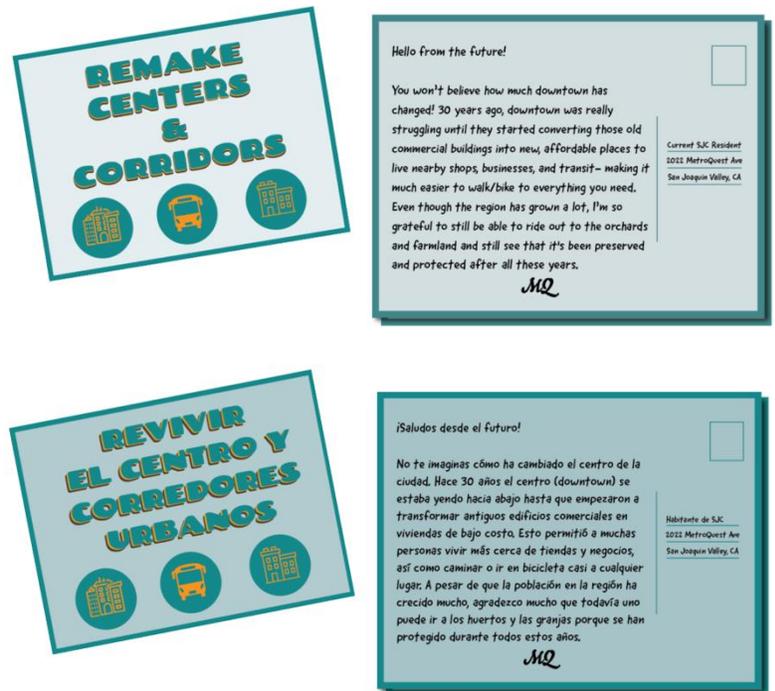RTP/SCS strategies were developed and refined during the first three Working Group charrettes and through a collaborative process involving SJCOG staff, scenario development consultants, RTP/SCS Working Group members, strategy audits of past SJCOG RTP/SCS cycles, as well as drawing from neighboring regional governments. Over 120 strategies were initially developed and organized across the six pillars; RTP/SCS strategies represent actions that SJCOG and its partners (cities, non-profits, advocacy groups, trade organizations, etc.) could undertake to help implement the RTP/SCS.

The consultant team analyzed and refined the strategy list to focus the fourth Working Group charrette on prioritizing strategies and identifying which strategies would be most useful for the broader public to provide input on (via the MetroQuest survey).

Part of the prioritization exercise facilitated during the fifth Working Group charrette included the development of a web-based app called, *Face-the-Future*, which allowed Working Group members to dynamically review and compare strategy performance in four key metrics (VMT Reduction, Transit Ridership, GHG Reduction, and Housing Affordability) by their related pillar or general theme.

Ultimately, 27 RTP/SCS Strategies were identified as most critical to move forward in receiving broader public input (via the *Envision 2050* MetroQuest survey) and to be further evaluated for their estimated performance within the context of the three TrendLab+
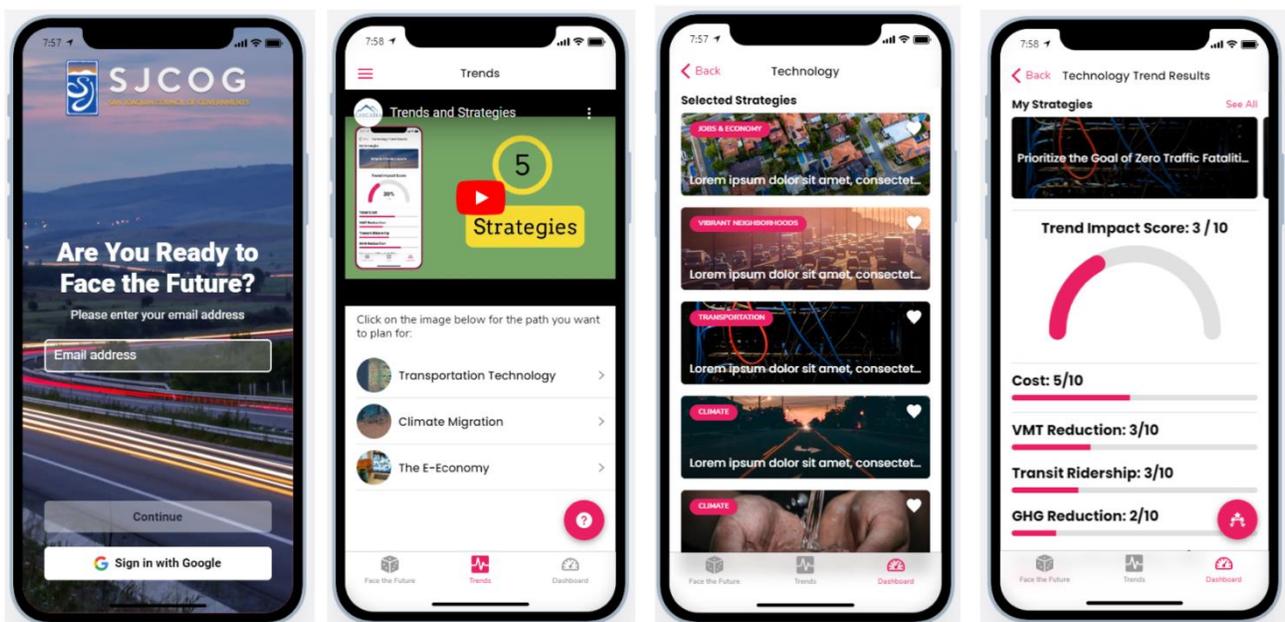
FIGURE 17: SCREENSHOTS OF FACE-THE-FUTURE WEB-BASED 2022 RTP/SCS STRATEGY EVALUATION APP

futures (Transportation Technology, Climate Migration, and the E-Economy).

4.1.2 - Scenario Themes

A scenario theme is a traditional scenario planning construct for which strategies and assumptions about future development can be organized within. By design, scenarios themes are qualitative and are typically developed to emphasize a particular set of strategies or policy decisions for how and where housing and employment growth happens.

2022 RTP/SCS scenario themes development started in Working Group Meeting Charrette #1; members identified, prioritized, and
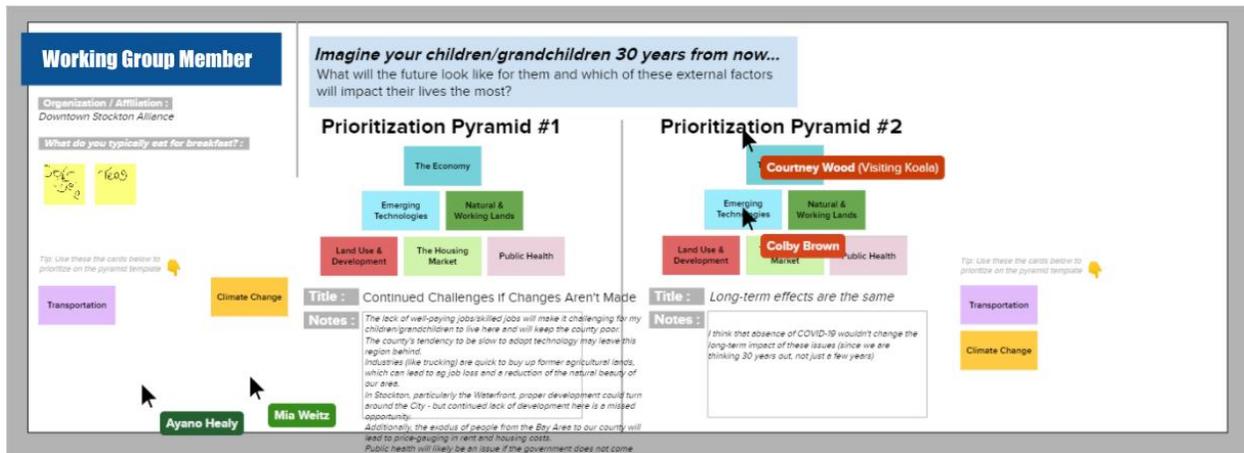
FIGURE 18: EXAMPLE OF WORKING GROUP MEMBER'S PRIORITIZATION EXERCISE
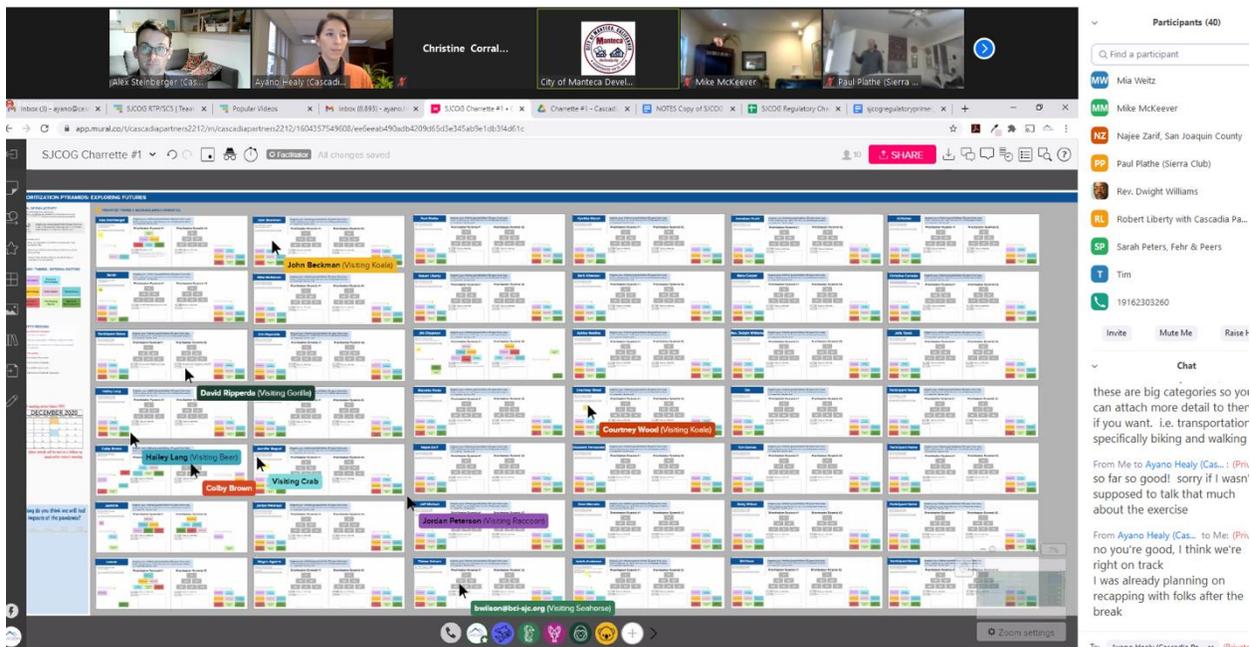
FIGURE 19: SCREENSHOT WORKING GROUP MEETING CHARRETTE #1 - PRIORITIZING TRENDS

discussed the near-term and long-term trends that were most important for the region to take action towards.

Driverless transportation, climate change, and working/shopping/schooling from home arose as significant trends that the region would need to account for when planning for the future. These three regionally significant factors identified from Charrette #1 were further developed and presented to focus group participants, asking participants what types of solutions or actions they would like to see in the future, given these trends.

Engagement consultants co-hosted five (5) virtual focus groups with mini-grantee partners between April and May 2021. Special focus was applied to recruiting community members of traditionally underrepresented groups. Approximately 30 community members participated across the five focus group meetings, including representatives from community-based organizations, housing advocacy groups, parents, school board leadership, community organizers, students, and business owners.

Top priorities identified by focus groups during discussion on emerging trends centered around cost of living, gentrification and lack of (affordable) housing options, issues with the public transportation network, and availability of living-wage jobs. A complete summary of focus group meeting key takeaways can be found in *Appendix C*.

As a result of RTP/SCS Working Group and focus group discussions, the scenario themes were further refined to the ultimate set of four (Stay the Course, Remake Centers and Corridors, 20-Minute Neighborhoods, and Commuter Villages) and ready to be shared with the broader public for input.
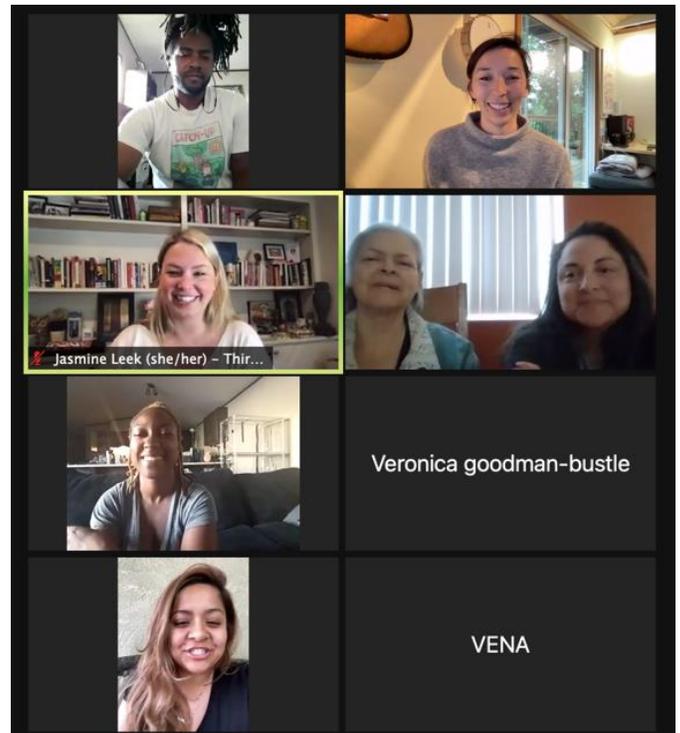
FIGURE 20: SCREENSHOT OF VIRTUAL FOCUS MEETING PARTICIPANTS

Over 430 San Joaquin Valley residents responded to the *Envision 2050* MetroQuest survey; with majority respondents identifying as White, male, and median age of 35-44. The survey invited the public to prioritize the scenario themes and their respective strategies as well as to rank their top five priorities for what the region should focus on for the future. Top five regional priorities identified by respondents were: (1) More housing affordability; (2) More job & training opportunities; (3) Thriving small businesses; (4) Improved public transit; (5) Proactive to climate change.

Envision 2050 Public Outreach
TOP PRIORITIES

Percentage of participants that ranked the item in their top 5

Priority	%
More housing affordability	73%
More job & training opportunities	68%
Thriving small businesses	67%
Improved public transit	67%
Proactive to climate change	62%
Inclusive community engagement	54%
Investment without displacement	51%
Stronger social support	47%
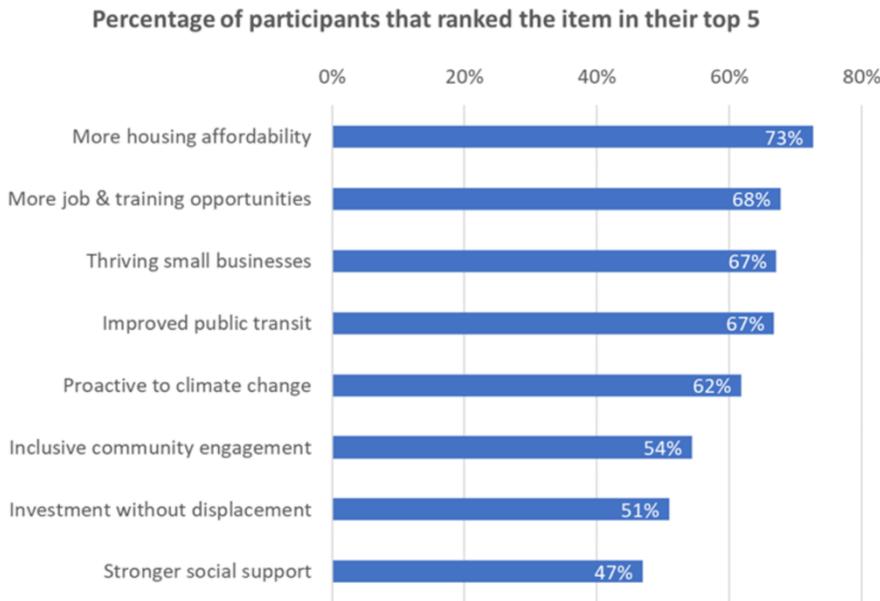
What do you want the future to look like?

1. More **housing affordability**
2. More **job & training opportunities**
3. **Thriving small businesses**
4. **Improved public transit**
5. **Proactive to climate change**

FIGURE 22: TOP PRIORITIES THE REGION SHOULD ADDRESS (ENVISION 2050 METROQUEST SURVEY)

Envision 2050 Public Outreach
SCENARIO RATINGS

SCENARIO RATING

Scenario	1 star	2 stars	3 stars	4 stars	5 stars
Stay the course	12%	15%	21%	28%	24%
Remake Centers & Corridors		3%	21%	36%	39%
20-min Neighborhoods	2%	9%	26%	33%	30%
Commuter Villages	3%	4%	15%	32%	46%
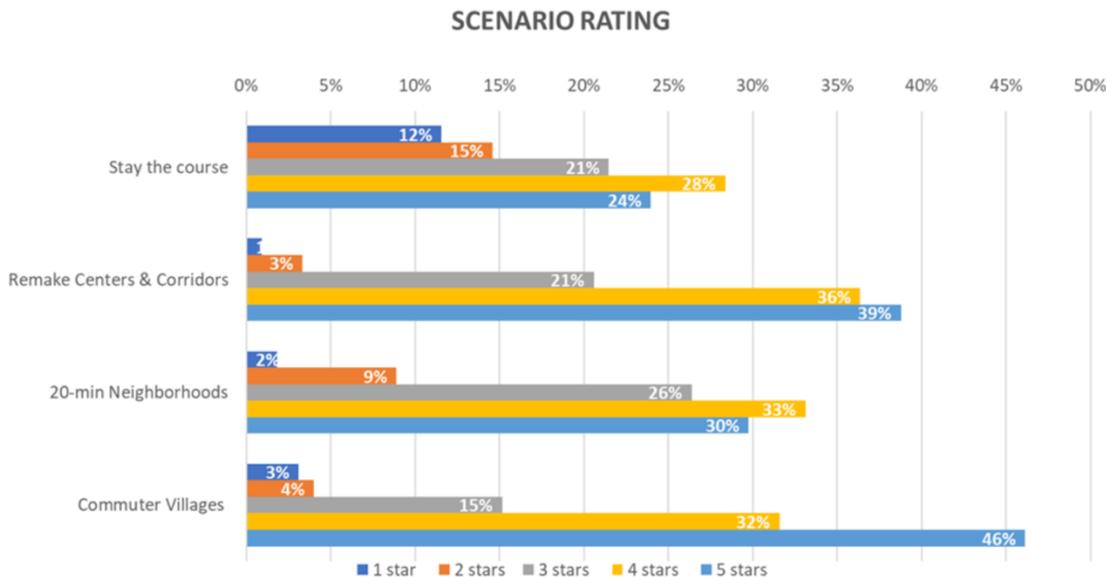
Participants consider that ***Commuter Villages*** *and* ***Remake Centers & Corridors*** *are the scenarios that better address their priorities*

FIGURE 21: SCENARIO RATINGS (ENVISION 2050 METROQUEST SURVEY)

In regard to scenario themes, survey respondents reported *Commuter Villages* and *Remake Centers & Corridors* as the top two scenario themes that best address their priorities.

4.1.3 - Land Use Allocation

Transforming scenario themes into GIS-based land use allocations was done through applying several guiding datasets into a scenario "painting" process, using land use scenario planning software Envision Tomorrow. In order to develop realistic scenarios that accounted for the best and most recent information on current and future development, consultants met individually with planning directors and staff for each of the nine jurisdictions within (and including) San Joaquin County.

These one-on-one meetings were an opportunity for jurisdictional partners to flag any planned development that might not be

represented in an existing dataset, as well as share insights on areas for anticipated projects or parcels that were off limits for development. Opportunities and constraints identified from one-on-one jurisdictional meetings were incorporated into all four scenarios.

These guiding datasets were applied to all scenarios to varying degrees, with the intent of creating equitable and sustainable land use allocations that also meet the region's goals for the sixth cycle of RHNA and the GHG reductions targets set by the California Air Resources Board (CARB). These guiding datasets are summarized below.
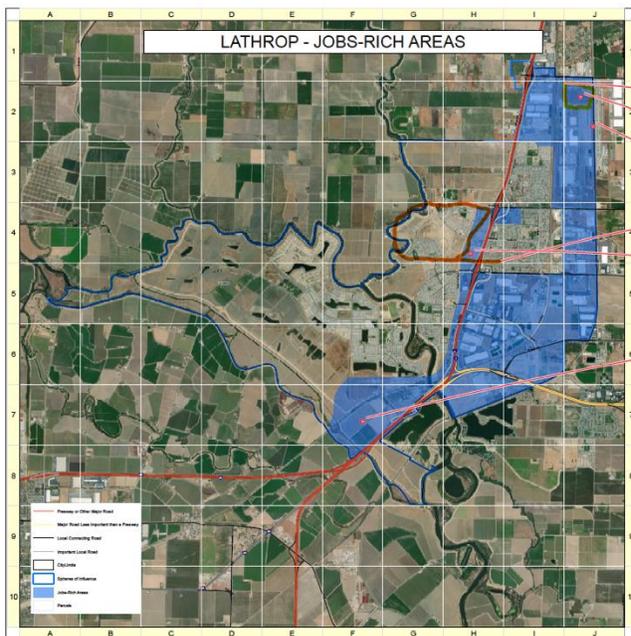
FIGURE 23: SCREENSHOT OF MARKED UP PDF FROM ONE-ON-ONE JURISDICTIONAL MEETING

Scenarios Comparison
Growth Location

A STAY THE COURSE — 8% | 11% | 18% | 63%
HIGH QUALITY TRANSIT AREAS (HQTAs) | URBAN ARTERIALS | ESTABLISHED NEIGHBORHOODS + EMPLOYMENT AREAS | NEW GROWTH AREAS

B REMAKE CENTERS & CORRIDORS — 20% | 30% | 24% | 27%
HIGH QUALITY TRANSIT AREAS (HQTAs) | URBAN ARTERIALS | ESTABLISHED NEIGHBORHOODS + EMPLOYMENT AREAS | NEW GROWTH AREAS

C 20-MINUTE NEIGHBORHOODS — 8% | 10% | 19% | 63%
HIGH QUALITY TRANSIT AREAS (HQTAs) | URBAN ARTERIALS | ESTABLISHED NEIGHBORHOODS + EMPLOYMENT AREAS | NEW GROWTH AREAS

D COMMUTER VILLAGES — 28% | 14% | 20% | 38%
HIGH QUALITY TRANSIT AREAS (HQTAs) | URBAN ARTERIALS | ESTABLISHED NEIGHBORHOODS + EMPLOYMENT AREAS | NEW GROWTH AREAS

FIGURE 24: SCENARIOS COMPARISON OF GROWTH LOCATION

4.1.4 - Scenario Evaluation Similarly, on October 5, 2021, scenario planning consultants facilitated a virtual public workshop, inviting members of the public to review and evaluate scenario performance metrics and identify which scenario appeared most likely to help address regional priorities.

Both the RTP/SCS Working Group and participants of the public workshop identified Scenario B, Remake Centers & Corridors as the best fit for meeting state and federal mandated targets as well as regional priorities for growth.

The scenario painting process in Envision Tomorrow, scenarios were now able to have accompanying metrics, allowing more substantive evaluation of scenarios- comparing performance metrics such as: density of new development, average water and energy use of new households, places of employment, and estimates of VMT and greenhouse gas emissions.

Working Group Meeting Charrette #7 facilitated RTP/SCS Working Group members through side-by-side comparisons of scenario performance metrics, asking members to prioritize which scenarios embodied the best composition of performance metric outcomes. By design, each scenario emphasizes a different set of metrics, Working Group members were asked to weigh the tradeoffs of which outcomes mattered most towards achieving regional goals.

Scenarios Comparison
Metric Prioritization

Scenarios prioritize various outcomes. Which two matter most to you:

Minimizing loss of prime agricultural land

Prioritizing low income housing development in high opportunity areas

Prioritizing housing growth in areas of low VMT

Increasing development around high quality transit infrastructure

Consistency with jurisdictions' General and Specific Plans

Reducing VMT and Greenhouse Gas Emissions

Increasing access to alternative modes of transportation

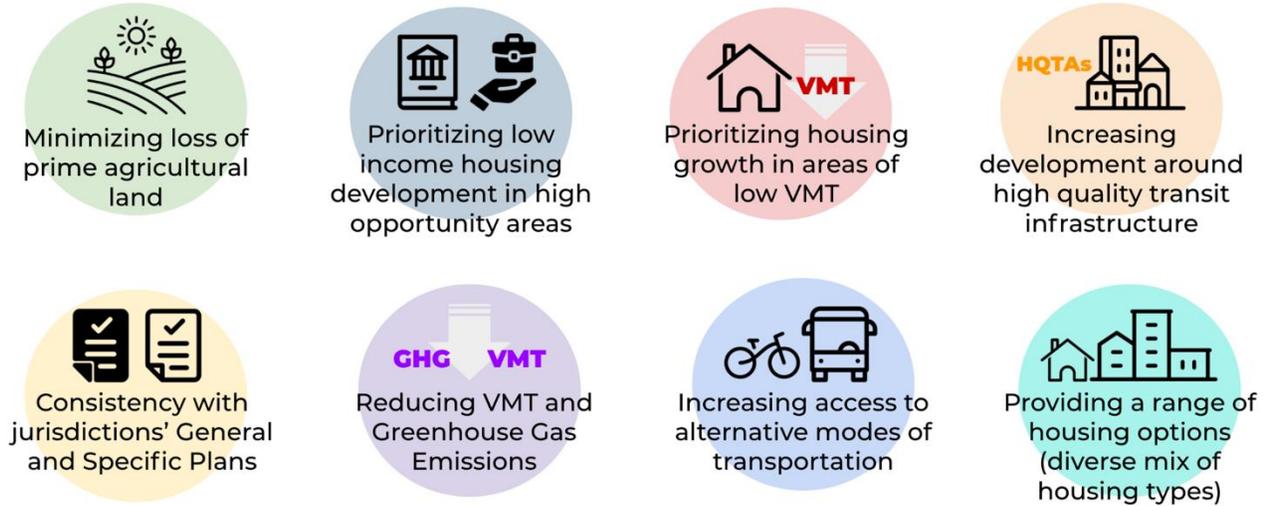Providing a range of housing options (diverse mix of housing types)

FIGURE 25: SCENARIO PERFORMANCE METRIC OUTCOMES

FIGURE 26: FLOW CHART OF PREFERRED SCENARIO SELECTION

CHAPTER 5. PREFERRED SCENARIO DEVELOPMENT

As we have seen in Chapter 4, there was significant interest from the general public and the RTP/SCS working group to integrate features from Scenario B: Remake Centers and Corridors into the 2022 RTP/SCS. In order to honor the desires of the public and stakeholders, SJCOG elected to pursue a hybrid scenario that integrated features from Scenario B into Scenario A, the preferred scenario from the 2018 RTP/SCS. In doing so, they not only honored the desires of the public, but also the hard-won consensus achieved in 2018.

Scenario Growth by Priority Growth Area	A. Stay the Course	B. Remake Centers and Corridors	C. 20 Minute Neighborhoods	D. Commuter Villages	E. Hybrid Preferred
High Quality Transit Areas	8%	20%	8%	28%	15%
Urban Arterials	11%	30%	10%	14%	15%
Established Neighborhoods and Job Centers	18%	24%	19%	20%	25%
New Growth Areas	63%	27%	63%	38%	45%

FIGURE 27: GROWTH TARGETS BY SCENARIO AND GROWTH AREA

5.1 - Preferred Scenario Creation

In order to rationally combine scenarios A and B, SJCOG used the Priority Growth Areas discussed in Chapter 3 to re-focus growth in a way that reflected both scenarios. The table below shows targets for growth by PGA for each scenario and the hybrid scenario.

Using the above targets as a guide and scenario A as a starting point, growth was first transferred from scenario B's high quality transit areas, urban arterials, and established neighborhoods and job centers. Parcels were then reverted back to their existing state until the growth percentages in these areas reflected the lower targets desired by SJCOG
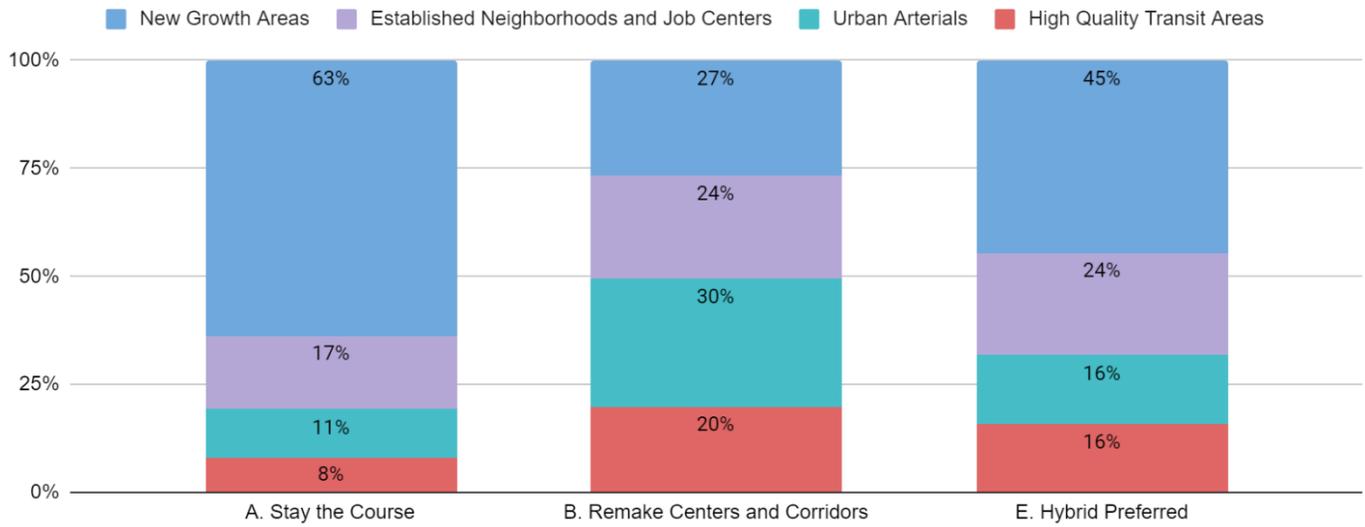
FIGURE 28: LOCATION OF GROWTH BY SCENARIO AND PGA

staff. Finally, new growth areas from scenario A were unpainted until the percentage of growth remaining matched the 45% figure shown in column E above.

Selected Scenario Indicators	A. Stay the Course	B. Remake Centers and Corridors	E. Hybrid Preferred
Acres of Land Consumed	20,316	13,798	16,574
Redevelopment Rate	1.70%	12.30%	5.60%
Residential Gross Density (DU/Acre)	5.3	8.8	6.7
Multifamily %	32%	52%	42%

FIGURE 29: SELECTED SCENARIO INDICATORS

5.2 - Performance

By using the methodology described, it was possible to create a hybrid scenario that matched the desired growth locations within +/- 2%. As the following graph shows, scenario E conforms closely to the range formed by scenario A and B and closely matches the percentages desired by SJCOG staff.

In addition, the hybrid preferred scenario performs within the range set by A and B for nearly all other Envision Tomorrow metrics. The table below provides a selection of metrics which clearly show the hybrid preferred scenario falling, as expected, between the two original scenarios.
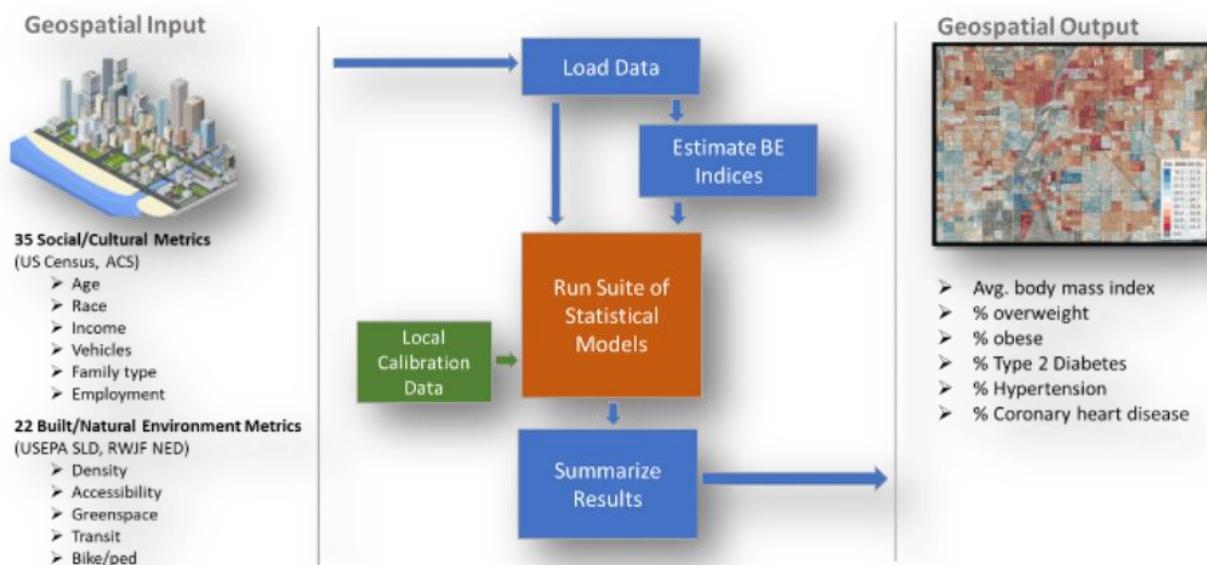
FIGURE 30: BASIC DATA AND PROCESS DIAGRAM FOR UD4H'S PUBLIC HEALTH ASSESSMENT MODEL

5.2.1 - California Public Health Assessment Model Performance

Public health consultant, Urban Design 4 Health, imported the Envision Tomorrow data for the baseline conditions, Scenario A and Scenario E into a version of its most recent public health assessment model. This model, customized for the SJCOG estimates average health outcomes at the Census Block Group level based on changes proposed in

level based on changes proposed in Envision Tomorrow and other baseline data regarding the built and natural environment. Figure 30 describes the basic flow of data and processing steps used in the model. Thematic maps showing the relative improvement of the five public health metrics for Scenario A and Scenario E can be found in the following pages.

Relative Improvement in BMI>25 (Overweight) Prevalence

Scenario A

- No improvement
- 0.1% - 2%
- 2.1% - 4%
- 4.1% - 6%
- > 6%
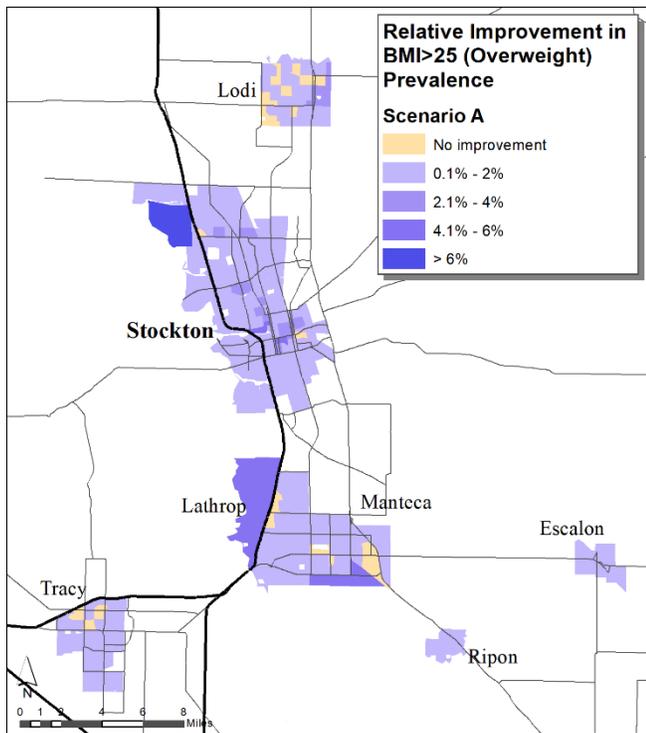
Percent of Adults with a BMI>25

The percent of adults with a BMI>25, is an indicator of community health. Being overweight is a risk factor for other chronic and infectious diseases. Scenarios A and E are expected to reduce the percentage of the population with BMI>25 in the SJCOG region. Scenario E is estimated to provide the most improvement, particularly in those areas with high segregation, poverty, and low resources. https://www.cdc.gov/healthyweight/effects/index.html

TCAC Opportunity Area	Baseline	Scenario A	Scenario E
High Segregation & Poverty	68.0%	66.6%	65.6%
Low Resource	67.7%	66.3%	66.1%
Moderate Resource	65.6%	65.4%	65.2%
High Resource	63.9%	62.7%	62.6%
Highest Resource	62.5%	62.2%	62.2%
Total	64.9%	63.8%	63.7%
Absolute difference from baseline		-1.12%	-1.21%
Relative difference from baseline		-1.73%	-1.86%

FIGURE 31: TOTAL SJCOG REGION'S POPULATION-WEIGHTED AVERAGE OF BMI>25 FOR EACH SCENARIO BY OPPORTUNITY AREA CLASSIFICATION

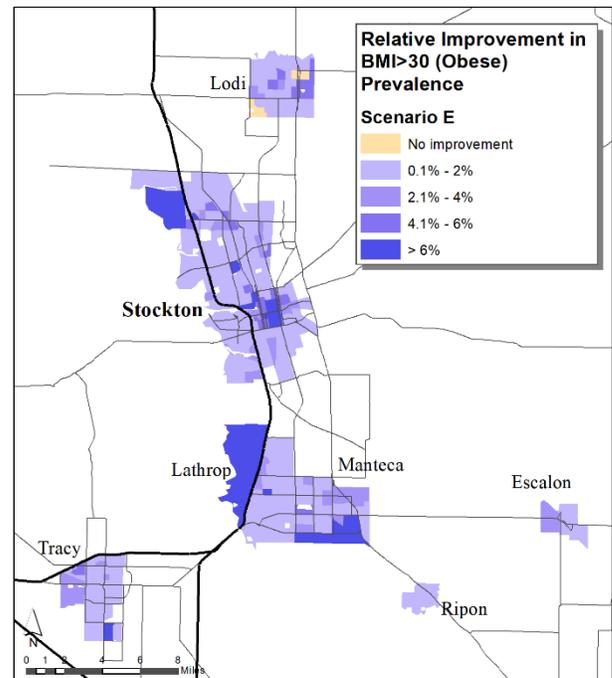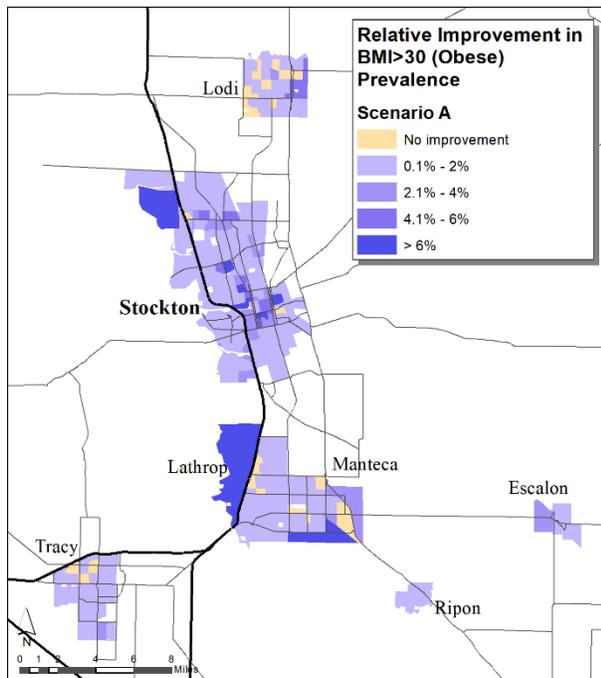## Percent of Adults with a BMI>30

The percent of adults with a BMI>30, is an indicator of community health. Excessive weight is a serious risk factor for other chronic and infectious diseases. Scenarios A and E are expected to reduce the percentage of the population with BMI>30 in the SJCOG region.

Scenario E is estimated to provide the most improvement, particularly in those areas with high segregation, poverty, and low resources. https://www.cdc.gov/healthyweight/effects/index.html

TCAC Opportunity Area	Baseline	Scenario A	Scenario E
High Segregation & Poverty	32.4%	31.2%	30.5%
Low Resource	31.8%	30.4%	30.2%
Moderate Resource	29.7%	29.4%	29.2%
High Resource	27.8%	26.6%	26.6%
Highest Resource	26.1%	25.8%	25.8%
Total	28.9%	27.8%	27.8%
Absolute difference from baseline		-1.10%	-1.14%
Relative difference from baseline		-3.82%	-3.93%

FIGURE 32: TOTAL SJCOG REGION'S POPULATION-WEIGHTED AVERAGE OF BMI>30 FOR EACH SCENARIO BY OPPORTUNITY AREA CLASSIFICATION
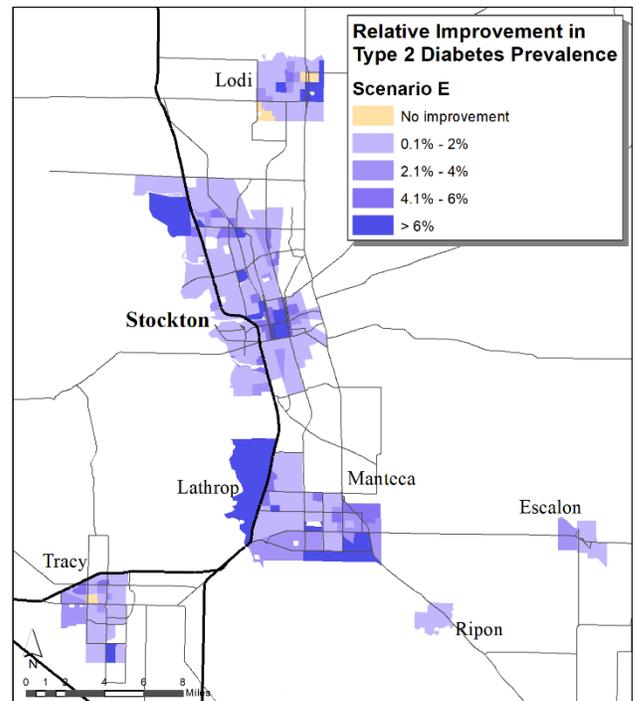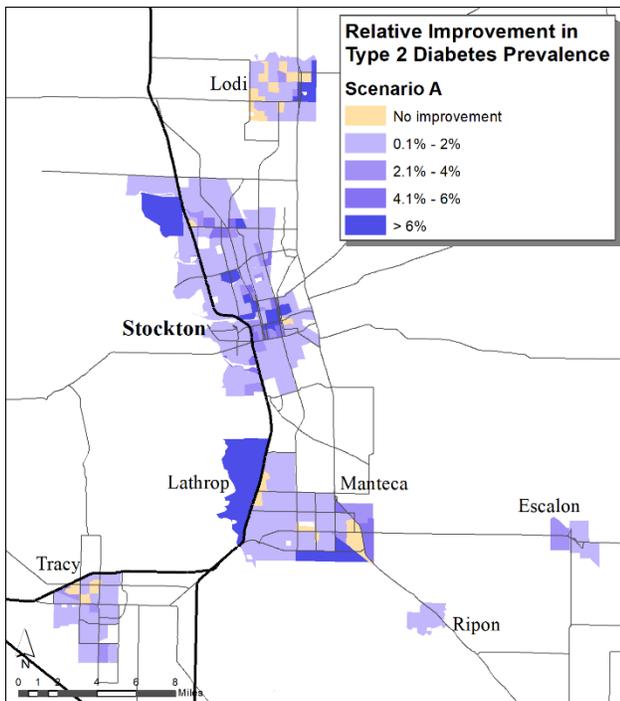
Type 2 Diabetes

Scenarios A and E are expected to reduce the percentage of the population with Type 2 diabetes in the SJCOG region. Scenario E is slightly better than Scenario A in areas with high segregation, poverty, and low resources. Complications from Type 2 diabetes include being at a higher risk for other chronic diseases and other health problems.
https://www.cdc.gov/diabetes/basics/type2.html

TCAC Opportunity Area	Baseline	Scenario A	Scenario E
High Segregation & Poverty	10.7%	10.5%	10.2%
Low Resource	10.3%	9.4%	9.3%
Moderate Resource	9.9%	9.9%	9.7%
High Resource	8.9%	8.4%	8.4%
Highest Resource	8.8%	8.5%	8.6%
Total	9.4%	8.9%	8.9%
Absolute difference from baseline		-0.51%	-0.53%
Relative difference from baseline		-5.42%	-5.66%

FIGURE 33: TOTAL SJCOG REGION'S POPULATION-WEIGHTED AVERAGE OF TYPE 2 DIABETES PREVALENCE FOR EACH SCENARIO BY OPPORTUNITY AREA CLASSIFIC

Coronary Heart Disease

Scenarios A and E are not expected to significantly reduce the percentage of the population with coronary heart disease in the SJCOG region, although they both result in a relative improvement of about 3%. Coronary heart disease is a leading cause of death in the US.

https://www.cdc.gov/heartdisease/coronary_ad.htm
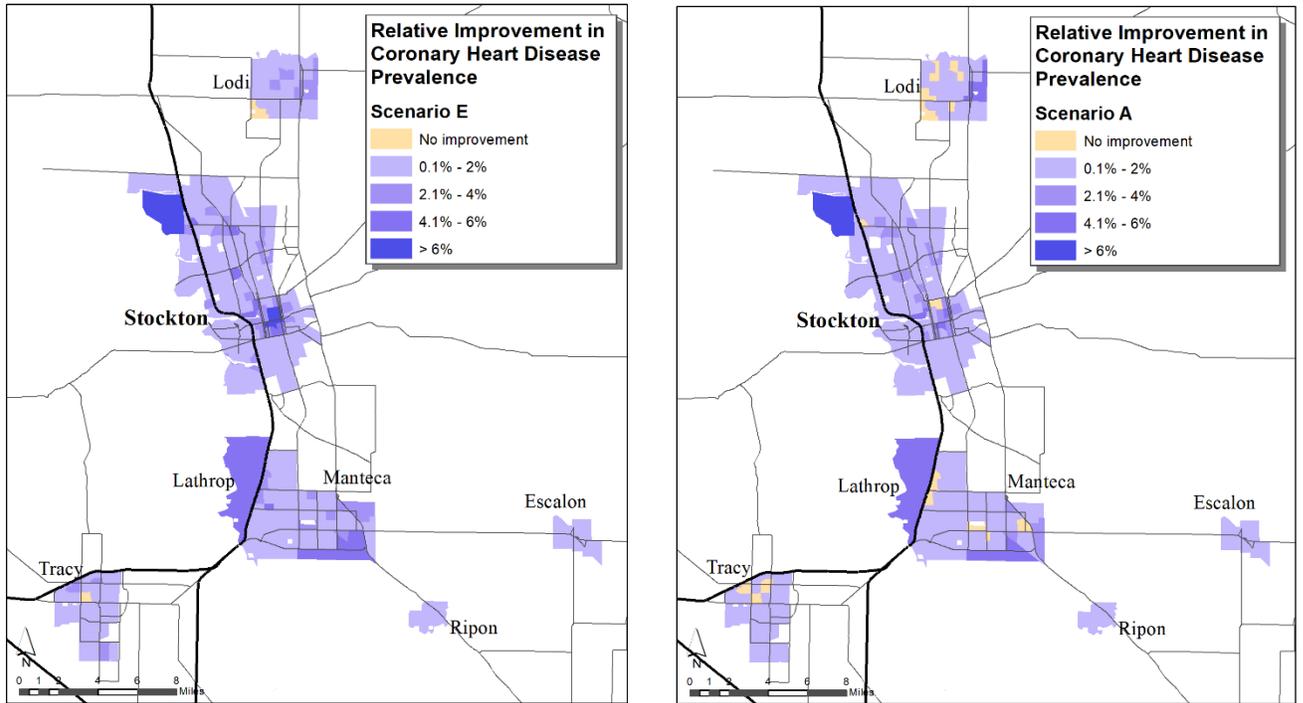
TCAC Opportunity Area	Baseline	Scenario A	Scenario E
High Segregation & Poverty	2.6%	2.6%	2.6%
Low Resource	2.8%	2.6%	2.6%
Moderate Resource	2.9%	3.0%	2.9%
High Resource	2.9%	2.8%	2.8%
Highest Resource	3.0%	2.9%	3.0%
Total	2.9%	2.8%	2.8%
Absolute difference from baseline		-0.09%	-0.09%
Relative difference from baseline		-3.02%	-3.18%

FIGURE 34: TOTAL SJCOG REGION'S POPULATION-WEIGHTED AVERAGE FOR CORONARY HEART DISEASE PREVALENCE FOR EACH SCENARIO BY OPPORTUNITY AREA CLASSIFICATION
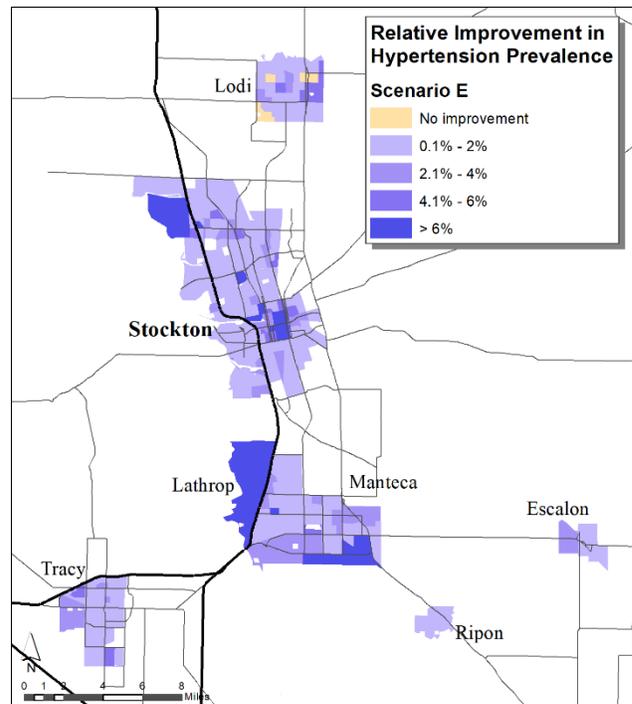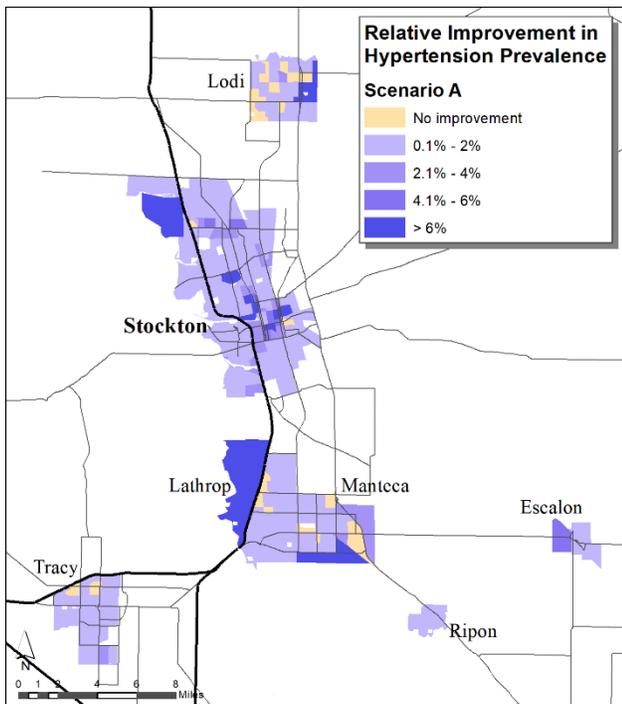
Hypertension

Scenarios A and E are both expected to reduce the percentage of the population with hypertension in the SJCOG region. Both scenarios are similar in the expected impact with a 3-4% relative improvement. Having high blood pressure increases the risk for heart disease and stroke, the two leading causes of death in the US.

https://www.cdc.gov/bloodpressure/index.htm

TCAC Opportunity Area	Baseline	Scenario A	Scenario E
High Segregation & Poverty	29.6%	28.8%	28.0%
Low Resource	30.0%	28.4%	28.3%
Moderate Resource	30.6%	30.8%	30.4%
High Resource	29.2%	27.8%	27.8%
Highest Resource	29.4%	28.7%	28.9%
Total	29.6%	28.5%	28.5%
Absolute difference from baseline		-1.11%	-1.17%
Relative difference from baseline		-3.73%	-3.94%

FIGURE 35: TOTAL SJCOG REGION'S POPULATION-WEIGHTED AVERAGE OF HYPERTENSION PREVALENCE FOR EACH SCENARIO BY OPPORTUNITY AREA CLASSIFICATION.

5.3 - RHNA Consistency

SJCOG is currently developing a methodology for distributing regional housing need for the sixth cycle regional housing needs allocation (RHNA). This process will result in local jurisdictions being required to demonstrate adequate zoned capacity to accommodate their need over an eight-year period spanning 2023 - 2031. Housing element law stipulates that RHNA methodologies should align with the RTP/SCS by protecting environmental and agricultural resources, meeting GHG emissions reduction targets, and promoting socioeconomic equity through efficient development patterns[4].

Throughout the scenario development process, every opportunity was taken to ensure consistency of the RTP/SCS preferred land use allocation with the RHNA process. This was accomplished by setting explicit goals for higher density housing, engaging in joint meetings with RHNA consultants and jurisdiction representatives, using RHNA-specific guiding datasets and ensuring RHNA "fit" at the jurisdictional level.

5.3.1 - Goals for Higher Density Housing

Housing element law stipulates that RHNA consider the needs of low, very low, and extremely low-income households. As such, every region must plan for ample capacity to build units for households at these income levels. This is mandated in housing element law through zoned density. Specifically, for the SJCOG region, below-moderate income housing need must be satisfied within zones that allow densities of 20 units per acre or more. Three of the four scenarios created as part of the scenario process addressed this need by attempting to accommodate at least 40% of housing units at densities of 20 units per acre or more.

5.3.2 - Joint RTP/SCS and RHNA Meetings

Another example of RHNA/RTP consistency included in the scenario development process was frequent communication between SJCOG's land use consultants for the RTP/SCS and the consultants responsible for the RHNA methodology. RHNA and RTP consultants had frequent meetings to share ideas and provide

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[4] Section §65584.d of the California Government Code

progress updates. Most importantly, SJCOG facilitated meetings with representatives from every jurisdiction that included land use consultants (to discuss scenario pipeline assumptions) and RHNA consultants (to discuss RHNA adjustment factors). Having both consultant teams present for these meetings served to further cement the relationship of RHNA and the RTP/SCS among local jurisdictions.

5.3.3 - RHNA-Specific Datasets

As discussed in Chapter 3, one of the guiding datasets used to develop scenarios was the

TCAC "Access to Opportunity" dataset. This dataset maps locations within the region where lower income households are more likely to have access to high quality education, employment, transportation options, and clean air and water. By using this layer to guide scenario painting, it was possible to further engrain one of the five RHNA objectives (Affirmatively Furthering Fair Housing) into the land use pattern exhibited by the scenarios. The table below summarizes the percentage of housing growth located in areas of "high" or "highest" resource in each scenario.

Below-Moderate Income Housing by Scenario	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)	Scenario E (2046)
Percent of New Dwelling Units @ 20 Units Per Acre or More	26%	47%	40%	40%	37%

FIGURE 36: PERCENT OF DWELLING UNIT GROWTH TARGETED AT BELOW-MODERATE INCOMES

5.3.4 - RHNA "Fit"

SJCOG's RHNA methodology, once adopted, will stipulate the total number of units each jurisdiction must plan for, as well as the share of those units which need to be accommodated at densities of 20 units per acre or greater. By comparing this data with the land use patterns of the preferred scenario, it is possible to see if "fitting" the required housing need at various density levels is possible given the preferred scenario. It should be noted that while the RHNA process is a plan for 8 years of housing

need, the RTP plans for 24 years of growth. Equally important, however, is the fact that the RTP only plans for new forecasted households, while the housing need included in RHNA factors in existing underproduction of housing due to overcrowding and low vacancy rates. The table below summarizes the total number of new dwelling units assumed in scenario E, by jurisdiction. It also provides a summary of the number of those dwelling units provided at densities of 20 units per acre or greater.

Below-Moderate Income Housing by Scenario	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)	Scenario E (2046)

| Share of New Households in Areas of High or Highest Resource (TCAC) | 72% | 56% | 80% | 67% | 67% |

FIGURE 37: SCENARIO GROWTH IN "AREAS OF OPPORTUNITY"

RHNA "Fit' Assessment	Total New Housing (2022 - 2046)	Total New Housing @ 20+ Units per Acre	% @ 20+ Units per Acre
Escalon	529	181	34%
Lathrop	13,103	3,240	25%
Lodi	6,854	2,879	42%
Manteca	13,837	4,970	36%
Mountain House	5,909	1,608	27%
Ripon	1,970	473	24%
Stockton	18,603	11,406	61%
Tracy	15,948	4,625	29%
Unincorporated	3,700	270	7%
Total	**80,453**	**29,653**	**37%**

FIGURE 38: RHNA "FIT" ASSESSMENT

Appendix A

A.1 - Population and Employment Forecast Assumptions

Table 1: Household Forecast by Jurisdiction, UoP (yellow box denotes interpolated year)

Household Forecast by Jurisdiction	2015	2016	2020	2025	2030	2035	2040	2045	2046
ESCALON	2,561	2,582	2,664	2,823	2,912	2,962	3,006	3,046	3,054
LATHROP	5,397	5,705	6,937	9,291	11,561	13,794	16,098	18,459	18,931
LODI	22,177	22,450	23,543	25,113	26,085	26,712	27,313	27,881	27,995
MANTECA	23,126	23,712	26,055	28,708	30,899	32,829	34,871	37,027	37,458
RIPON	5,003	5,092	5,450	5,943	6,311	6,608	6,909	7,212	7,273
STOCKTON	92,273	93,113	96,474	102,073	105,132	106,722	108,140	109,358	109,602
TRACY	25,069	25,562	27,535	30,476	32,779	34,722	36,686	38,658	39,052
Mountain House CDP	4,124	4,414	5,572	6,966	8,378	9,806	11,343	12,990	13,319
Unincorporated	43,333	43,649	44,914	46,954	47,752	47,829	47,780	47,596	47,559
County Total	223,063	226,279	239,144	258,347	271,809	281,984	292,146	302,227	304,243

Table 2: Employment Forecast by Jurisdiction, UoP (yellow box denotes interpolated year)

Employment Forecast by Jurisdiction	2015	2016	2020	2025	2030	2035	2040	2045	2046
ESCALON	1,629	1,631	1,639	1,823	1,836	1,860	1,917	1,986	2,001
LATHROP	7,566	7,779	8,630	10,478	11,029	11,307	12,126	13,010	13,192
LODI	21,695	21,822	22,331	24,049	24,250	24,640	25,241	25,927	26,082
MANTECA	17,289	17,260	17,145	19,561	19,715	20,424	21,346	22,427	22,670
RIPON	3,688	3,743	3,964	4,356	4,404	4,473	4,599	4,748	4,782
STOCKTON	105,561	106,635	110,931	123,374	126,314	128,582	132,140	136,264	137,202
TRACY	23,809	24,485	27,189	33,648	35,386	35,846	37,341	39,155	39,564
Mountain House CDP	487	491	507	1,043	1,785	2,386	2,693	3,025	3,100
Unincorporated	49,005	50,038	54,169	58,796	59,693	59,873	61,124	62,712	63,083
County Total	230,729	233,884	246,505	277,128	284,413	289,391	298,526	309,254	311,675

A.2 - Envision Tomorrow Modeling Assumptions

Table 3: Envision Tomorrow Control Total Assumptions

Assumption	Value	Source
Base Year	2,016	SJCOG
Out Year	2,046	SJCOG
Households (2016)	227,784	Valley Model Improvement Program 2 (VMIP2)
Dwelling Units (2016)	240,619	Census occupancy rate applied to households
Population (2016)	714,860	Census ACS 5-Year Estimate 2016
Household Size (2016)	3.14	Census ACS 5-Year Estimate 2016
Occupancy Rate (2016)	94.7%	Census ACS 5-Year Estimate 2016
Employment (2016)	239,093	VMIP2
Households (2046)	304,243	UoP Forecast (2046 interpolated)
Dwelling Units (2046)	320,256	Census occupancy rate applied to households
Population (2046)	994,238	UoP Forecast (2046 interpolated)
Household Size (2046)	3.27	UoP Forecast (2046 interpolated)
Occupancy Rate (2046)	95.0%	HCD definition of "healthy housing market"
Employment (2046)	311,675	UoP BEA to BLS Adjusted
Incremental Households (2016 - 2046)	76,459	UoP and VMIP2
Incremental Dwelling Units (2016 - 2046)	79,637	UoP and VMIP2
Population (2016 - 2046)	279,378	UoP and VMIP2

Household Size (2016 - 2046)	3.65	UoP and VMIP2
Employment (2016 - 2046)	72,582	UoP and VMIP2

Table 4: Envision Tomorrow Building Type Assumptions

Building Type	Height (Stories)	Floor Area Ratio (FAR)	Dwelling Units per Net Acre	Jobs per Net Acre
Mixed-Use Residential -15 Story	15	7.0	217	30
Mixed-Use Residential -5 Story	5	2.9	65	27
Mixed-Use Residential -3 Story	3	1.4	31	16
Mixed-Use Residential -2 Story	2	0.8	25	11
Mixed-Use Office 10 -Story	10	2.7	-	238
Mixed-Use Office 5 -Story	5	2.8	-	205
Mixed-Use Office 2 -Story	2	1.0	-	88
Multifamily Small Unit	3	1.2	55	-
Multifamily Large	2	0.6	24	-
Suburban Multifamily	2	0.6	17	-
Duplexes	1	0.8	17	-
Townhomes	2	0.7	15	-
Cottage Home Small Lot	1	0.3	11	-
Single Family Small Lot	2	0.5	10	-
SFR Standard Lot	2	0.3	6	-
Single Family Large Lot	1	0.2	2	-
Single Family Estate	2	0.1	1	-

Building Type	Height (Stories)	Floor Area Ratio (FAR)	Dwelling Units per Net Acre	Jobs per Net Acre
Mobile Home	1	0.4	19	-
Low Rise Office	1	0.3	-	32
Medical Office	2	0.8	-	74
Hotel - 2 Stories	2	1.0	-	20
Educational	1	0.5	-	28
Low Density Commercial	1	0.3	-	13
Main Street Commercial	1	0.9	-	57
Large Format Retail	1	0.3	-	12
Business Park Flex	1	0.3	-	18
Light Industrial	1	0.3	-	9
Heavy Industrial and Warehousing	1	0.3	-	9
Jail / Prison	1	0.6	-	19
Civic Office	1	0.6	-	33

Table 5: Envision Tomorrow Development Type Assumptions - Residential

Development Type Name	Total	Multifamily	Townhome	Single Family	Mobile Home	Hotel Rooms
Downtown	16.1	80.1	-	-	-	41.0
Downtown Residential	30.0	34.8	-	-	-	-
Town Center	8.6	28.1	-	-	-	41.0
Town Neighborhood	11.4	23.1	11.1	7.1	-	-

Development Type Name	Total	Multifamily	Townhome	Single Family	Mobile Home	Hotel Rooms
Small Downtown	3.7	18.2	11.1	-	-	-
Compact Neighborhood High	8.0	13.5	10.7	6.5	-	-
Main Street	1.5	16.4	-	-	-	-
Mixed-Use Corridor	10.1	21.8	-	-	-	41.0
Compact Neighborhood Low	5.8	-	10.7	5.3	-	-
Suburban Multifamily	19.8	21.2	-	-	-	-
Suburban Residential	3.0	-	-	3.2	-	-
Large Lot Residential	1.3	-	-	1.2	-	-
Mobile Homes	15.9	-	-	-	13.3	-
Office Park	-	-	-	-	-	-
Public Office	-	-	-	-	-	-
Medical Office	-	-	-	-	-	-
Hotel	44.1	-	-	-	-	41.0
Activity Center	-	-	-	-	-	-
Regional Retail	6.9	-	-	-	-	41.0
Arterial Commercial	4.8	-	-	-	-	41.0
Industrial and Warehousing	-	-	-	-	-	-
University District	14.8	33.5	-	-	-	41.0
Lower Educational	-	-	-	-	-	-
Estate Home Agriculture	0.1	-	-	0.7	-	-

Table 6: Envision Tomorrow Development Type Assumptions - Employment

Development Type Name	Total	Retail	Office	Industrial	Public / Civic	Education al	Hotel / Hospitality
Downtown	55.0	13.6	60.7	-	-	19.7	13.5
Downtown Residential	17.2	13.8	89.6	-	-	-	-
Town Center	42.6	12.6	52.1	-	-	19.7	13.5
Town Neighborhood	2.2	13.8	19.4	-	-	-	-
Small Downtown	24.7	9.8	24.5	2.5	-	19.7	-
Compact Neighborhood High	-	-	-	-	-	-	-
Main Street	33.3	17.4	23.1	-	-	-	-
Mixed-Use Corridor	28.2	12.3	33.0	-	-	-	13.5
Compact Neighborhood Low	-	-	-	-	-	-	-
Suburban Multifamily	-	-	-	-	-	-	-
Suburban Residential	-	-	-	-	-	-	-
Large Lot Residential	-	-	-	-	-	-	-
Mobile Homes	-	-	-	-	-	-	-
Office Park	21.4	1.1	17.0	2.8	-	19.7	-
Public Office	25.4	0.9	-	-	22.1	-	-
Medical Office	49.9	4.6	48.0	-	-	-	-
Hotel	14.6	-	-	-	-	-	13.5
Activity Center	12.2	6.6	21.3	-	-	-	-
Regional Retail	12.9	8.6	51.3	-	-	-	13.5

Development Type Name	Total	Retail	Office	Industrial	Public / Civic	Education al	Hotel / Hospitality
Arterial Commercial	13.3	7.7	24.2	3.8	-	-	13.5
Industrial and Warehousing	7.8	0.5	3.0	4.8	-	-	-
University District	19.1	14.9	19.8	-	-	19.7	13.5
Lower Educational	24.3	-	-	-	-	19.7	-
Estate Home Agriculture	-	-	-	-	-	-	-

A.3 - Selected Envision Tomorrow Indicators

Table 7: Resource Conservation Indicators

Resource Conservation Indicators	Description	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)	Scenario E (2046)	Notes
Land Consumed	Total land consumed due to new development (important farmland / identified natural resource areas by type [state- or federally-designated habitat lands, floodplains, riparian areas, vernal pools, forested areas, groundwater recharge zones] / all) (Acres)	25,522	17,394	19,161	19,025	20,326	ET vacant acres + redeveloped developed acres
Important Farmland	Total important farmland consumed due to new	20,911	10,516	14,692	13,054	14,672	FMMP 2018 unioned to painted

Resource Conservation Indicators	Description	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)	Scenario E (2046)	Notes
Consumed (total)	development (where "important" includes prime) include inside SOI						parcels. Includes both inside and outside SOI
	Prime Farmland	7,795	1,146	4,934	3,136	4,060	
	Farmland of State Importance	4,168	1,306	2,779	1,742	2,523	
	Farmland of Local Importance	8,493	8,017	6,782	8,069	7,795	
	Unique Farmland	64	18	33	33	31	
	Grazing Land	390	29	164	75	263	
Nonagricultural or Natural Vegetation Consumed (total)	Total	231	85	166	152	185	nv designation in FMMP
	Outside of SOI	65	31	-	-	31	
Important Farmland Consumed (as defined by SB 375)	Total important farmland consumed due to new development (where "important" includes prime) outside Spheres of Influence. (Acres)	1,335	129	438	430	535	Outside SOI only
	Prime Farmland	1,007	126	407	401	512	
	Farmland of State Importance	310	3	18	16	11	

Resource Conservation Indicators	Description	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)	Scenario E (2046)	Notes
	Unique Farmland	18	-	12	12	12	
Percent of Growth by Land Type	Land use mix: Percentage of new housing and jobs that is infill/redevelopment (revitalized).	37%	68%	37%	62%	55%	Infill defined as "HQTAs, "Urban Arterials", and "Existing Neighborhoods and Job Centers"
	Land use mix: Percentage of new housing and jobs that is greenfield.	63%	32%	63%	38%	45%	
	Housing	6%	37%	5%	25%	20%	units or jobs built on previously developed land
		4,819	30,081	4,314	19,721	16,341	
	Jobs	12%	41%	8%	34%	29%	
		8,900	37,475	6,238	28,545	23,895	

Table 8: Efficiency Indicators

Efficiency Indicators	Description	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)	Scenario E (2046)	Notes
Water Consumption	Per household water usage from new growth(gal/day)	467	374	390	396	417	Internal water consumption: Vickers, Amy. Handbook of Water Use

Efficiency Indicators	Description	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)	Scenario E (2046)	Notes
							and Conservation. (2001) External water consumption: .05 gallons per sqft lawn area
Energy Usage	Per household energy consumption from new growth (million Btu)	105	90	94	94	97	Based on standard CA fuel mix. Assumptions unchanged from 2018 RTP/SCS

Table 9: Housing and Employment Indicators

Housing and Employment Indicators	Description	Existing (2016)	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)	Scenario E (2046)	Notes
Distance of Housing and Employment from Major Transit Stations	Households located within 1/2 mile of high quality transit stops and centers.	20,155	24,824	33,033	25,866	37,794	29,997	Based on HQTA data provided by SJCOG
	Employment located within 1/2 mile of high quality transit	46,010	51,525	58,920	50,732	64,290	57,752	

Housing and Employment Indicators	Description	Existing (2016)	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)	Scenario E (2046)	Notes
	stops and centers.							
Jobs / Housing Fit	Jobs-housing balance and fit (Jobs/Household)	1.05	1.02	1.02	1.02	1.02	1.02	
Housing Type (Units) (Existing + Growth) Countywide	Total	240,618	320,114	320,066	320,183	320,207	320,174	
	Residential High / Multi-Family (RU2 to RU8)	54,039	85,892	103,582	101,064	99,266	95,613	TOT_MF and TOT_TH
	Mobile Homes & Other (RU9-RU10)	8,373	8,475	8,449	8,475	8,450	8,476	TOT_MH
	Small Lot Single-Family (included in RU1)	17,078	37,869	34,401	33,494	36,142	36,207	TOT_SF_SM
	Conventional Lot Single-Family (included in RU1)	74,493	95,671	85,155	88,169	87,423	89,747	TOT_SF_MD
	Large-Lot Single-Family (included in RU1)	86,635	92,207	88,478	88,981	88,926	90,131	TOT_SF_LRG

Housing and Employment Indicators	Description	Existing (2016)	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)	Scenario E (2046)	Notes
	Single Family Subtotal	178,207	225,746	208,035	210,644	212,492	216,085	

Table 10: Environmental Justice Indicators

Environmental Justice Indicators	Description	Existing (2016)	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)	Scenario E (2046)	Notes
Distance of New Households and Employment from Major Transit Stations. (Growth Only)	Percent of households located within 1/2 mile of high quality transit stops and centers.		7%	17%	8%	25%	13%	Based on EJ file provided by SJCOG
	Percent of employment located within 1/2 mile of high quality transit stops and centers.		10%	22%	7%	31%	19%	
	Percent of households located within 1/2 mile of high quality transit stops and centers. EJ		21%	33%	19%	48%	41%	

Environmental Justice Indicators	Description	Existing (2016)	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)	Scenario E (2046)	Notes
	Percent of employment located within 1/2 mile of high quality transit stops and centers. EJ		17%	33%	15%	44%	36%	
	Percent of households located within 1/2 mile of high quality transit stops and centers. Non-EJ		3%	8%	5%	14%	3%	
	Percent of employment located within 1/2 mile of high quality transit stops and centers. Non-EJ		5%	12%	3%	21%	5%	
	Total		**100%**	**100%**	**100%**	**100%**	**100%**	
Housing Type Growth % (Units) Countywide	Residential High / Multi-Family (RU2 to RU8)		41%	62%	59%	57%	52%	
	Mobile Homes & Other (RU9-RU10)		0%	0%	0%	0%	0%	

Environmental Justice Indicators	Description	Existing (2016)	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)	Scenario E (2046)	Notes
	Small Lot Single-Family (included in RU1)		26%	22%	21%	24%	24%	
	Conventional Lot Single-Family (included in RU1)		26%	14%	17%	16%	19%	
	Large-Lot Single-Family (included in RU1)		7%	3%	3%	3%	5%	
	Single Family Subtotal		59%	38%	41%	43%	48%	
	Total		**17,608**	**29,002**	**14,550**	**22,216**	**21,378**	
Housing Type Growth (Units) Countywide - EJ	Residential High / Multi-Family (RU2 to RU8)		9,013	21,912	9,452	16,323	15,190	
	Mobile Homes & Other (RU9-RU10)		1	0	0	0	1	
	Small Lot Single-Family (included in RU1)		3,645	4,966	2,596	3,978	3,561	
	Conventional Lot Single-		3,876	1,981	2,163	1,742	2,202	

Environmental Justice Indicators	Description	Existing (2016)	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)	Scenario E (2046)	Notes
	Family (included in RU1)							
	Large-Lot Single-Family (included in RU1)		1,073	143	339	173	425	
	Single Family Subtotal		8,595	7,090	5,098	5,893	6,187	
	Total		**63,323**	**51,914**	**65,371**	**58,261**	**59,075**	
Housing Type Growth (Units) Countywide - Non- EJ	Residential High / Multi-Family (RU2 to RU8)		23,905	28,333	37,698	29,226	26,675	
	Mobile Homes & Other (RU9-RU10)		103	102	103	103	103	
	Small Lot Single-Family (included in RU1)		17,211	12,508	13,856	15,183	15,695	
	Conventional Lot Single-Family (included in RU1)		17,457	8,982	11,594	11,404	13,298	
	Large-Lot Single-Family		4,646	1,989	2,119	2,345	3,304	

Environmental Justice Indicators	Description	Existing (2016)	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)	Scenario E (2046)	Notes
	(included in RU1)							
	Single Family Subtotal	39,314	23,479	27,569	28,932	32,297		
	Total		**100%**	**100%**	**100%**	**100%**	**100%**	
	Residential High / Multi-Family (RU2 to RU8)		51%	76%	65%	73%	71%	
	Mobile Homes & Other (RU9-RU10)		0%	0%	0%	0%	0%	
Housing Type Growth % (Units) Countywide - EJ	Small Lot Single-Family (included in RU1)		21%	17%	18%	18%	17%	
	Conventional Lot Single-Family (included in RU1)		22%	7%	15%	8%	10%	
	Large-Lot Single-Family (included in RU1)		6%	0%	2%	1%	2%	
	Single Family Subtotal		49%	24%	35%	27%	29%	

Environmental Justice Indicators	Description	Existing (2016)	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)	Scenario E (2046)	Notes
	Total		**100%**	**100%**	**100%**	**100%**	**100%**	
Housing Type Growth % (Units) Countywide - Non- EJ	Residential High / Multi-Family (RU2 to RU8)		38%	55%	58%	50%	45%	
	Mobile Homes & Other (RU9-RU10)		0%	0%	0%	0%	0%	
	Small Lot Single-Family (included in RU1)		27%	24%	21%	26%	27%	
	Conventional Lot Single-Family (included in RU1)		28%	17%	18%	20%	23%	
	Large-Lot Single-Family (included in RU1)		7%	4%	3%	4%	6%	
	Single Family Subtotal		62%	45%	42%	50%	55%	
New HH Within 500 Feet of Freeway	**Total**		**4,634**	**7,057**	**4,086**	**5,797**	**5,788**	I-580, SR99, SR4, SR120, I-205, I-5
	EJ		939	3,208	806	1,816	2,056	
	Non-EJ		3,695	3,849	3,280	3,981	3,732	

Environmental Justice Indicators	Description	Existing (2016)	Scenario A (2046)	Scenario B (2046)	Scenario C (2046)	Scenario D (2046)	Scenario E (2046)	Notes
New HH Within 500 Feet of Freeway (%)	Total		100%	100%	100%	100%	100%	
	EJ		20%	45%	20%	31%	36%	
	Non-EJ		80%	55%	80%	69%	64%	

Opportunities to Re-Prioritize
SJCOG 2022 RTP Transportation Project List

The purpose of this white paper is to establish criteria by which SJCOG can finalize its RTP project list in a manner that corresponds to the proposed 2050 RTP/SCS land use scenarios and that reflects recent changes to state laws, evolving trends in travel behavior, and its established commitments to State and Federal entities, all in keeping with the region's goals for environmental sustainability, maintaining effective trade corridors, and promoting innovation and technology, growth management, social equity and mobility.

The Draft 2022 SJCOG RTP project list serves as the starting point for proposed adjustments in response to alternative land use and policy packages defined by Cascadia Partners in June 2021. The extent to which each scenario's land use pattern differs from the reference case helps define the types of additional projects or the reorientation of proposed projects that would best support the desired land use/ transportation interactions and broader goals.

In the following sections, we identify types of transportation projects that should be emphasized or deemphasized based on recommended changes to land use allocations relative to the General Plan reference case. For each policy scenario, the amount differences in land use density, type and location indicates the types of transportation projects that could be emphasized (added) or deemphasized (scaled back) relative to the draft project list. These shifts are defined in terms of greater or lesser allocation of funding resources to the general project categories of: freeway mainline, interchanges, regional roadways, rail crossings, bus transit, rail corridor, airports, active transportation, and TCMs.

The remainder of this paper describes our:

A. General Approach

We recommend that, in prioritizing capital projects for the 2022 RTP, SJCOG take into consideration the findings in this study on the extent to which regional VMT and transit use are affected by scenario-specific land use variations, new environmental screening principles, emerging trends in travel, and regional economic and sustainability goals.

Adjustments focus on the broad categories of improvements. Those categories are defined in the draft project list in the following ways.

- **Freeway Mainline.** The draft project list allocates $1.3 billion (17%) of the RTP funding is allocated toward mainline freeway projects. Given the new CEQA attention to induced travel under SB 743, we suggest performing a pre-analysis of projects in the list to determine their potential for induced travel that could lead to needing to scale back or even dropping some of the projects on the list and reallocating the funding to other project categories.

- **Regional Roads and Interchanges.** Local roads, rail crossings and freeway interchanges would receive about $2.0 billion (27%) in the draft RTP projects list. These projects are nominated by the local jurisdictions based on their own modeling of their General Plan traffic impacts. In cities for which alternative land use plans would deemphasize auto-oriented development, it may be possible to scale back some of these capacity needs in favor of orienting funding instead to transit and pedestrian and complete streets-oriented projects.

- **Bus Transit** -- The list includes $2.4 billion for bus related improvements (about 31% of non-maintenance expenditures). The list contains a number of effective concepts for improving bus service within the county, including demand responsive systems, deviated fixed routes, mobility hubs or transfer centers and BRT. Allocations state they're for "costs associated with…" or "costs to support…"   Adjustments to the list emphasize general levels of additional funding to the bus transit category in order to bring either bring greater assurance of timely delivery or possibly expanding the list of such projects, particularly in areas targeted for land use intensification and mix.

- **Rail Corridor** -- The draft SJCOG 2022 RTP project list includes $1.5 billion for ACE rail improvements, or about 20% of the non-maintenance total expenditure plan. Unlike the RTP/SCS Reference Case, the new scenarios under consideration for the 2050 RTP/SCS call for additional land use intensification near ACE stations. Among the new land use concepts, the Commuter Villages scenario focuses greater amounts of new development adjacent to, commuter rail stations suggesting greater emphasis on the RTP list's rail corridor projects.

- **Active Transportation Facilities.** Active transportation projects are allocated $300,000 (4%) in the RTP project list. These projects are generally proposed by the local jurisdictions, reflecting their own assessments of needs and benefits of such improvements. In planning scenarios that intensify development within cities it may be warranted to shift some of the funding from local road widenings to expanding the list of active transportation projects in areas targeted for less auto-oriented land use mixes.

- The RTP allocates $4.3 billion to transportation facility maintenance and operations. We don't propose to adjust the specific needs assessments or amounts.

The general principles listed above were applied in the context of each of the respective land use policy scenarios under study. Within each, the following areas of emphasis guide scenario-driven investments in transportation:

- **Scenario A: Remake Centers and Corridors** -- emphasis on complete streets/ active, access to transit by boosting allocations to bus transit and active through competitive positioning for Federal and State funding and anti-inducement savings on roads.

- **Scenario B: 20-Min Neighborhoods** -- emphasize EV incentives and complete streets/ active investments through competitive positioning and anti-inducement savings on roads.

- **Scenario C: Commuter Villages** – in addition to greater emphasis on rail corridor projects, this concept suggests greater EV and BRT and autonomous transit incentives through competitive positioning and through savings on otherwise travel-inducing roads.

In the sections below, we propose modal emphases based on each scenario's predominant combinations of development type, density and location considering both existing and new development. For a given scenario and its related policies, we suggest shifts in funding emphasis among the RTP project categories: rail corridor, bus transit, mainline and interchanges, regional roads, and active transportation.

B. Scenario and Policy Analysis

In the context of the Cascadia Partners visioning and scenario planning process for the SJCOG 2022 RTP/SCS, the team we have assessed the SJCOG Draft RTP transportation projects list to consider opportunities stemming from:

1. Scenario-specific shifts in land use locations and forms relative to the reference case.
2. Environmental screening in the context of new State laws
3. Regional economic and sustainability commitments
4. Fundamental changes in travel behavior resulting from disruptive forces, emerging technologies, or policies shifts in state and regional policies.

1. Scenario-specific shifts in land use locations and forms relative to the reference case.

Transportation projects that best support infill, compact and transit-oriented development will be better served by transportation projects that emphasize transit investments and complete streets and active modes than would be the case if the same amount of growth were allocated to more remote and car-dependent locations and forms. RTP project categories can be reconsidered on the basis of how well they fit each scenarios envisioned land use in terms of:

- Changes in development to land use types and densities that generate less VMT per capita, and
- Shifts in development location to contexts that are better supported by transit service and infrastructure and more amenable to use of active modes.

On the basis of these two factors, each scenario's land use reallocation relative to the reference case suggests a reallocation of transportation investments toward those that would be more compatible with the scenario's proposed land use distribution. For example, for scenarios proposing lower levels of auto-orientation than the reference case, transportation projects may shift emphasis from freeway interchanges and regional roads to bus transit, rail corridor and active modes.

Cascadia Partners developed three RTP/SCS land use scenarios in June 2021 with the following characteristics:

- **Scenario A - Centers and Corridors** – compared with the incremental housing growth in the Reference Case, Scenario A shifts more than 50% of the region's housing growth from densities less than 10 units per acre to densities of greater than 15 units per acre. It also envisions substantially greater mixed-use development, with three times as many new employees in mixed settings rather than office centers than in the Reference Case.

- **Scenario B - 20 Minute Neighborhoods –** also shifts the majority of new housing into higher density categories, though somewhat less dense than Scenario A. It doubles the jobs allocation to mixed-use settings compared with the Reference Case.

- **Scenario C - Commuter Villages –** has a similar, but slightly moderated, shift to higher densities compared with Scenario A, and a mixed-use jobs allocation between the other two scenarios.

Table 1 shows the effects of the land use shifts on VMT generation per capita for the RTP/SCS growth increment, and Table 2 presents the VMT reduction for the total region, combining the trip-making rates of the existing development patterns and those of the incremental growth. The land use scenarios reduce the incremental rates by about 4% to 6%, and they reduce the regional total VMT generation per capita by between 1% and 2%.

Table 1
SCS Scenario Effects on Regional VMT Generation per Capita – Growth Increment

Scenario	Difference in VMT per Capita versus Reference Case for Growth Increment		
	Residential	Employment	Total
Scenario A Centers and Corridors	-6.1%	-4.1%	-5.7%
Scenario B 20 Min Neighborhoods	-5.4%	-1.8%	-4.1%
Scenario C Commuter Villages	-6.1%	-3.4%	-5.3%

Table 2
SCS Scenario Effects on Regional VMT Generation per Capita – 2050 Regional Totals

Scenario	Difference in VMT per Capita versus Reference Case for Regional Totals		
	Residential	Employment	Total
Scenario A Centers and Corridors	-1.7%	-1.2%	-1.8%
Scenario B 20 Min Neighborhoods	-1.5%	-0.5%	-1.3%
Scenario C Commuter Villages	-1.7%	-1.0%	-1.6%

Another consideration in strengthening the relationship between the SCS land use scenarios and the RTP project list is the degree to which, compared with the Reference Case, the land use scenarios shift development locations to contexts that are better supported by transit service and infrastructure and more amenable to use of active modes.

Each of the three scenarios represents different degrees of emphasis on within areas of suited to higher quality transit service and less oriented toward auto dependence. These include locations within ¼ mile of frequent bus service and locations within ½ mile of rail stations. In addition to these transit walkshed areas, development located along urban arterials have the potential to support and benefit from high quality corridor bus services such as BRT.

Figures 1 and 2 indicate the degrees to which the proposed SCS scenarios shift future development into such transit supportive locations, combining the existing land use with the growth increments to show the total 2050 distribution of land uses. Scenario A, Centers and Corridors and Scenario Commuter Villages both shift notable percentages of future jobs and housing to transit oriented settings near frequent bus services or rail. In both cases, the regional allocation of jobs and housing in 2050 would be 16% more transit oriented than in the Reference Case. Scenario C in particular would place almost 40% more jobs within bus and rail walksheds than would the Reference Case. These shifts could justify greater allocations of RTP project funding toward bus and rail and active transportation projects within these transit opportunity nodes and corridors.

Figure 1
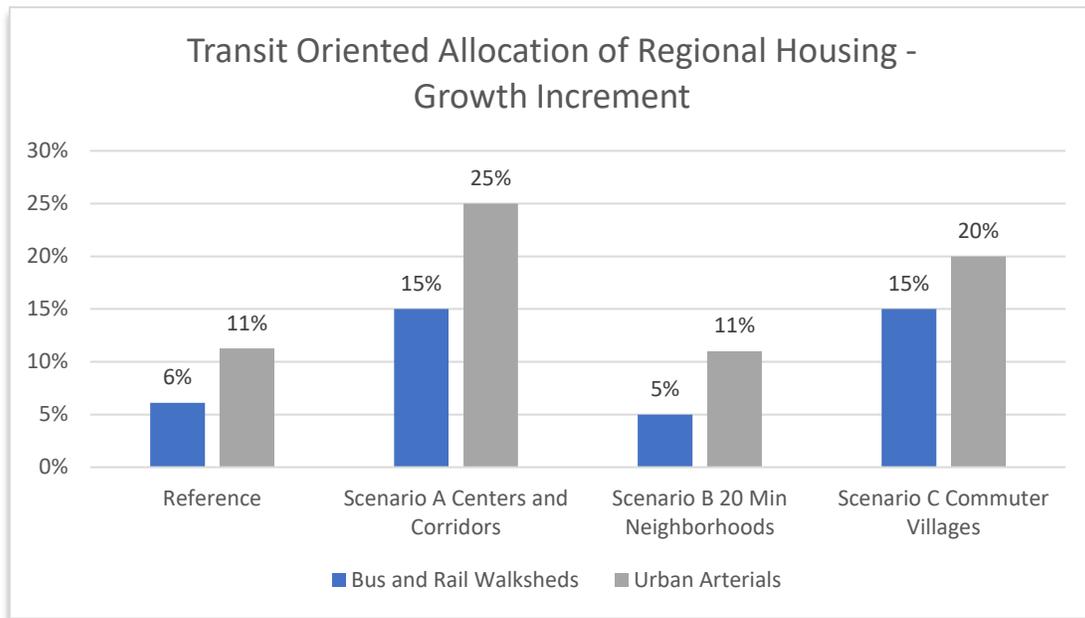**Percentage of Regional Housing Growth in Transit Supportive Locations**

Figure 2
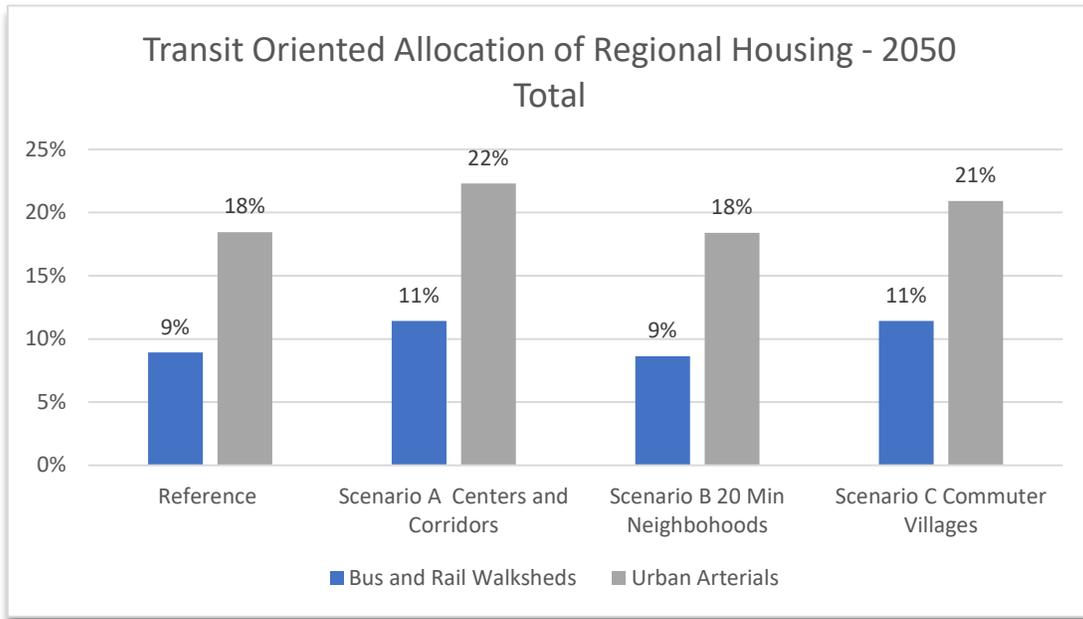**Percentage of Regional 2050 Housing in Transit Supportive Locations**

Transit Oriented Allocation of Regional Housing - 2050 Total

Figure 3
Percentage of Regional Jobs Growth in Transit Supportive Locations

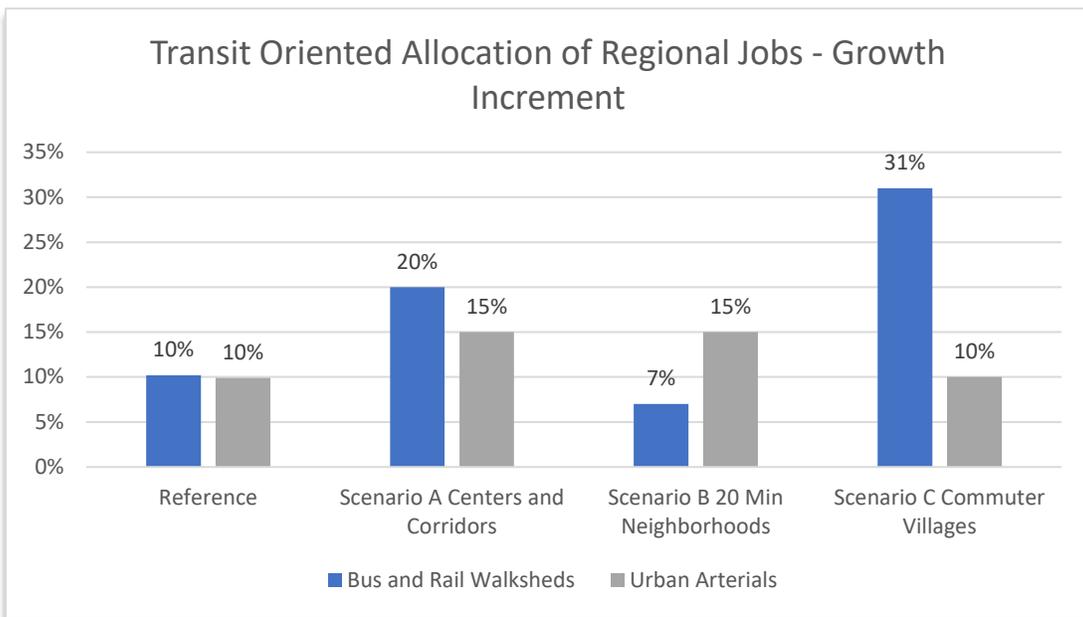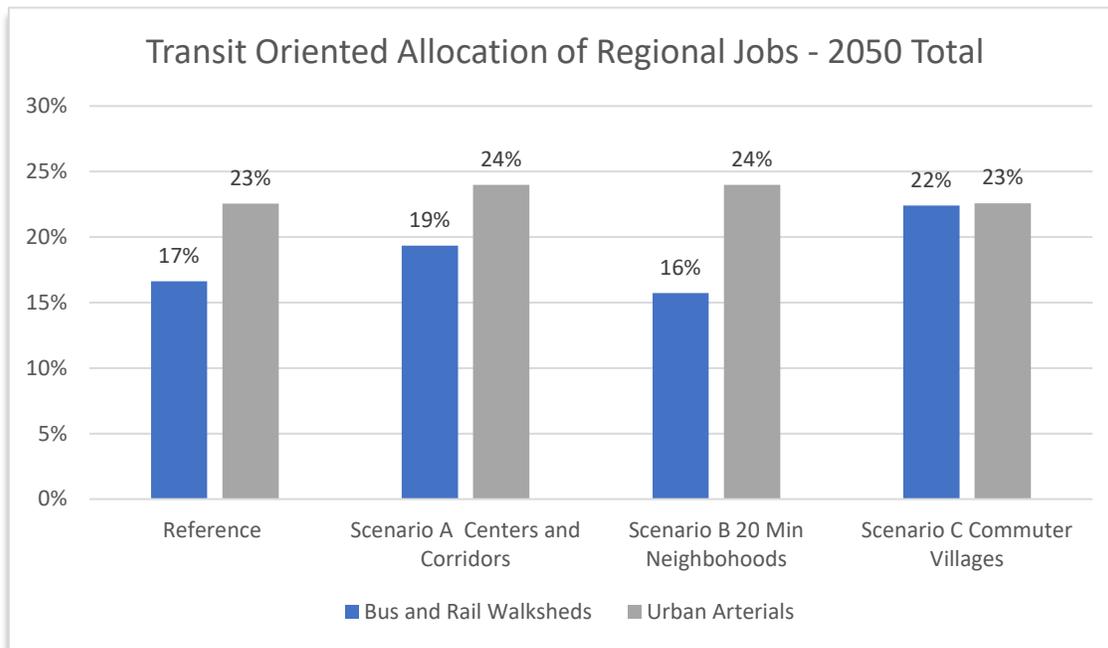Transit Oriented Allocation of Regional Jobs - Growth Increment

Figure 4
Percentage of Regional 2050 Jobs in Transit Supportive Locations

None of the forecast scenarios envision a change to San Joaquin County's overall jobs/housing balance, so VMT reductions are not expected to occur due to reduced long distance commuting to adjacent regions. However, the combined effects of the SCS land use scenarios on travel demand and transportation needs suggest the re-prioritizing some of the funding away from highway and road projects and toward transit and active modes would improve community service, environmental outcomes and cost effectiveness. The scenarios would generate 1% to 2% lower rates of VMT per capita and could place 16% more jobs and housing within transit supportive locations than would the reference case.

2. Environmental screening.

Traditional measures of roadway network performance were based on traffic levels of service criteria which tended to justify road capacity expansion to minimize traffic delay. State laws including SB 375 and SB 743 shift the primary criteria for defining transportation impacts to increases in vehicle miles travelled (VMT). Minimizing and mitigating VMT impacts will affect environmental clearance of both land use development patterns that encourage greater VMT per capita and roadway expansion projects that induced additional travel. In terms of land use patterns, environmental performance of the RTP/SCS policy scenarios will be judged by their ability to reduced VMT relative to State targets and relative to the base year conditions. For transportation projects, those that provide a greater increase in traffic capacity than warranted by the land use projections will generate induced traffic and find it difficult to address their impacts under the new State laws. In some situations, this presents the need and opportunity to scale back traffic capacity expansions and redirect the funding toward VMT reducing transportation projects.

Caltrans, the Governor's Office of Planning and Research and other State agencies are currently developing recommended methods for estimating the amount of additional VMT induced by roadway expansion projects. An extreme but likely recommendation could be that all of the traffic growth ultimately accommodated by a road capacity expansion represents induced travel and, therefore, a negative environmental impact under SB 743. In our estimation, however, some of the strongest research on the subject concludes that the over half of the change is VMT associated with a capacity expansion is attributable already anticipated and planned regional population growth and goods movement and beneficial diversion of traffic from congested to less congested routes[1] [2].

In this context, we recommend that SJCOG be prepared to either justify that its RTP freeway, interchange and roadway expansion projects either do not generate induced development and VMT or that measures that convert of trips served from single-occupant to HOV will mitigate the impacts. Otherwise, SJCOG may have difficulty justifying as much as 40-50% of the added capacity contained in those projects. In the process, a balance might be found that reallocates some of the planned investments in capacity-expanding road and highway projects to alternative mode projects that, together, reduce both VMT and the adverse effects of congestion.

3. Regional economic and sustainability commitments

The region's economic well-being depends on its role as a hub and supporting network for goods movement and logistics. Its future vision rests on the provision of effective trade corridors and business opportunities for innovation and technology balanced with objectives toward growth management and environmental sustainability. San Joaquin COG has identified a series of projects in keeping with those objectives for which it is pursuing federal funding support through its 2021 "One Voice" Federal Legislative Platform. Some of these, along with other commitments, are also contained in the current State Transportation Improvements Program. In addition to preserving the projects proposed in the One Voice initiative, we do not recommend any changes to the RTP project list that would affect projects included in the 2020 Caltrans STIP. These include:

- San Joaquin, Route 99/120 Connector, Phase 1B, $7.9 million.
- San Joaquin, Diamond Grade Separation, $20.8 million
- San Joaquin, Stockton Regional Rail Maintenance Facility Expansion, $15 million
- San Joaquin SJJPA rail 9883 Stockton Diamond Grade Separation
- San Joaquin SJJPA rail 9884 Stockton Regional Rail Maintenance Facility Expansion

Our recommendations also avoid changes to non-transportation projects in the SJCOG OneVoice initiative, such as creek bed improvements, security cameras, community-level broadband. We also do not suggest eliminating projects whose justification in the One Voice initiative is based on benefits to freight movement within and through the county or on the basis of safety issues or that address the One Voice objectives of environmental sustainability, trade corridors, innovation and technology, growth management, social equity and mobility.

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[1] Duranton and Turner, *The Fundamental Law of Road Congestion: Evidence from US Cities*, 2011.
[2] Cervero, *Road Expansion, Urban Growth, and Induced Travel – A Path Analysis*, 2002.

The total costs estimate of projects in the STIP and/or the One Voice proposal is about $1.5 billion or about 20% of the cost of the overall RTP project list.

Table 3
Costs to Deliver 2022 RTP Projects

	Total Cost to Deliver	%	Approx. Total Cost of Projects Included in STIP and/or One Voice*	Cost of Projects **Potentially** Eligible for Re-Prioritization	% of Eligible Costs	% of Total Costs
Mainline	$1,297	17%	$350	$947	16%	13%
Roads, RxR, I/C	$2,046	27%	$560	$1,486	25%	20%
Bus Transit	$2,357	31%	$0	$2,357	39%	31%
Rail	$1,542	20%	$605	$937	16%	12%
Active	$305	4%	$0	$305	5%	4%
Total	**$7,547**	**100%**	**$1,515**	**$6,032**	**100%**	**80%**
% of Total to Deliver			20%			

** Costs are approximate**, as One Voice listing does not always report local matching nor the same project totals as the Draft 2022 project list.

RTP projects that might be de-prioritized due to SCS scenario land use shifts or by their induced travel impacts could include mainline freeway, and local road and interchange projects. Costs eligible for reprioritization represent 16% and 25% of the total eligible RTP project costs, respectively, or 13% and 20% of the total RTP program costs.

The Draft RTP list includes over 100 projects on local roads, railroad crossings and freeway interchanges, often nominated by local jurisdictions based on their assessments of impacts and mitigations associated with their General Plans and/or projects warranted for safety reasons. Whether the land use shifts suggested in the RTP scenarios or the more far-reaching trends in travel choices and behaviors affects these local needs should be addressed on a case-by-case basis.

Mainline projects that might be reprioritized are listed in Table 4 below. However, to the extent that these project address other regional needs, including trade corridor functions, safety projects or projects likely to encourage VMT reduction through greater use of HOVs, these projects may not be good candidates for de-prioritization. Further, projects such as the SR99/120 connector phases 1A and 1C may not be separable from the STIP project for connector phase 1B.

4. Shifting Trends in Travel Behavior

Over the next thirty years, travel choices and behaviors are likely to shift even more radically than during the prior thirty. Just as emergent technologies and generational preferences such as transportation network companies, telecommunications advances and social networking have changed the amounts and modes of travel, so may the sustaining after-effects of the Covid-19 pandemic and the emergence of transportation technologies like autonomous vehicles substantially change travel demand and the need for transportation infrastructure. Covid-19, for example, may have lasting effects on the number of people working from home and relying on home deliveries rather than shopping trips while,

at the same time, reducing travelers' willingness to use transit and other shared modes. Many studies predict that autonomous vehicle availability will increase the daily VMT by removing some of the perceived time-loss associated with traveling greater distances and generating zero-occupant vehicle trips to independently perform certain functions or to avoid the difficulty and cost of parking[3] [4] [5] [6].

Table 4
Candidate 2022 RTP Projects not Included in 2020 STIP or One Voice Initiative

SJCOG Draft 2022 RTP Project List – Mainline Projects not included in STIP or One Voice	
I-5 HOV Mossdale	Widen to add HOV lanes with HOV Connector Ramps to I-205 and SR-120
SR-120	Widen 4 to 6 lanes
SR-99 HOV	Widen 6 to 8 lanes, including reconstruction of SR-99/Main Street and SR-99/Wilma Avenue interchanges and pedestrian overcrossing
SR-99 Widening	Widen 4 to 6 lanes - Environmental Only
I-5 HOV	Widen from 6 to 8 lanes including auxiliary lanes
SR 99/120 Connector Project Phase 1A	Widen the eastbound SR 120 to southbound SR 99 connector ramp from one-lane to two-lanes; Remove the Austin Road overcrossing and replace with a new 4 lane structure spanning SR 99 and UPRR; Add a new connecting road from Austin Road to Woodward Ave and Moffat Blvd and modify the existing UPRR gated crossing at Woodward Ave
SR 99/120 Connector Project Phase 1C	Add braided off ramps from SR 99 and SR 120 to Austin Road; Add loop on ramp from Austin Road to northbound SR 99 and to westbound SR 120; Add auxiliary lane on eastbound SR 120 from Main Street to SR 99; Add an auxiliary lane in each direction on SR 99 from SR 120 to approximately 1.7 mile south of Austin Road and relocate the frontage road.

Two other policy-related shifts that could also potentially influence travel and its impacts are increased adoption of electric vehicles and the adoption of additional road user changes to moderate demand and generate transportation revenue. Most auto manufacturers are entering a transition period toward making EVs their primary offerings in new vehicles starting within the next five to ten years. Under current roadway funding formulae, increased EV adoption will substantially diminish gasoline tax revenues and reduce federal and state funding for transportation. To maintain consistency with past RTPs and with the current practices, our assumptions for this analysis are that these loses are offset by alternative federal and state funding mechanisms such as network tolling or VMT-based road user fees. For purposes of analysis, we assume that the cost of travel per vehicle mile adjusted for inflation does not change and that transportation revenues per vehicle miles do not change over the period between 2022 and 2050.

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[3] UC Davis, *An Naturalistic Experiment to Simulate AV Impacts on Travel Patterns,* 2018

[4] Soteropoulos, Berger and Ciari, *Impacts of Automated Vehicles on Travel Behavior and Land Use: An International Review of Modelling Studies*, 2018.

[5] Cushman & Wakefield, *Mobility Shifts in Commercial Real Estate - Implications of Ridesharing; Autonomous Vehicles; Micro-mobility and Electric Vehicles*, 2019.

[6] Metropolitan Transportation Commission, *Autonomous Vehicles Perspective Pape*r, 2019

The 2050 RTP travel forecasts consider the influence of the potential shifts in travel paradigms listed in Table 5 as possible factors influencing 2050 travel behavior.

Table 5
Emergent Trends Potentially Affecting 2050 Travel

Category	Factor	Low	High
AVs	level of adoption of privately owned fully autonomous vehicles in 2050[7]	5%	50%
Telecommute	percent working from home on average day in 2050[8]	0%	25%
EV	EVs as a percentage of U.S. light-vehicle sales in 2050[9]	60%	90%
Tolling	% increase in VMT pricing relative to today in 2050	Sufficient to offset user cost savings and transportation revenue loss due to EV adoption	

Table 6 presents our forecasts based on published research and generalized modeling of the degree to which these trends could affect 2050 VMT and transit use.

Table 6
Emergent Trends Potentially Affecting 2050 Travel

Change from Existing Rates of Travel	Low Telecommute, Low AV	Low Telecommute, High AV	High Telecommute, Low AV	High Telecommute, High AV
VMT per Capita	+1%	+15%	-24%	-14%
Transit Trips per Capita	-1%	-5%	-25%	-29%

Under these assumptions, transit ridership would decline notably due to reduced daily commuting for those working from home and due to conversion of some transit trips to AV travel as fleets of AVs provide on-demand service at lower cost than presently offered by Uber and Lyft. In most scenarios,

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[7] [Transportation Research Part A: Policy and Practice, 95:49-63 (2017).](#)
[8] [Becker Friedman Institute, Ronzetti Initiative for the Study of Labor Markets: Why Working From Home Will Stick (2021)](#)
[9] [Center for Entrepreneurship and Technology, Electric Vehicles in the United States: A new Model with Forecasts to 2030, 2009](#)

VMT per capita would also decline due to high levels of telecommuting but would be partially offset by high AV trip generation.

C. Conclusions

The analysis above presents estimates of the degrees to which the SJCOG 2022 RTP project list could be influenced by a series of factors not likely to have been fully considered in developing the RTP Reference case and Draft Project List, including:

- Scenario-specific shifts in land use locations and forms relative to the reference case
- Environmental screening in the context of new State laws
- Regional economic and sustainability commitments
- Fundamental changes in travel behavior resulting from disruptive forces, emerging technologies, or policies shifts in state and regional policies.

The findings are:

- The alternative land use scenarios could reduce 2050 regional VMT by 1-2% and shift development patterns to place 16% more jobs and housing within transit-oriented locations than would the reference case. These findings could justify reducing the RTP project funding allocation to VMT accommodating projects and reallocating toward rail, bus and active transportation projects.

- New State laws will require that highway capacity expansions be demonstrated to not induce addition VMT per capita or induce development out of keeping with sustainable communities strategies. National and California studies of induced travel effects indicate that 40% or more of capacity added in new highway and road projects may be induced. SJCOG should anticipate needing to address the issue in environmental documentation and possibly need to scale back some of its RTP highway projects.

- A very rough estimate of the Draft 2022 RTP project list, the 2020 STIP and the SJCOG One Voice initiative suggests that about 13% of the program costs allocated to mainline improvements and about 20% of the costs allocated to roads, rail crossings and interchanges are not fully committed through either of those pledges. Some portion of those amounts could be reallocated to projects more consistent with the selected SCS land use alternative and other factors addressed in this paper.

- Travel behaviors are likely to change over the next thirty years, and the RTP should anticipate needing to reevaluate the appropriate orientation of its resources over the period. While unpredictable, some of the more impactful and likely changes include changes in commuting and telecommuting and the emergence of new transportation technologies. The trend scenarios considered here indicate that these changes are likely to reduce VMT and transit use per capita, although a combination of low telecommuting and high AV use could increase VMT per capita.

Future RTPs will have the opportunity to better assess the potential long-term consequences of telecommuting, autonomous vehicles and other trends affecting travel demand. Until then, the general indications from the other analyses presented above suggest that SJCOG consider reallocating some of its proposed funding for capacity expansions of freeway mainlines, interchanges and local roads to

funding categories supporting rail, bus transit, active transportation and transportation control measures.