URBAN DESIGN 4 HEALTH

2019-2020 San Joaquin County Health Outcome Update & Small Area Focus Studies

TASK 3: South Stockton Promise Zone Alternative Scenario Development

Task 4: Translation of Health Outcome Analysis into Investment Guidance

Master Contract & Task Order #:

- C-18-019, TO#3

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About this Report

Urban Design 4 Health, Inc. (UD4H) prepared this report. UD4H's mission is to support clients with innovative and objective information and tools to achieve health, environmental, economic, and quality of life goals that are intrinsic in efforts to build new communities and to retrofit existing ones. Learn more at www.ud4h.com.

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Eric Fox served as the Project Manager for this study. Eric Fox identified and organized the methodological procedures used, completed data analysis, and was the lead author for this report. Jim Chapman contributed to methodology development, project design, and assisted with the writing of this report. Dr. William Bachman led health outcome model development and calibration. Dr. Larry Frank reviewed the analysis approach and provided critical input and feedback.

Suggested Citation for Health Outcome Update & Small Area Focus Studies:

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This work builds on the original health equity study (C-18-019, #1) completed for SJCOG by UD4H in 2017-2018. UD4H would like to acknowledge Nicole Iroz-Elardo, Principal, UD4H (currently at the University of Arizona, School of Landscape Architecture and Planning) who led the 2017-2018 study, and Jessica Schoner, Lead Analyst & Project Manager, UD4H (currently at Toole Design Group) who managed the National Public Health Assessment Model (NPHAM) version 1.0 analysis for the original study.

Suggested Citation for Original Health Equity Study:

Iroz-Elardo, N, Fox EH, Schoner, J, Chapman J, Frank LD. *Task 3: Public Health Analysis of Draft Scenarios – Final*. Rochester (N.Y.): Urban Design 4 Health; 2018. Contract No.: C-18-019. Supported by the San Joaquin Council of Governments.

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1 Introduction

A growing body of evidence suggests that transportation and land use investments and policies can have broad-reaching implications for population health, access to economic opportunities, and climate change.[1-6] Transportation systems link people with social and health-promoting resources, such as employment, education, food, recreation, social services, and health care.[7-10] Transportation systems influence healthy behaviors such as walking and biking. The resulting health outcomes from increases in physical activity are well documented[11].

Long-range regional transportation planning is informed through modeling of travel demand and land use. There is an increasing demand for these models to be linked to additional analyses to understand the social and health impacts of planned land use and transportation policies and investments. This report describes the current and future conditions of health equity and other social equity goals. These results can be used to inform additional analyses in the Regional Transportation Plan context.

Urban Design 4 Health (UD4H) is under contract to the San Joaquin Council of Governments (SJCOG) to provide assistance related to its 2018 Regional Transportation Plan (RTP)/Sustainable Communities Strategy (SCS) implementation efforts. In a pilot study completed in early 2018, UD4H applied its National Public Health Assessment Model (NPHAM) to San Joaquin County. This was done to analyze the predicted current conditions of estimated public health benefits (e.g., physical activity levels and health outcomes), as well as the built, natural, and social environment metrics used as inputs to calculate those estimated outcome values.[1] Health outcomes were generated for three alternative scenarios (Scenario 1, 2, and 3) developed by SJCOG for the 2018 RTP.[2]

The current analysis used an enhanced version of NPHAM with additional health outcomes to build upon these pilot efforts, and update health outcome estimates for the entire San Joaquin County at the census block group-level. The enhanced NPHAM was applied to the baseline and the alternative scenario (Scenario 2A) that was adopted for the 2018 RTP. The analysis results were prepared in the separate report: *Regional Physical Activity & Health Outcome Update for San Joaquin County*.[3]

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[1] 2018 RTP/SCS SJCOG – Public Health Analysis of Draft Scenarios, 2018.
[2] It is anticipated that these health metrics will be applied for the 2022 RTP/SCS planning efforts underway as of June, 2020.
[3] 2019-2020 San Joaquin County Health Outcome Update & Small Area Focus Studies: Task 2: Regional Physical Activity & Health Outcome Update for San Joaquin County: ***SJCOG_RTP_Stockton_T2_SJC_NPHAM_Findings_Report_06112020_submitted.pdf***

The enhanced version of NPHAM (NPHAM v. 2.0) was also used to analyze the South Stockton Promise Zone (SSPZ) subarea in the City of Stockton. The analysis conducted for this report fulfills the remaining subtasks items for *Task 3: Promise Zone Focused NPHAM 2.0 Sub-Area Analysis*, and *Task 4: Translation of Health Outcome Analysis into Investment Guidance.*[4] This analysis also utilized findings and conclusions, including the identification of three subareas within the SSPZ, from previously performed subtasks -- *Task 3: Promise Zone Focused NPHAM 2.0 Sub-Area Analysis*, and *Task 4: Translation of Health Outcome Analysis into Investment Guidance.*[5]

The NPHAM tool was used to calculate updated health outcomes for baseline (2015) and two newly created alternative scenarios. The sections that follow summarize the findings of the physical activity and health outcome analysis for the SSPZ.

1.1 South Stockton Promise Zone

The South Stockton Promise Zone (SSPZ) is a public, private and non-profit collaborative initiative with the principal aim of "empower[ing] residents to transform their community – to affect the root causes of intergenerational poverty through improvements in safety, education, housing, job creation, economic development, and health."[6] SJCOG is a partner with the Reinvent South Stockton Coalition, which is facilitating a working group interested in focused investments in the SSPZ. The SSPZ has three main objectives:

1. to create awareness and advocate for the strengths/needs of South Stockton,
2. to align long-term strategies and resources to improve South Stockton, and
3. to develop civic engagement structures that will provide South Stockton residents a voice in decision-making.

The SSPZ includes large sections of Downtown Stockton and areas south of the Downtown Core within the municipal limits, as well as the unincorporated area of Kennedy (shown in Figure 1 and Figure 2 in subsequent sections). The borders are defined by Harding Way on the north, SR 99 on the east, Arch Road on the South, and Interstate-5 on the west excluding Weston Ranch, including Conway, SR 4, and Center Street (including the Madison neighborhood). The SSPZ contains a total of 53 census block groups with a total population of just under 77,000 people in 2015[7] comprising just under one-third of Stockton's population.

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[4] 2019 San Joaquin County Health Outcome Update & Small Area Focus Studies: C-18-019 TO3 – Task 3 Scope Expansion: ***SJCOG_UD4H_C-18-019_TO3_Task_3_Scope_Expansion_09182019_submitted.pdf***

[5] Task 3: South Stockton Promise Zone Subarea Analysis & Task 4: Translation of Health Outcome Analysis into Investment Guidance: ***SJCOG_RTP_Stockton_T3_T4_SSPZ_Subarea_Analysis_09262019_submitted.pdf***

[6] South Stockton Promise Zone Plan, City of Stockton, 2016.

[7] 2015 American Community Survey 5-Year Estimate, U.S. Census Bureau, 2015.

Three geographic areas were examined for the 2018 RTP and were used again for the Task 2 San Joaquin County report on updated health outcomes.[8] These included the CalEnviroScreen defined disadvantaged communities developed by the California Environmental Protection Agency, areas of concentrated people of color populations referred to here as concentrated minorities, and areas of concentrated poverty. Each is described in more detail below.

CalEnviroScreen[9] provides an index of disadvantaged communities. The 207 census block groups (CBGs) in San Joaquin County that rank within the top quartile of all California CBGs were flagged for analysis.

Concentrations of Minorities are located using the American Community Survey (2015, 5-year estimate, B03002 dataset) to identify census tracts where at least 75% of a census block group's population consists of races and ethnicities, which are not non-Hispanic White. Within San Joaquin County, 136 CBGs meet the threshold and are defined as areas of concentrated minority populations.

Concentrated Poverty locations are identified using the American Community Survey (2015, 5-year estimate, S1701 dataset). Census tracts were used where 30% or more of the population is identified as having an income "below the federal poverty level." A total of 31 census tracts in the County meet the 30% threshold, resulting in 89 block groups being defined as areas of concentrated poverty.

Every block group within the SSPZ is in one of the three environmental justice (EJ) indicators (Table 1). The SSPZ has a much higher number of CBGs with concentrated poverty (83%) in contrast to the City of Stockton (42%) and the County (22.5%). These relative differences are also present for CBG's with high concentrations of people of color within the SSPZ (96%), 57% for Stockton, and 34% countywide.

[8] 2019-2020 San Joaquin County Health Outcome Update & Small Area Focus Studies: Task 2: Regional Physical Activity & Health Outcome Update for San Joaquin County: ***SJCOG_RTP_Stockton_T2_SJC_NPHAM_Findings_Report_06112020_submitted.pdf***

[9] https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30

Table 1: Summary of block group level EJ indicators across the County, Stockton, and the SSPZ.

EJ Indicator	*Block Group Count (%)*		
	San Joaquin County	*City of Stockton*	*SSPZ*
CalEnviroScreen	207 of 395 (52.4%)	104 of 169 (61.5%)	53 of 53 (100.0%)
Concentration of Minority Population	136 of 395 (34.4%)	97 of 169 (57.4%)	51 of 53 (96.2%)
Concentrated Poverty	89 of 395 (22.5%)	71 of 169 (42.0%)	44 of 53 (83.0%)
CalEnviroScreen or Concentration of Minority Population or Concentrated Poverty	234 of 395 (59.2%)	124 of 169 (73.4%)	53 of 53 (100.0%)

2 Methodology

2.1 SJCOG 2018 RTP

Long-range scenario planning efforts compare different land use and investment strategies. In 2017, SJCOG started with four alternative development scenarios. The health effects of three of them were investigated during the development of the 2018 RTP: Scenarios 1, 2A, and 3. Walkability, physical activity, and health are best supported by compact design.

The final 2018 RTP adopted the Scenario 2A alternative, which was the focus of the updated countywide analysis.[10] This analysis aligns directly with the temporal periods used for the 2018 RTP, with baseline indicating outcomes in 2015 and the future scenario corresponding to a 20-year horizon (2035). The sections that follow review the development of two new alternative scenarios for the SSPZ subarea only.

2.2 2019-2020 SSPZ Scenario Development

The creation of two new scenarios used a methodology consistent with the 2018 RTP/SCS to create new development type characteristics and to locate them in the SSPZ. The development placetypes used for Scenario 1, 2A and 3 to assign expected or forecasted land use change, served as the foundation for updated placetypes created to prepare the two new alternative scenarios (Scenario 4 and 5).

Scenario 4 is focused on an increase in residential, commercial, and mixed-use density. Scenario 5 follows the same trends as Scenario 4 but applies an even greater increase in density across the placetypes. Scenario 4 (denser than baseline) serves as a moderate increase in density. Scenario 5 (densest) presents an even larger increase in density

[10] 2019-2020 San Joaquin County Health Outcome Update & Small Area Focus Studies: Task 2: Regional Physical Activity & Health Outcome Update for San Joaquin County: ***SJCOG_RTP_Stockton_T2_SJC_NPHAM_Findings_Report_06112020_submitted.pdf***

compared to what was created for the 2018 RTP /SCS. The inclusion of new, denser placetypes in the alternative scenarios for the SSPZ allows for an investigation of how more intensive and compact development, as well as mixed land uses, may produce more positive health outcomes in the future.

2.3 Change by Development Type & Building Mixture

There were two primary steps to develop scenarios with different land uses. The first was by adding new development types or placetypes to the "palette" available to "paint" potential future changes. The second was by changing the placetypes assigned to a parcel or hybrid grid in the SSPZ to a different kind.

Different placetypes have different building mixtures, densities, and development rates on greenfield land and redevelopment rates on existing developed land. Greenfield land development is building on previously undeveloped land, such as forest, agricultural land, open space, or vacant land. The redevelopment rate is a ratio of new development to previously existing development that remains unchanged. The redevelopment rate may be different for each placetype and reflects the likelihood or ease at which redevelopment may take place.

Eighteen original placetypes were used for the 2018 RTP/SCS's three alternative scenarios. Nine new development placetypes were created and used for Scenarios 4 and 5. The vast majority of all SSPZ parcels that changed in Scenario 1 (84.0%), Scenario 2A (80.0%), and Scenario 3 (94.1%), were also changed in Scenario 4 and 5. The remaining parcels not covered by the new development placetypes in Scenario 4 and 5 received the same placetype used in Scenario 2A in the original 2018 RTP/SCS development.

Table 2 summarizes the residential and commercial building mixture for each of the nine updated development placetypes used for Scenario 4 and 5. The building mixtures for residential and commercial align with the building mixtures previously used to develop Scenarios 1, 2, and 3. Among the nine development types, four are residential only, one is commercial only, and four are a mixture of residential and commercial. Redevelopment rates remained unchanged from the 2018 RTP placetype assignments. The two downtown placetypes have the highest redevelopment rates at over 20%. The *Mixed-Use Corridor*'s rate is 15%. The average redevelopment rate for all development placetypes is 11%.

Table 2: Updated development placetypes with residential and commercial building mixture used for Scenario 4 and 5.

#	*Development Placetype*	*Building Mixture*		*Building Total*	*Redevelopment Rate*
		Residential	*Commercial*		
1	Downtown Residential	90%	10%	100%	21%
2	Downtown	25%	75%	100%	23%
3	Compact Neighborhood High	100%	0%	100%	6%
4	Compact Neighborhood Low	100%	0%	100%	5%
5	Mixed-Use Corridor	30%	70%	100%	15%
6	Town Neighborhood	75%	25%	100%	8%
7	Suburban Multifamily	100%	0%	100%	10%
8	Suburban Residential	100%	0%	100%	3%
9	Office Park	0%	100%	100%	4%

2.4 Change by Geography

In addition to changes in development placetypes for the alternative Scenarios 4 and 5, the level of growth in a given location in population, housing units and jobs from development were determined by the spatial distribution of anticipated change. The spatial distribution of this new development included both the number of parcels or grids that were changing and determining which were being left. As a result of the considerable effort made by SJCOG to decide which parcels changed and to what development placetype (as compared to baseline) for the 2018 RTP/SCS's scenarios those same parcels/grids were the ones to which updated Scenario 4 and 5 placetypes were applied, with a limited number of exceptions confined to Catalytic Investment Opportunity parcels, which are explained below.

2.4.1 Economic Opportunity Zones

In addition to the previously identified parcels/grids as part of the 2018 RTP/SCS development, placetypes were also applied to all parcels in the SSPZ identified as "Catalytic Investment Opportunities" by the City of Stockton within federally designated "Opportunity Zones."[11] These parcels have been identified by Stockton's Economic Development Department to guide and encourage investment in these targeted areas.[12] More information and details on these areas were provided in previously submitted deliverables (*Task 3: South Stockton Promise Zone Subarea Analysis* and *Task 4: Translation of Health Outcome Analysis into Investment Guidance*).[13]

The majority (61 of 71 parcels or 85.9%) of identified Catalytic Investment Opportunity (CIO) parcels in the SSPZ were already assigned a future development placetype as part

[11] Opportunity Zone Overview, Internal Revenue Service, 2018.
[12] Opportunity Zones Prospectus, City of Stockton, 2019.
[13] ***SJCOG_RTP_Stockton_T3_T4_SSPZ_Subarea_Analysis_09262019_submitted.pdf***

of the 2018 RTP/SCS. The remaining ten parcels were assigned one for Scenarios 4 and 5. This mostly included parcels along the Airport Way Corridor, such as Windstone Village and the Grand View Village project in Downtown Stockton (Figure 1). The University Park project includes almost all of the Stanislaus State Stockton Campus area slated for a variety of mixed-use development aimed at supporting the campus through residential and commercial land use. Based on guidance from University Park master plan documents[14] and the Stanislaus State Stockton Campus Five-Year Strategic Plan: 2018-2023,[15] a combination of *Lower Educational*, *Office Park,* and *Mixed-Use Corridor* development placetypes were applied to the campus.

[14] University Park Master Development Plan, City of Stockton, 2003.
[15] Five-Year Strategic Plan: 2018-2023, Stanislaus State Stockton Campus, 2018.

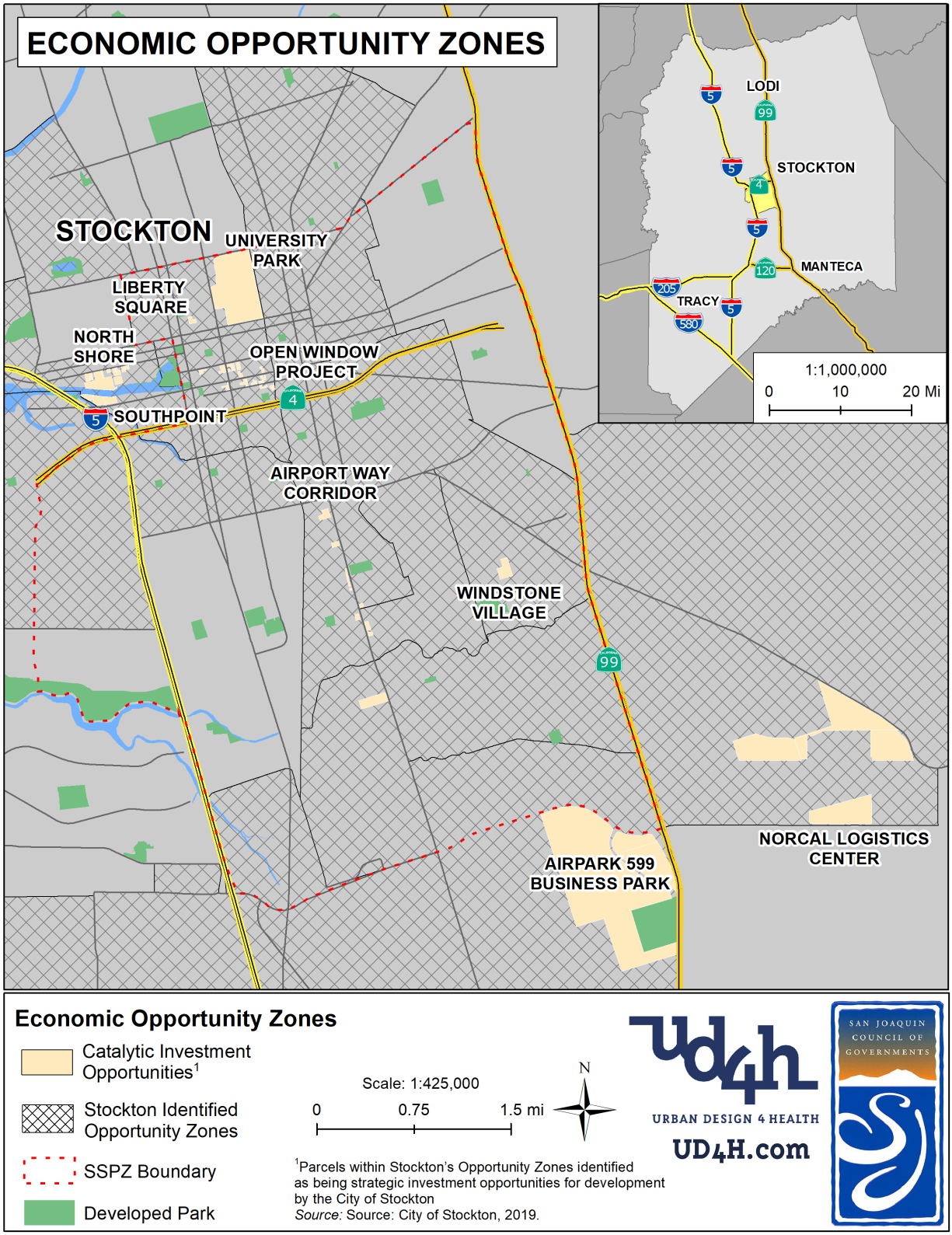

Figure 1: Map showing Catalytic Investment Opportunity parcels within the SSPZ that provide incentives for private investment in these economic opportunity zones.

2.5 Identification of Target Subareas for Investment Priorities

Multiple criteria were used to select the following three subareas for investment: Subareas A, B, and C.[16] The selected areas represent neighborhoods within the SSPZ which overlap with areas of high traffic crashes, reduced public transportation access, limited bicycle facilities, high population growth, decreased access to developed parks, and are economic opportunity zones. Table 3 provides a summary of the elements used in this analysis as they align with each of the identified subareas.

These selected subareas comprise one or more key commercial corridors along a major arterial and also encompass surrounding residential areas. The boundaries of the subareas align with larger arterials and collector roads, in addition to major industrial facilities and natural features such as rivers. All subarea boundaries are within the City of Stockton jurisdiction. The eastern edge of Subarea A shares a nearby boundary with the western edges of Kennedy. These identified subareas are locations to prioritize for future RTP planning efforts and alternative future growth scenarios. The sections that follow describe the findings of each of the analyses presented above for these locations.

Figure 2 shows the selected areas within the SSPZ context. Subarea A is bounded by Charter Way/Dr. Martin Luther King Jr. (north), with the Union Pacific Stockton Yard (west), Ralph Avenue (south), and the eastern border being the north side entrance of Stockton Dirt Track, and continuing south on Schribner St and then Bieghle St. connecting with Ralph Ave. Subarea B is bounded by Weber Ave. (south), Wilson Way (east), E. Harding Way (north), and California St. (west). Subarea C is near the El Dorado Corridor, bounded by Lafayette St. (north), just south of the Crosstown Freeway (SR 4), California St. (east), Madison St. (west), and Charter Way/Dr. Martin Luther King Jr. (south). Together the subareas comprise 14 block groups in the SSPZ: 1) Subarea A (n=4), 2) Subarea B (n=4), and 3) Subarea C (n =6).[17]

[16] Task 3: South Stockton Promise Zone Subarea Analysis & Task 4: Translation of Health Outcome Analysis into Investment Guidance:
SJCOG_RTP_Stockton_T3_T4_SSPZ_Subarea_Analysis_09262019_submitted.pdf

[17] Subarea block groups were determined by identifying those block groups that contained at least 15% of their total area within the limits of each subarea.

Table 3: Summary of the spatial overlap of analysis elements with the three targeted subareas within the SSPZ.

Element of Analysis	*Subarea A*	*Subarea B*	*Subarea C*
Traffic Safety	• Traffic hotspots within boundaries not statistically significant • Boundaries are surrounded by 3 of the 14 key high traffic crash sites	• One of the highest concentrations of traffic hotspots for all traffic crashes and non-motorized traffic crashes only • 4 of the 14 key high traffic crash sites within boundaries	• Traffic crashes tend to cluster, but to a slightly lesser extent than Subarea B • 3 of the 14 key high traffic crash sites within boundaries • Boundary also surrounded by another of the 14 key high traffic crash sites
Infrastructure Conditions	1 nearby high traffic crash intersection shows low (<3/7) intersection safety scores	25% (1 of 4) of the high crash intersections showed a moderate (5/7) intersection safety score, while the remaining 75% (3 of 4) exhibited low (<3/7) intersection safety scores	3 high traffic crash intersections indicated low (<3/7) intersection safety scores
Population Growth	The forecasted population changes for 2035 estimate that some areas will have slight increases; while some areas are expected to experience minimal growth or slightly negative population change	The greatest percent of RTP forecasted population changes for 2035 (+0.8% - +2.5%) in the SSPZ	Slight increases (between +0.0% and +0.3%) of RTP forecasted population changes for 2035
Land Use Characteristics	Low employment density	Relatively high employment density	Moderate-low employment density
Transportation Access & Infrastructure	• Includes one of the three identified gaps in bicycle infrastructure • Two key gaps in bicycle facilities surround the southeastern borders • Low frequency of transit service	• Frequency of transit service is relatively high	• Frequency of transit service is relatively high
Green Infrastructure	• Two parks within the area boundaries, • Some parcels that require a ≥20-minute walk to a park • 2 large areas of vacant parcels and is less connected to park facilities than Subarea B and Subarea C	• One park within boundaries, and three nearby • Parcels in the northeast corner require a 20-minute walk to reach the nearest developed park	• Four developed parks within Subarea C boundaries • All parcels are within a 10-minute walk to a park
Economic Opportunity Zones	• Located within an Opportunity Zone • Catalytic Investment Opportunities: Airport Way Corridor	• Located within an Opportunity Zone • Catalytic Investment Opportunities: University Park, Open Window Project	• Located within an Opportunity Zone • Catalytic Investment Opportunities: None

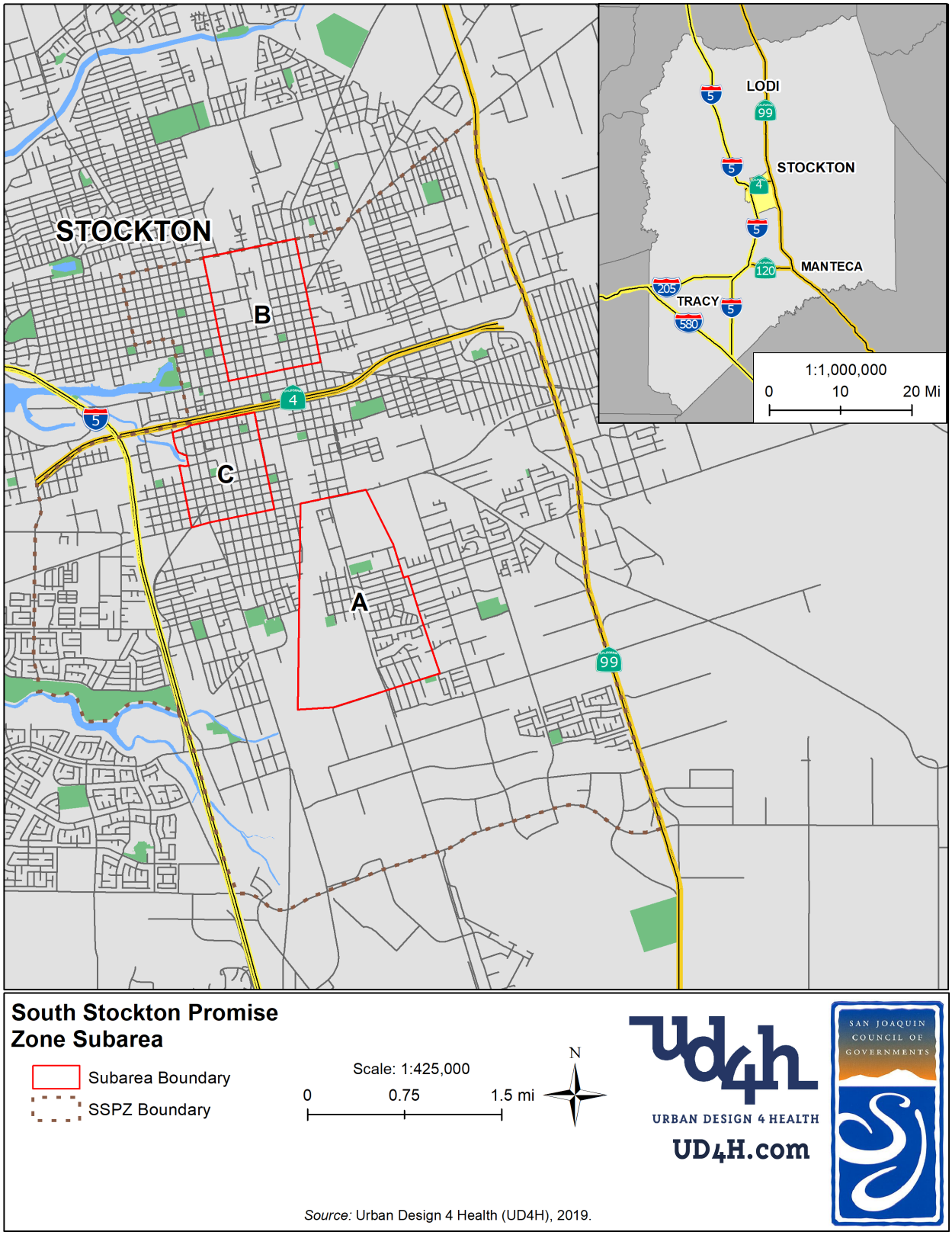

Figure 2: Map showing the Subarea A, Subarea B, and Subarea C boundaries in the SSPZ.

2.6 Scenario 4 & 5 Land Use Development

The updated scenarios for the SSPZ provided a significant increase in the density and intensity of development as an aspirational outlook for what a future South Stockton could look like in 2035. Scenario 4 applied a substantially increased density for both residential and commercial building types beyond what was forecasted as part of the 2018 RTP/SCS for Scenario 2 or 3. Development placetypes for both scenarios were only modified for those parcels or grids located within the SSPZ. Redevelopment rates used for the development of Scenarios 1, 2, and 3 for the 2018 RTP/SCS remained unchanged.

Creating the new scenarios involved working at the parcel or grid level and shifting the percentage of building types from single family to low and medium density multi-family. Low and medium density multi-family was shifted to high density multi-family and mixed-use residential. Scenarios 4 and 5 increased the percentage of mixed-use residential land use for 15-story, 5-story, and less than 5-story buildings for *Downtown Residential*, *Downtown*, *Mixed-Use Corridor*, *Town Neighborhood* and *Suburban Multifamily* placetypes.

Table 16 in Appendix A (Table 18 in Appendix B for Scenario 5) provides a summary of the residential building mixture characteristics used for Scenario 4. Table 17 in Appendix A (Table 19 in Appendix B for Scenario 5) provides a summary of the commercial building mixture characteristics used for Scenario 4.

Table 4 shows an estimated forecast of the main demographic and employment descriptives for Scenarios 4 and 5. The total population increased by approximately 32% to nearly 100,000 people in Scenario 4. The total population increased by about 38,000 people to just over 112,000 in Scenario 5. Multi-family units increased by over 10,000 units in Scenario 4 and over 17,000 units in Scenario 5. These changes increased their percentage of total housing unit stock from 27% in 2015 to 45% and 64% for Scenario 4 and 5, respectively. Due to commercial and mixed-used development placetypes being heavily geared toward retail and office jobs, there were large increases in both Scenario 4 and 5. Office jobs increased from 20% of jobs in 2015 to 40% and 46% of jobs in Scenario 4 and 5, respectively. Similarly, retail jobs increased by nearly 4,000 (+150%) in Scenario 4 and 5,600 (+214%) in Scenario 5, increasing their share of total jobs from 8% in baseline to 13% (Scenario 4) and 14% (Scenario 5).

Table 4: Estimated demographic and employment characteristics for the two new development scenarios in the SSPZ.

Variable	*Baseline (2015)*	*Percent (%)*	*Scenario 4 (2035)*				*Scenario 5 (2035)*			
			Change	*Total*	*Change (%)*	*Component (%)*	*Change*	*Total*	*Change (%)*	*Component (%)*
Demographics										
Population	75,512	100%	+24,282	99,793	+32%	—	+37,660	112,219	+49%	—
Households	21,460	100%	+11,829	33,290	+55%	—	+18,464	39,515	+84%	—
Multi-Family Units	6,652	27%	+10,257	16,908	+154%	45%	+17,454	23,695	+256%	64%
Single-Family Units	16,389	67%	+810	17,199	+5%	46%	+505	16,796	+2%	45%
Townhouse Units	1,282	5%	+1,534	2,816	+120%	8%	+1,694	2,948	+130%	8%
Other Units	317	1%	0	317	0%	1%	0	317	0%	1%
Housing Units	24,639	100%	+12,601	37,241	+51%	100%	+19,653	43,757	+78%	117%
Employment										
Retail Jobs	2,603	8%	+3,825	6,428	+147%	13%	+5,642	8,177	+214%	14%
Office Jobs	6,423	20%	+13,921	20,345	+217%	40%	+21,016	27,080	+322%	46%
Industrial Jobs	10,479	32%	+173	10,652	+2%	21%	+173	10,558	+1%	18%
Other Jobs*	13,347	41%	0	13,347	0%	26%	0	13,347	0%	23%
Total Jobs	32,852	100%	+17,919	50,771	+55%	100%	+26,830	58,655	+79%	100%
Total Workers†	23,918	100%	+9,484	33,403	+40%	100%	+14,710	38,341	+60%	100%

* "Other jobs" include public jobs, education jobs, and other employment. The placetypes used to indicate land use and employment changes in Scenarios 4 and 5 did not impact these job types; therefore, their count is held constant from baseline to 2035.

† "Workers" denote the home residence location of the total population that is employed.

Table 5 shows the dispersion of new development placetypes by parcel/grid hybrid across each of the three subareas for Scenarios 4 and 5. Nearly all of the new development in Subarea A was low-density residential development based on the use of the following placetypes -- *Compact Neighborhood Low* to the east of Airport Way with some moderate density *Mixed-Use Corridor* and *Town Neighborhood* along the west side of Airport Way. Subarea B dedicated more than half of the changed parcels/grids to high density *Downtown Residential* and *Downtown*, as well as *Mixed-Use Corridor* and *Town Neighborhood* along the Airport Way and Wilson Way corridors. Residential uses dominated Subarea C (*Compact Neighborhood Low* and *Compact Neighborhood High* comprised 71% and 9% of new parcels/grids respectively), as well as some *Downtown Residential* (11%) and *Town Neighborhood* (8%) along the Charter Way/Dr. Martin Luther King Jr. Blvd. commercial corridor.

Table 5: Summary of parcels/grid development placetypes used for Scenario 4 and 5 by subarea in the SSPZ.

#	*Development Placetype*	*New Parcels/Grids with Development Placetypes*				
		Subarea A	*Subarea B*	*Subarea C*	*Non-Subareas*	*Total SSPZ*
		N (%)	*N (%)*	*N (%)*	*N (%)*	*N*
1	Downtown Residential	0 (0.0%)	391 (42.8%)	94 (10.3%)	429 (46.9%)	914
2	Downtown	0 (0.0%)	60 (41.1%)	0 (0.0%)	86 (58.6%)	146
3	Compact Neighborhood High	0 (0.0%)	140 (8.4%)	80 (4.8%)	1,447 (86.8%)	1,667
4	Compact Neighborhood Low	531 (31.9%)	0 (0.0%)	624 (37.5%)	507 (30.5%)	1,662
5	Mixed-Use Corridor	18 (2.9%)	195 (31.1%)	17 (2.7%)	397 (63.3%)	627
6	Town Neighborhood	6 (1.3%)	87 (19.2%)	70(15.5%)	289 (63.9%)	452
7	Suburban Multifamily	0 (0.0%)	0 (0.0%)	0 (0.0%)	42 (100.0%)	42
8	Suburban Residential	0 (0.0%)	0 (0.0%)	0 (0.0%)	108 (100.0%)	108
9	Office Park	0 (0.0%)	6 (15.0%)	0 (0.0%)	34 (85.0%)	40
Total		555	879	885	3,339	5,658

3 Application of the Updated Alternative Scenarios

3.1 Demographic & Environmental Inputs to NPHAM

Since the initial 2017-2018 pilot application of the National Public Health Assessment Model (NPHAM) version 1 tool in San Joaquin County, UD4H has updated its health outcome metrics. This was done with support from the U.S. Environmental Protection Agency. As part of the model improvement process, there were modifications to the demographic and environmental variables required as model inputs. These changes to input variables were determined based on an enhanced analysis of health and transportation survey data and through direction provided by the NPHAM technical advisory panel.

Table 6 shows the NPHAM version 2 demographic and built environment inputs and the expected type of change to occur in the 2035 scenario development. Sources of expected changes included the presence/absence and density of different types of developments and land uses at the parcel/grid level. In addition, other sources of expected changes included assumptions based on an existing trend or a direction outlined in plans or policy. These assumptions were made depending on data availability for each variable.

The first set of variables shown in the table (rows 1 – 11) are the individual input demographic and built environment measures used for NPHAM version 1 for the initial pilot study. These same variables were used for several different health outcomes for NPHAM version 2. One of the most important changes to the input variables for NPHAM version 2 was the creation of a series of index or composite variables comprised of the combination of several individual variables. Five new composite indices were developed to include core components of the built and natural environment: 1) density index, 2) destination index, 3) transit index, 4) park index, and 5) the bicycle/pedestrian index.

Based on the changes in Scenario 4 and 5, as compared to baseline, the last column in Table 6 shows the expected change for the NPHAM inputs to the indices.

Table 6: NPHAM version 1 and 2 demographic and built environment inputs.

Type	*Index*	*Variable*	*NPHAM Version 1*	*NPHAM Version 2*	*SSPZ Relevant **	*Expected Change Type***
Demographics		Total Population	✓	✓	✓	Increase, Derived
		Total households	✓	✓	✓	Increase, Derived
		Average household size	✓	✓	✓	Increase, Derived
		Total employees (jobs)	✓	✓	✓	Increase, Derived
		Total workers (employed residents)	✓	✓	✓	Increase, Derived
		Percent of low-income households	✓	✓	✓	No Change
Built Environment		Population density (population/acre)	✓	✓	✓	Increase, Derived
		Employment density	✓	✓	✓	Increase, Derived
		Retail density	✓	✓	✓	Increase, Derived
		Employment mix (5-tiers)	✓	✓	✓	Increase, Derived
		Intersection density	✓	✓	–	No Change
	Density	Gross population density (people/acre) on unprotected land	–	✓	✓	Increase, Derived
		Total road network density	–	✓	–	No Change
		Street intersection density (weighted, auto-oriented intersections eliminated)	–	✓	–	No Change
		Gross employment density (jobs/acre) on unprotected land	–	✓	✓	Increase, Derived
	Destination	Trip productions and trip attractions equilibrium index; the closer to one, the more balanced the trip making	–	✓	✓	Increase, Derived
		8-tier employment entropy (denominator set to the static 8 employment types in the CBG)	–	✓	✓	Increase, Derived
		Gross retail (8-tier) employment density (jobs/acre) on unprotected land	–	✓	✓	Increase, Derived
	Transit	Proportion of CBG employment within ¼ mile of fixed-guideway transit stop	–	✓	✓	Increase, Derived
		Proportion of CBG employment within ½ mile of fixed-guideway transit stop	–	✓	✓	Increase, Derived
		Unbuffered rail station (any type) count	–	✓	–	No Change
		Unbuffered rail station (any type) gross density using sausage	–	✓	–	No Change

		buffer as the denominator				
		Aggregate frequency of transit service within 0.25 miles of block group boundary per hour during evening peak period	_	✓	✓	Increase, Assumed
		Aggregate frequency of transit service per square mile	_	✓	✓	Increase, Assumed
		Distance from population-weighted centroid to nearest transit stop (meters)	_	✓	✓	Increase, Assumed
	Park	Gross density of any active park (developed park) within a block group population center 1km network buffers. "Solid surface" sausage buffer area used as the denominator.	_	✓	✓	Increase, Derived
		Unbuffered percent tree canopy coverage	_	✓	✓	Increase, Assumed
		Unbuffered percent forest	_	✓	_	No Change
		Unbuffered percent natural land cover	_	✓	_	No Change
	Bicycle/ Pedestrian	Unbuffered sum line segment length (m) for all bike infrastructure types	_	✓	✓	Increase, Derived
		Buffered bike-share facility count	_	✓	✓	Increase, Derived
		Buffered NHTSA pedestrian/bicyclist-involved fatal traffic crash rate per 1,000 persons	_	✓	_	No Change
		Unbuffered FBI violent crime rate per 100,000 persons	_	✓	_	No Change

* Denotes whether these elements are relevant in any meaningful way to the SSPZ. A "✓"indicates it is relevant.

** Denotes the type of change expected: 1) "No Change" -- no or limited change expected (a change in the future scenario may occur, but no data are available to make informed assumptions about this change), 2) "Increase, Derived" -- an increase change positively associated with health is expected and is derived directly from changes in built environment data through the scenarios, 3) "Increased, Assumed" -- an increase change is expected, but is only assumed with an increase factor applied to baseline conditions due to a lack of built environment data.

4 SSPZ-Level Results

4.1 NPHAM Travel Behavior Estimates for Scenario 4 & 5

This section describes the population-weighted average predicted travel and physical activity behaviors for both Scenario 4 and 5 for the SSPZ. These variables are presented for both physical activity duration in minutes and percent of participation for each type. Figure 3 provides a choropleth map illustrating daily minutes of walking for transportation for Scenario 4 (2035) in the SSPZ. It shows the highest level of duration minutes (2.5 minutes or more per day) in Downtown Stockton with other high levels along the Charter Way/Dr. Martin Luther King Jr. Blvd. corridor.

For all physical activity measures evaluated except weekly minutes of recreational physical activity, both Scenario 4 and 5 produced improved health outcomes in 2035 in comparison to the baseline (2015). For all measures, Scenario 5 performed slightly better than Scenario 4 in terms of generating improved health outcomes in the future. These results were anticipated, given the fact that non-land use driven demographic and built environment measures remained constant between Scenario 4 and 5. Scenario 5 has a denser urban form for both residential and commercial environments. Holding some variables constant is useful to be able to evaluate the direct impacts of development placetypes with higher density.

Table 7 summarizes the weighted mean values and changes in baseline and predicted future measures for all census block groups in the SSPZ. Changes are color-coded to indicate a healthy direction in population health (green) or an unhealthy direction (red).

Highlights include:

- **Walking Behavior –** Scenario 4 and 5 were predicted to produce significant increases for duration and percentage participation in transportation walking. Daily minutes of walking for transport increased by around 25% to an average of nearly 2 minutes for both scenarios. Even higher increases were exhibited in participation in transportation walking (Scenario 4: +35%; Scenario 5: +40%). Leisure walking increased slightly in duration (Scenario 4: 3.8%; Scenario 5: 4.3%) and even less in participation (Scenario 4: 1.2%; Scenario 5: 1.4%).
- **Bicycling Behavior –** Both scenarios generated a large increase in participation in bicycling for transportation (Scenario 4: +45%; Scenario 5: +50%) and slight increases in daily minutes of transportation bicycling of 2.6% and 2.8% respectively.

- **Recreational Behavior –** While recreational physical activity duration per week declined slightly for both scenarios, participation increased 19.6% for Scenario 4 and 20.8% for Scenario 5.

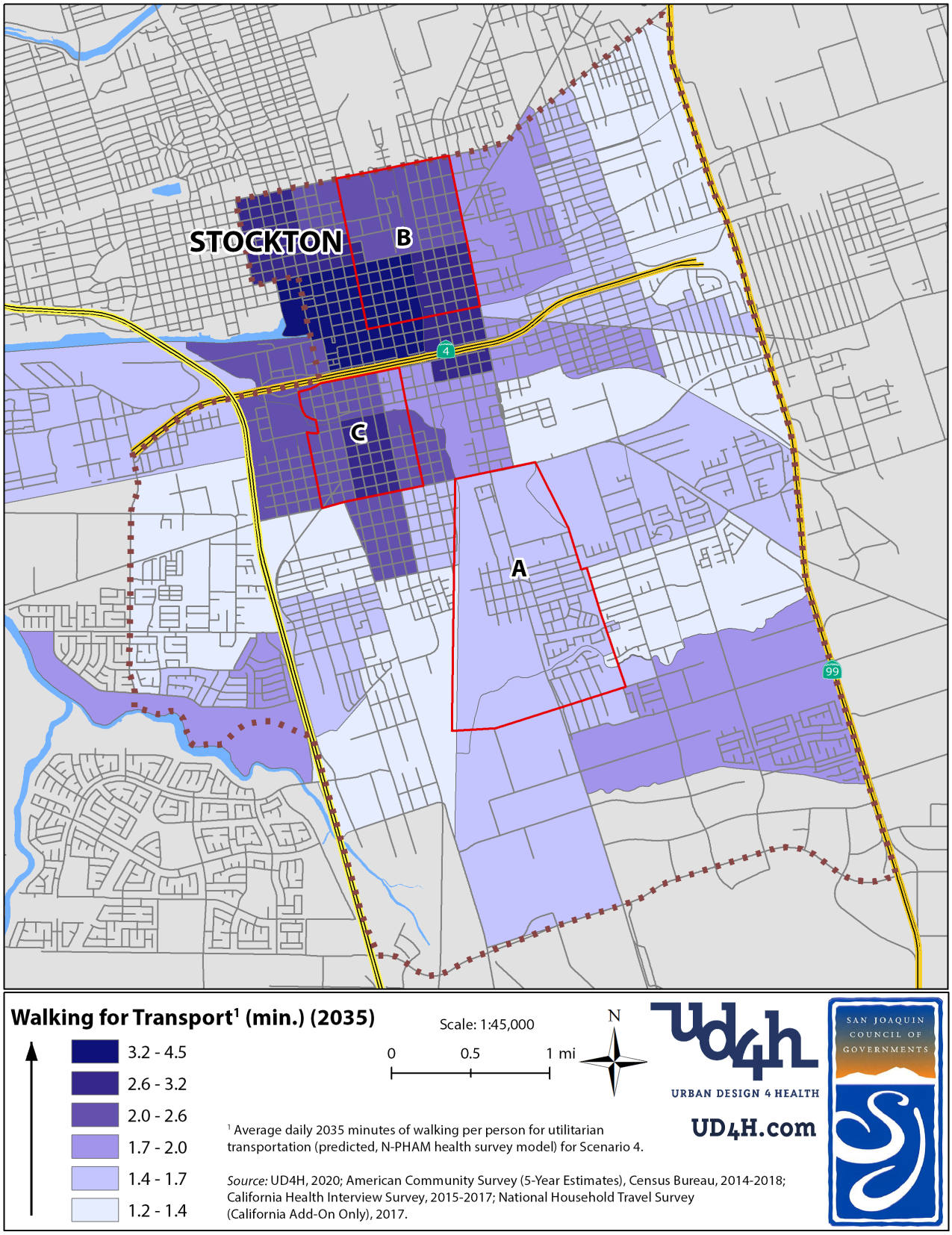

Figure 3: Estimated daily walking for transportation minutes for Scenario 4 (2035) for the SSPZ.

Table 7: Weighted travel behavior and physical activity estimates for baseline and Scenario 4 and 5.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*			*Baseline*	*Scenario 5*		
Daily minutes of walking for transportation	1.56 (0.36)	1.94 (0.71)	+0.38	+24.4%	1.56 (0.36)	1.99 (0.77)	+0.43	+27.6%
Percent of daily walking for transport participation	17.0% (6.6%)	22.9% (11.1%)	+5.9%	+34.9%	17.0% (6.6%)	23.7% (11.9%)	+6.7%	+39.7%
Daily minutes of walking for leisure	13.42 (0.74)	13.94 (1.05)	+0.51	+3.8%	13.42 (0.74)	14.01 (1.10)	+0.58	+4.3%
Percent of weekly walking for leisure participation	57.8% (1.1%)	58.5% (1.5%)	+0.7%	+1.2%	57.8% (1.1%)	58.6% (1.5%)	+0.8%	+1.4%
Daily minutes of bicycling for transportation	1.04 (0.03)	1.06 (0.05)	+0.03	+2.6%	1.04 (0.03)	1.07 (0.05)	+0.03	+2.8%
Percent of daily bicycling for transport participation	0.9% (0.4%)	1.4% (0.7%)	+0.4%	+45.2%	0.9% (0.4%)	1.4% (0.8%)	+0.5%	+50.4%
Weekly minutes of recreational physical activity	53.17 (19.11)	53.14 (19.11)	-0.03	-0.1%	53.17 (19.11)	53.14 (19.11)	-0.03	-0.1%
Percent of weekly recreational physical activity participation	0.8% (4.5%)	0.9% (5.1%)	+0.1%	+19.6%	0.8% (4.5%)	0.9% (5.1%)	+0.2%	+20.8%

Green = region shows improved health; red = region shows worse health

Additional insight into the spatial distribution of the behavior outcomes can be found by examining mapped projected changes in outcomes between baseline and the future scenarios. Figure 4 shows the highest concentration of increases in walking for transportation daily minutes for Scenario 4 is located Downtown Stockton (nearly double) and just south of with the Robert J. Cabral Station (> 65% increase). Other high concentrations of walking for transport were located along Charter Way/Dr. Martin Luther King Jr. Blvd. corridor. The population-weighted average duration of walking for transport minutes was estimated to increase from 1.5 minutes in 2015 by between 24% (Scenario 4) and 28% (Scenario 5) to nearly 2 minutes in 2035. Moderate to high increases in transportation walking were also anticipated to increase by between 35% and 50% for areas around Downtown Stockton, as well as large portions of the identified subareas in the SSPZ.

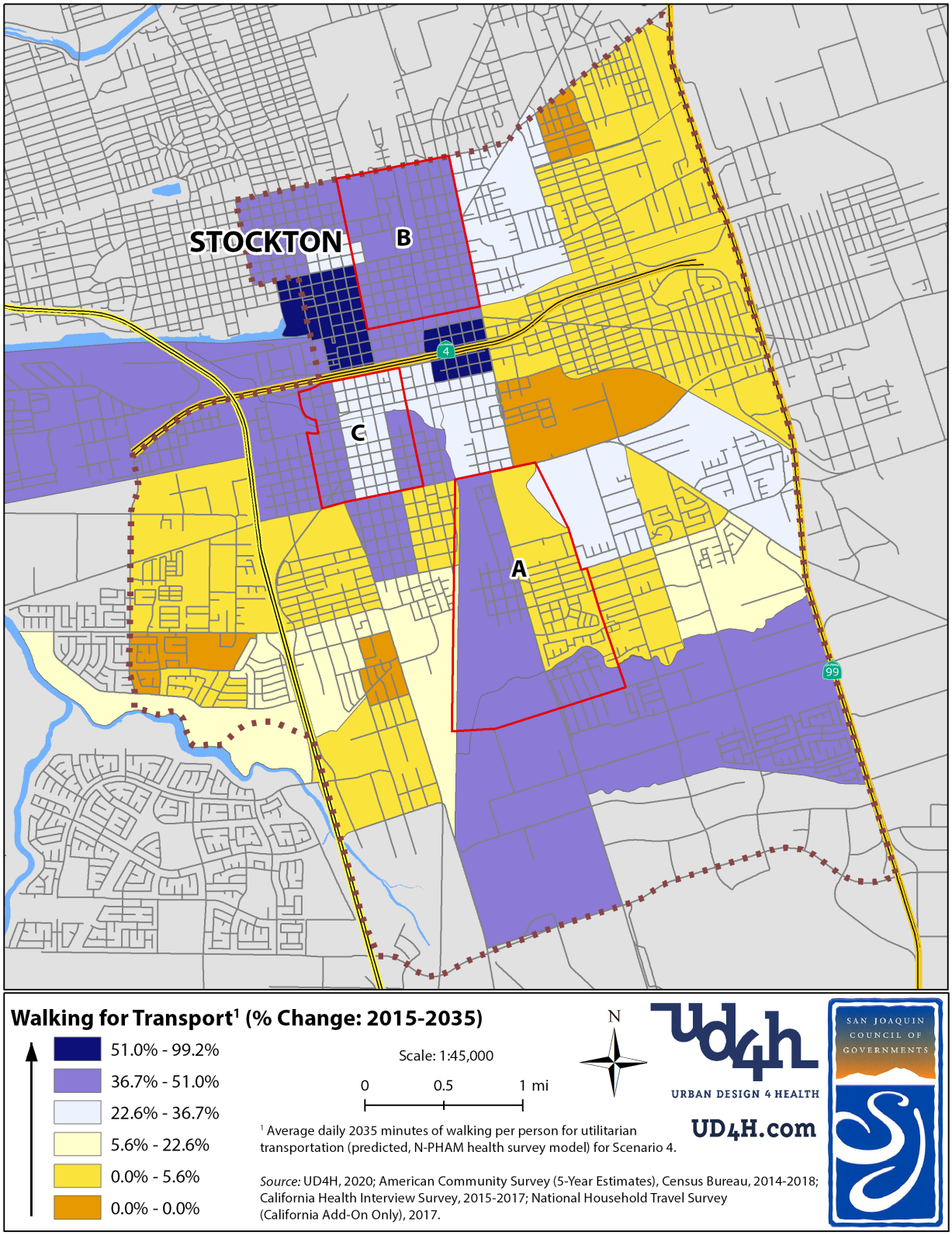

Figure 4: Estimated percent change in daily walking for transportation minutes between 2015 and 2025 for Scenario 4 in the SSPZ.

4.2 NPHAM Health Outcomes Estimates for Scenario 4 & 5

This section describes the population-weighted estimates for health behaviors, including BMI and type 2 diabetes, as well as cardiovascular diseases and mental health for both baseline and Scenario 4 and 5 for the SSPZ. Changes are color-coded to indicate a healthy direction in population health (green) or an unhealthy direction (red).

Summaries of weighted mean values for health behaviors and cardiovascular disease for both baseline and Scenario 4 and 5 are provided in Table 8. The average BMI for the baseline measurement for block groups in the SSPZ was 29.54. Approximately 36% of people are estimated as obese (a BMI greater than 30) and 35% as overweight (a BMI greater than 25), indicating that over seven in ten people are overweight or obese.

Table 9 provides population-weighted, mean SSPZ values for general health and mental health status indicators. In 2015 (baseline) and 2035, 30.3% of the population in the SSPZ (nearly double that of the San Joaquin County weighted average) indicated a fair or poor general health status, with 32.8% estimated to have experienced some form of depression in the last 30 days[18] and 6.1% reporting psychological distress.[19]

[18] Depression based on CHIS survey question AJ32: "How often did you feel so depressed that nothing could cheer you up?", http://healthpolicy.ucla.edu/chis/design/Documents/2015-2016%20Questionnaires/CHIS%202016%20Adult%20Questionnaire%20(FINAL).pdf

[19] Derived from multiple questions, CHIS survey data dictionary: "Likely has had psychological distress in the past month", https://healthpolicy.ucla.edu/chis/data/public-use-data-file/Documents/CV2015-16_Adult_PUF.pdf

Table 8: Weighted health behaviors and cardiovascular disease estimates for baseline and Scenario 4 and 5.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*			*Baseline*	*Scenario 5*		
Average body mass index (BMI)	29.54 (0.49)	29.20 (0.63)	-0.35	-1.2%	29.54 (0.49)	29.16 (0.66)	-0.38	-1.3%
Percent of the population with obese status (>30 BMI)	36.0% (3.2%)	33.6% (4.1%)	-2.4%	-6.5%	36.0% (3.2%)	33.4% (4.2%)	-2.6%	-7.2%
Percent of the population with overweight or obese status (>25 BMI)	70.9% (3.1%)	68.5% (4.4%)	-2.4%	-3.3%	70.9% (3.1%)	68.3% (4.6%)	-2.6%	-3.7%
Percent of the population with coronary heart disease	4.2% (0.8%)	4.0% (0.8%)	-0.2%	-5.4%	4.2% (0.8%)	3.9% (0.8%)	-0.2%	-5.9%
Percent of the population with high blood pressure	29.7% (4.3%)	27.6% (4.4%)	-2.1%	-7.0%	29.7% (4.3%)	27.4% (4.4%)	-2.3%	-7.8%
Percent of the population with type 2 diabetes	11.1% (3.1%)	10.1% (2.8%)	-1.0%	-9.4%	11.1% (3.1%)	10.0% (2.8%)	-1.1%	-10.2%

Green = region shows improved health; red = region shows worse health

Table 9: Weighted general health and mental health status estimates for baseline and Scenario 4 and 5.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*			*Baseline*	*Scenario 5*		
Percent of population reporting fair to poor general health status	30.3% (4.9%)	29.6% (4.6%)	-0.7%	-2.4%	30.3% (4.9%)	29.5% (4.6%)	-0.8%	-2.6%
Percent of population reporting depression	32.8% (2.8%)	32.2% (2.7%)	-0.6%	-1.9%	32.8% (2.8%)	32.2% (2.7%)	-0.6%	-1.9%
Percent of population reporting psychological distress	6.1% (0.8%)	5.8% (0.7%)	-0.4%	-6.2%	6.1% (0.8%)	5.7% (0.7%)	-0.4%	-6.6%

Green = region shows improved health; red = region shows worse health

Highlights include:

- **BMI, Obesity & Overweight Status –** Body mass in Scenario 4 and 5 indicated markedly improved results with average weighted BMI being reduced by 1.2% (Scenario 4) and 1.3% (Scenario 5) and the percentage of the population which is obese being reduced 6.5% (Scenario 4) and 7.2% (Scenario 5) from 36% in 2015 to around 33.5% in 2035. Figure 5 shows the spatial distribution of BMI throughout the SSPZ for Scenario 5 (2035).
- **Cardiovascular Diseases –** High blood pressure estimates indicated an SSPZ average of 29.7% of the population in 2015, decreasing to 27.6% (-7.0% reduction) in Scenario 4 and even further to 27.4% (-7.8%) in Scenario 5 in 2035. Coronary heart disease comprises a much smaller percentage of the population, but the results showed similar patterns. It was estimated to decrease from 4.2% to 4.0% (-5.4%) in Scenario 4 and to 3.9% (-5.9%) in Scenario 5 by 2035.
- **Type 2 Diabetes –** Of people with diabetes, type 2 was estimated to represent between 90% and 95% of all cases in the U.S.[20] In 2015, San Joaquin County reported a countywide average of 9.5% of the population and the SSPZ reported an average of 11.1% with type 2 diabetes. Type 2 diabetes was forecasted to be reduced significantly to an average of 10.1% (-9.4%) in Scenario 4 and 10.0% (-10.2%) in Scenario 5.

[20] Bullard KM, Cowie CC, Lessem SE, et al. Prevalence of Diagnosed Diabetes in Adults by Diabetes Type – United States, 2016. MMWR Morb Mortal Wkly Rep 2018;67:359-361. DOI: http://dx.doi.org/10.15585/mmwr.mm6712a2

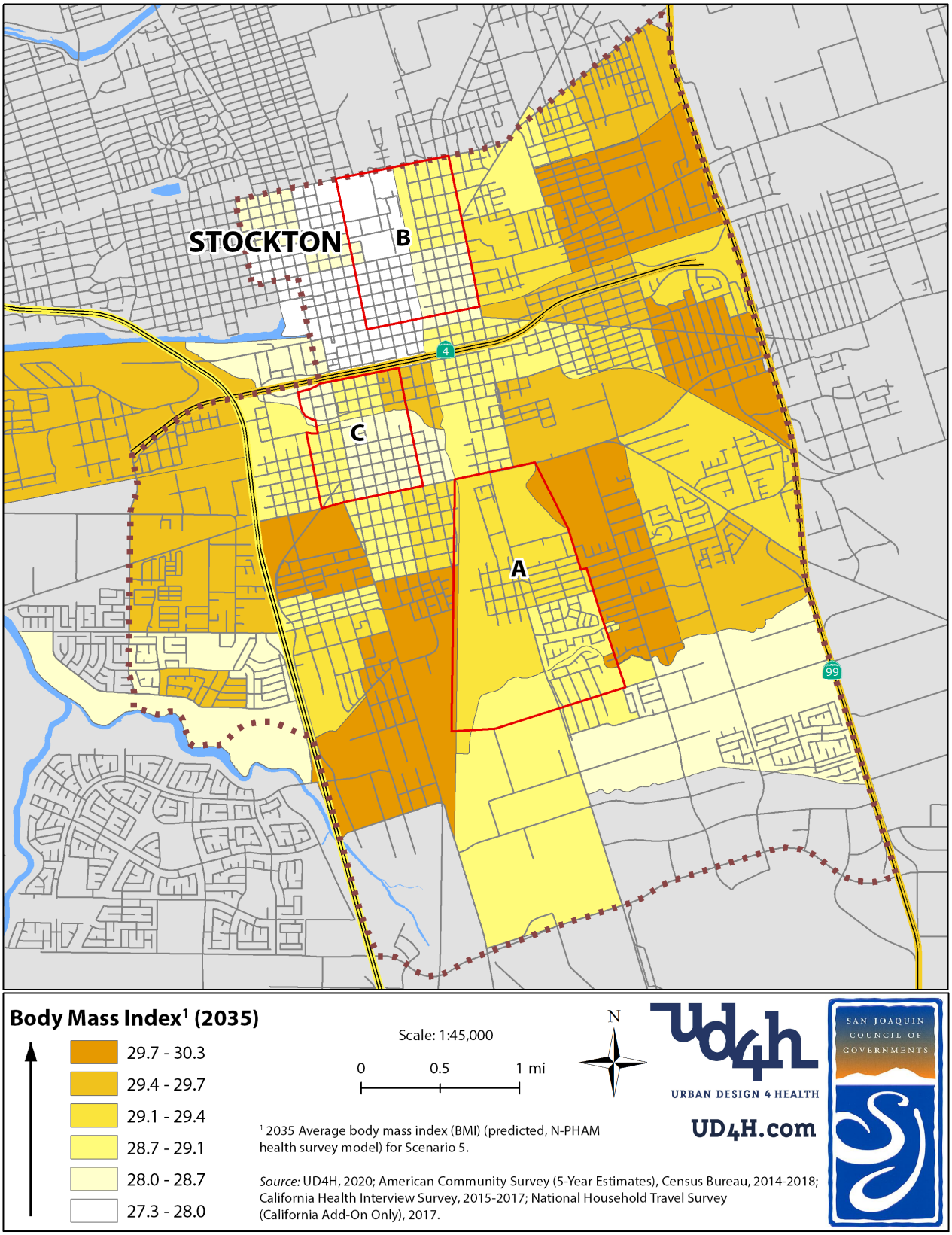

Figure 5: Estimated average population-weighted BMI for Scenario 5 (2035).

Highlights include:

- **Fair or Poor General Health Status –** Fair or poor general health is much worse (nearly double the rate) in the SSPZ in comparison to San Joaquin County as a whole. Self-reported fair or poor general health status in Scenario 4 and 5 indicated slight improvement being reduced by 2.4% and 2.6%, respectively. Nevertheless, even the block groups with the lowest percentage (around 19% estimated fair or poor general health) are more than 4% higher than the population-weighted average for the County. Figure 6 shows the spatial distribution of fair or poor general health throughout the SSPZ for Scenario 4 (2035). Reduced values were in northern sections of Downtown and Midtown, as well as some clusters in the southwest and extreme southeast of the SSPZ. The highest values near Subarea C were nearly triple the countywide average and represented the highest values in the County in 2035.
- **Mental Health –** Depression in the SSPZ was reduced by 1.9% for both scenarios in 2035 to a weighted average of 32.2%. The percentage of the population reporting psychological distress showed increased reductions to 5.8% (-6.2%) in Scenario 4 and 5.7% (-6.6%) in Scenario 5.

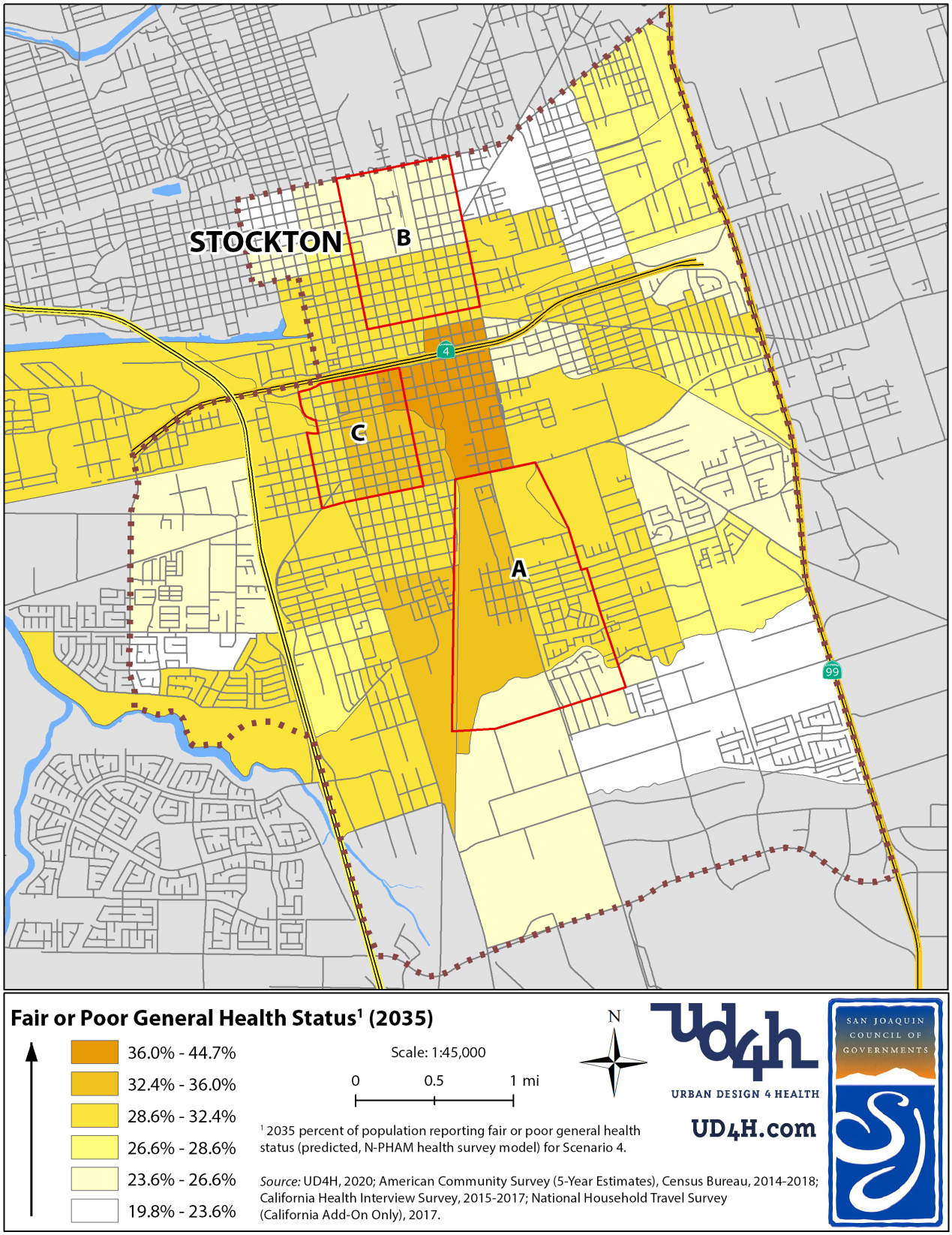

Figure 6: Estimated percentage reporting fair or poor health for Scenario 4 (2035).

5 Analysis of Subareas in the SSPZ

The benefits and impacts of land use and transportation investment policies and investment are not always evenly distributed across regions, cities, or neighborhoods. One of the core advantages of NPHAM is the ability to estimate the spatial distribution of public health outcomes at a relatively fine-grain spatial scale. This allows for equity analyses to be performed for regional or local studies in subareas, such as the SSPZ. Calculating weighted means of the three subareas within the SSPZ for baseline and Scenario 4 and 5 and the differences between the two can inform the extent to which proposed investments in targeted areas are helping address health disparities.

The remainder of this section documents subarea comparisons between baseline and Scenario 4 and 5 for the three defined subareas in the SSPZ.

The following methods were used to evaluate the population-weighted results:

- **Current Conditions & Future Scenario –** Population-weighted baseline averages and standard deviations were calculated for baseline using CBG 2015 population counts for the set of CBGs in each subarea in the SSPZ. Population-weighted scenario averages and standard deviations were calculated using the projected CBG 2035 population for the set of CBGs in each sub-group for Scenario 4 and 5.
- **Change from Baseline –** Absolute difference between population-weighted averages for baseline and Scenario 4 and 5 were calculated and evaluated. These absolute differences were also compared to the differences from the block groups in the balance of the SSPZ.

5.1 Baseline Conditions

Current conditions reflect past investment patterns, built environment conditions, and demographics within each subarea of the SSPZ. Each of the 17 NPHAM health indicators were summarized by Subarea A, B, and C individually for both Scenario 4 and 5. The results indicate a consistent trend for each subarea, with Scenario 5 results typically resulting in improved health because of more intensive land use development placetypes.

Appendix C provides more details on the health outcomes for baseline and Scenario 4 results for Subarea A (Table 20, Table 21, and Table 22), Subarea B (Table 23, Table 24, and Table 25), and Subarea C (Table 26, Table 27, and Table 28). Appendix D provides more details on the health outcomes for baseline and Scenario 5 results for Subarea A (Table 29, Table 30, and Table 31), Subarea B (Table 32, Table 33, and Table 34), and Subarea C (Table 35, Table 36, and Table 37).

Results for baseline conditions include:

- **Physical Activity & Travel Behavior**:
    - Subarea B showed the highest levels of walking for transportation among all three subareas with 2.10 minutes per day compared to 1.71 minutes per day for Subarea C and only 1.35 minutes per day for Subarea A. Subarea B and C had nearly the same levels of participation in walking for transport at around 21% compared to only 13.6% in Subarea A.
    - Leisure walking duration and participation for Subarea A and B were nearly the same at 13.36 and 13.77 minutes and 58.1% and 58.4% respectively compared to lower values for Subarea C (12.92 daily minutes and 56.9% participation). Figure 7 shows a choropleth map of the daily walking minutes for leisure for the SSPZ subareas for the baseline (2015).
    - Subarea A exhibited the highest levels of recreational physical activity duration among the subareas evaluated at 56.62 weekly minutes compared to only 47.94 minutes in Subarea B and 39.80 minutes at Subarea C. Participation in recreational physical activity was very low for all three subareas between about 0.1% and 0.2%.
    - Bicycling for transportation remained relatively low at all three subarea locations; however, Subarea B indicated the highest duration minutes (1.08 daily minutes) and participation (1.4%) among the three subareas (Subarea A: 1.01 minutes, 0.7% participation; Subarea C: 1.05 minutes, 1.0% participation).

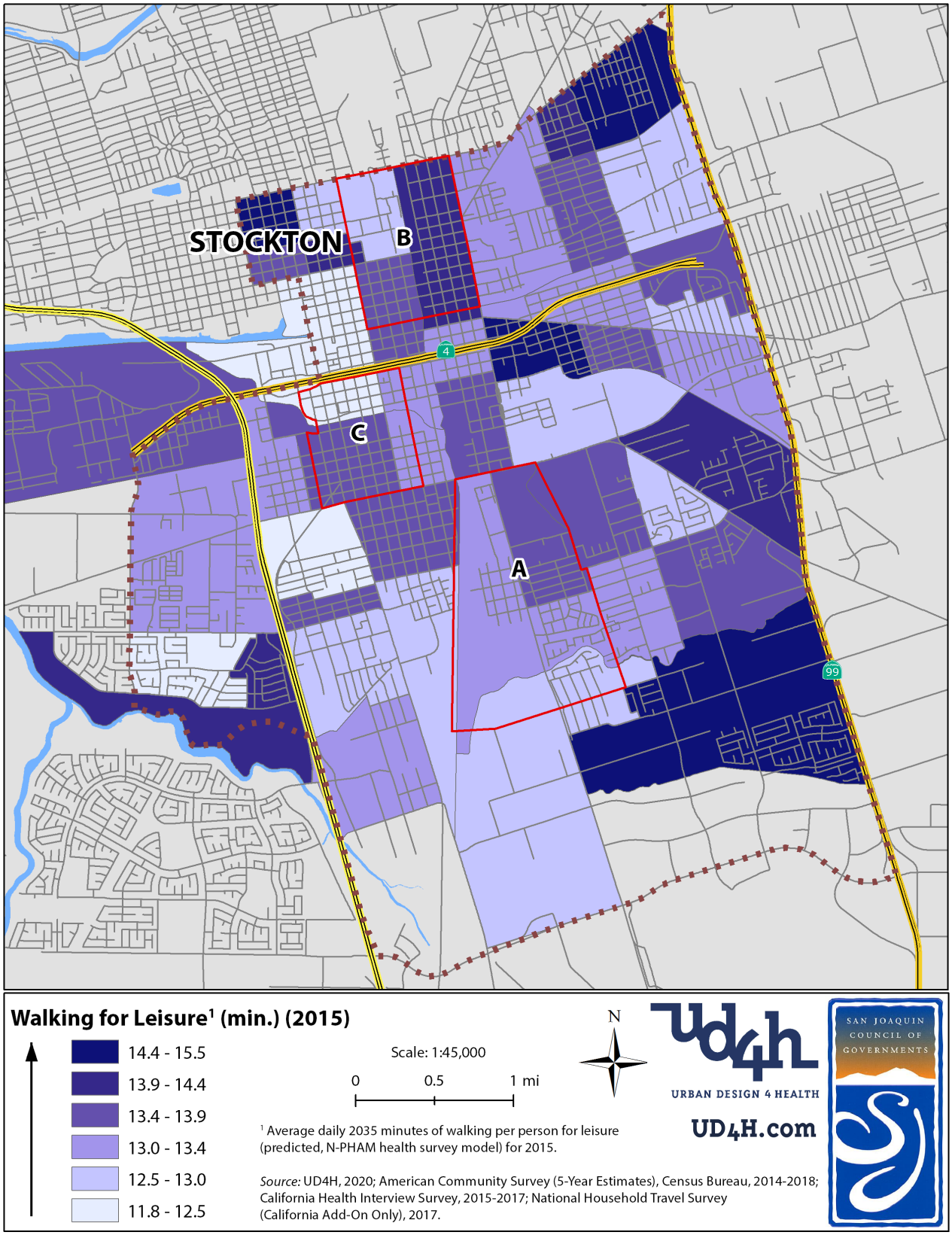

Figure 7: Estimated daily walking for leisure minutes for baseline (2015).

- **Health Behaviors:**
    - The average BMI was highest in Subarea C (29.56), followed by Subarea A (29.43) and then Subarea B (29.16). Obesity was the same at 35.5% for both Subarea A and C while being lower at Subarea B (34.4%). Overweight and obese status followed a similar trend, except that this measure was highest in Subarea A (71.2%), slightly lower at Subarea C (70.3%), and much lower at Subarea B (67.2%). All subareas showed much higher weighted average values than San Joaquin County as a whole.
    - The percentage of coronary health disease was highest at Subarea C (4.7%), followed by Subarea B (4.0%) and Subarea A (3.7%).
    - The percentage of high blood pressure followed a similar trend as coronary heart disease with Subarea C exhibiting the highest values at 31.8%, except in the case of this measure, Subarea B (27.5%) was slightly lower than Subarea A (28.5%).
    - Type 2 diabetes was highest in Subarea A (9.8%) followed closely by Subarea B (9.6%), with the lowest values shown for Subarea C (6.8%).
- **General Health & Mental Health:**
    - Fair or poor general health was highest in Subarea C (36.9%) and much lower in Subarea A (30.1%) and Subarea B (29.8%), despite still being roughly double that of the County weighted average. Depression was highest in Subarea C (35.9%) followed closely by Subarea B (35.3%), and with lower values in Subarea A (32.3%). Psychological distress was highest in Subarea B (6.9%), followed closely by Subarea C (6.8%), and Subarea A (5.9%) showing lower values for this mental health indicator.

5.2 Change from Baseline to Scenario 4 & 5

By 2035 the planned land use changes and investment strategies in the RTP are expected to be in place. To account for this, NPHAM estimates future outcomes for CBGs based on built environment changes as defined by SJCOG within the scenario planning software Envision Tomorrow. Future demographics were primarily assumed to match the proportion within the CBG in 2015. The exception was an assumed overall regional reduction in the proportion of low-income households due to demographic assumptions related to the chosen placetype developments in Envision Tomorrow.

The spatial distributions of healthy travel behavior and health outcomes for the baseline and scenarios across the SSPZ are valuable in understanding equitable access to healthy environments. It is also important to quantify the anticipated changes in subareas within the SSPZ between baseline and Scenario 4 and 5. These comparisons of changes provide information about the effect of the planned investments and policies in these areas.

Summaries of the differences between the population-weighted means of the future 2035 scenarios and the baseline 2015 for travel behavior and physical activity estimates were calculated for the three subareas within the SSPZ for Scenario 4 (Table 10) and 5 (Table 11). Each subarea value was compared with the average change between 2015 and 2035 for the balance of the entire SSPZ.[21] Absolute difference was chosen for this comparison because the percent difference may be deceiving given the relatively small number of subarea block groups in comparison to the balance of the SSPZ. The columns describing the change in weighted mean for subareas are color-coded to assist in interpretation. If the subarea was moving in a more healthful direction, it was coded green; if the balance of the SSPZ was moving in a more healthful direction, it was coded black; if the subarea or the balance of the SSPZ was moving in a less healthful direction, it was coded red; if the subarea outperformed the balance of the SSPZ in a healthier direction, it was bolded, underlined and shaded.

Highlights of the subarea analysis of changes attributed to Scenario 4 and 5 for travel behavior and physical activity include:

- **Walking for Transportation:** This indicator demonstrated the highest levels of increase among the physical activity and travel behavior measures, especially for Subarea B and C. For both Scenario 4 and 5, Subarea B and C increased beyond the balance of the SSPZ at 14.3%/16.6% and 10.6%/12.2% respectively. Subarea A increased by 2.6% for Scenario 4 and 3.1% for Scenario 5 but did not increase as much as the balance of the SSPZ. Duration of walking for transport minutes also increased substantially between scenarios with Subarea B and C outperforming their respective balances of the SSPZ: Subarea A (Scenario 4: +0.25; Scenario 5: +0.27), Subarea B (+0.92, +1.09) and Subarea C (+0.65, +0.74).
- **Walking for Leisure:** This indicator also showed significant gains for duration leisure minutes for all subareas. Subarea B gained the most at +1.98 minutes (Scenario 4) and +2.19 (Scenario 5). All subareas also outperformed duration minutes for walking for transportation. Both Subarea B and Subarea C also outperformed the increase shown for the balance of the SSPZ. Participation in leisure walking also witnessed moderate gains for participation with Subarea B (Scenario 4: +2.5%; Scenario 5: +2.7%) and Subarea C (Scenario 4: +1.1%; Scenario 5: +1.3%), again outperforming the gains made for the balance of the SSPZ.
- **Bicycling for Transportation:** As with the walking measures, both duration minutes and participation percentage indicated changes in a healthy direction for all subareas.

[21] The balance of the SSPZ includes all block groups that are not part of the specific subarea and do include block groups that are flagged as part of other subareas. All block groups included as part of each subarea are unique and do not overlap with block groups part of other subareas.

- **Recreational Physical Activity:** This indicator was less sensitive to built environment changes, and the results indicate a moderately unhealthy change in the duration minutes and only marginally healthy direction for participation. In addition to the potential built environment impacts on recreational opportunities and locations, one must also have the time available. People in areas of concentrated poverty may have less time for leisure activity, which may result in less recreational physical activity. Despite indicated decreases in duration, Subarea A showed the smallest decreases (Scenario 4 & 5: -0.02) outperforming the balance of the SSPZ. Subarea B showed the highest increase in participation of all the subareas at +0.12% (Scenario 4) and +0.15 (Scenario 5) with only marginally smaller increases than the balance of the SSPZ.

Table 10: Difference in weighted means between Scenario 4 and baseline for travel behavior and physical activity estimates by subarea in the SSPZ.

Health Outcome	*Subarea A*		*Subarea B*		*Subarea C*	
	Subarea	*Balance of SSPZ*	*Subarea*	*Balance of SSPZ*	*Subarea*	*Balance of SSPZ*
Daily minutes of walking for transportation	+0.25	+0.39	**+0.92**	+0.34	**+0.65**	+0.34
Percent of daily walking for transport participation	+2.6%	+6.2%	**+14.3%**	+5.2%	**+10.6%**	+5.3%
Daily minutes of walking for leisure	+0.34	+0.53	**+1.98**	+0.39	**+0.71**	+0.49
Percent of weekly walking for leisure participation	+0.6%	+0.7%	**+2.5%**	+0.6%	**+1.1%**	+0.7%
Daily minutes of bicycling for transportation	+0.03	+0.03	**+0.06**	+0.02	**+0.05**	+0.02
Percent of daily bicycling for transport participation	+0.2%	+0.4%	**+1.4%**	+0.3%	**+0.7%**	+0.4%
Weekly minutes of recreational physical activity	**-0.02**	-0.03	-0.04	-0.03	-0.06	-0.02
Percent of weekly recreational physical activity participation	+0.01%	+0.16%	+0.12%	+0.15%	+0.07%	+0.16%

Green = area shows improved health for the subareas; black = Balance of SSPZ shows improved health; red = area shows worse health; **bold underlined and shaded** indicates the subarea outperforms the balance of the SSPZ

Table 11: Difference in weighted means between Scenario 5 and baseline for travel behavior and physical activity estimates by subarea in the SSPZ.

Health Outcome	*Subarea A*		*Subarea B*		*Subarea C*	
	Subarea	*Balance of SSPZ*	*Subarea*	*Balance of SSPZ*	*Subarea*	*Balance of SSPZ*
Daily minutes of walking for transportation	+0.27	+0.44	**+1.09**	+0.38	**+0.74**	+0.39
Percent of daily walking for transport participation	+3.1%	+7.0%	**+16.6%**	+5.9%	**+12.2%**	+6.1%
Daily minutes of walking for leisure	+0.38	+0.60	**+2.19**	+0.45	**+0.83**	+0.55
Percent of weekly walking for leisure participation	+0.6%	+0.8%	**+2.7%**	+0.6%	**+1.3%**	+0.7%
Daily minutes of bicycling for transportation	+0.03	+0.03	**+0.06**	+0.03	**+0.05**	+0.03
Percent of daily bicycling for transport participation	+0.2%	+0.5%	**+1.5%**	+0.4%	**+0.8%**	+0.4%
Weekly minutes of recreational physical activity	**-0.02**	-0.03	-0.04	-0.03	-0.07	-0.02
Percent of weekly recreational physical activity participation	+0.01%	+0.17%	+0.15%	+0.16%	+0.09%	+0.17%

Green = area shows improved health for the subareas; black = Balance of SSPZ shows improved health; red = area shows worse health; **bold underlined and shaded** indicates the subarea outperforms the balance of the SSPZ

Highlights of the equity analysis of changes attributed to Scenario 4 (Table 12) and 5 (Table 13) for health behaviors include:

- **BMI, Obesity & Overweight Status**: All subareas indicated positive healthy gains in the reduction of body mass, with Subarea B and Subarea C outperforming their respective balance of the SSPZ (Table 12). Change in BMI, obesity and overweight status, when compared to baseline, was highest in Subarea B (Scenario 4: -0.81, -5.4%, -5.6%; Scenario 5: -0.92, -6.1%, -6.4%) followed by Subarea C (Scenario 4: -0.61, -4.2%, -4.3%; Scenario 5: -0.67, -4.6%, -4.8%).
- **Cardiovascular Disease**: All subareas showed changes in the healthy direction, with the largest decreases in the percentage of coronary heart disease with Subarea B and C declining by the same amount in Scenario 4 (-0.5%) and Subarea C declining by slightly more in Scenario 5 (-0.6%). This was to be expected given the relatively low average prevalence of this condition in the region. High blood pressure showed a similar pattern, with prevalence decreases for Scenario 4 and 5: 1) Subarea A: -1.8%, -1.9%, 2) Subarea B: -4.5%, -5.1% and 3) Subarea C: -4.0%, -4.4%.
- **Type 2 Diabetes**: Subarea B and C out-gained the balance of the SSPZ areas with larger decreases in the healthy direction. Subarea A also indicated a decrease in type 2 diabetes for both Scenario 4 and 5, but a greater decrease was shown in

the balance of the SSPZ. Subarea C declined by the highest amount of any subarea at -2.2% and -2.4% for Scenario 4 and 5. Subarea B similarly declined by -1.9% (Scenario 4) and -2.1% (Scenario 5), while Subarea A declined by -0.9% in both scenarios.

Table 12: Difference in weighted means between Scenario 4 and baseline for health behaviors and cardiovascular disease estimates by subarea in the SSPZ.

Health Outcome	*Subarea A*		*Subarea B*		*Subarea C*	
	Subarea	*Balance of SSPZ*	*Subarea*	*Balance of SSPZ*	*Subarea*	*Balance of SSPZ*
Average body mass index (BMI)	-0.28	-0.35	**-0.81**	-0.31	**-0.61**	-0.31
Percent of the population with obese status (>30 BMI)	-1.9%	-2.4%	**-5.4%**	-2.1%	**-4.2%**	-2.1%
Percent of the population with overweight or obese status (>25 BMI)	-2.1%	-2.4%	**-5.6%**	-2.1%	**-4.3%**	-2.1%
Percent of the population with coronary heart disease	-0.2%	-0.2%	**-0.5%**	-0.2%	**-0.5%**	-0.2%
Percent of the population with high blood pressure	-1.8%	-2.1%	**-4.5%**	-1.9%	**-4.0%**	-1.9%
Percent of the population with type 2 diabetes	-0.9%	-1.1%	**-1.9%**	-1.0%	**-2.2%**	-0.9%

Green = area shows improved health for the subareas; black = Balance of SSPZ shows improved health; red = area shows worse health; **bold underlined and shaded** indicates the subarea outperforms the balance of the SSPZ

Table 13: Difference in weighted means between Scenario 5 and baseline for health behaviors and cardiovascular disease estimates by subarea in the SSPZ.

Health Outcome	*Subarea A*		*Subarea B*		*Subarea C*	
	Subarea	*Balance of SSPZ*	*Subarea*	*Balance of SSPZ*	*Subarea*	*Balance of SSPZ*
Average body mass index (BMI)	-0.30	-0.39	**-0.92**	-0.34	**-0.67**	-0.34
Percent of the population with obese status (>30 BMI)	-2.1%	-2.6%	**-6.1%**	-2.3%	**-4.6%**	-2.3%
Percent of the population with overweight or obese status (>25 BMI)	-2.3%	-2.7%	**-6.4%**	-2.3%	**-4.8%**	-2.4%
Percent of the population with coronary heart disease	-0.2%	-0.3%	**-0.5%**	-0.2%	**-0.6%**	-0.2%
Percent of the population with high blood pressure	-1.9%	-2.3%	**-5.1%**	-2.1%	**-4.4%**	-2.0%
Percent of the population with type 2 diabetes	-0.9%	-1.1%	**-2.1%**	-1.1%	**-2.4%**	-1.0%

Green = area shows improved health for the subareas; black = Balance of SSPZ shows improved health; red = area shows worse health; **bold underlined and shaded** indicates the subarea outperforms the balance of the SSPZ

Highlights of the equity analysis of changes attributed to Scenario 4 (Table 14) and 5 (Table 15) for general and mental health include:

- **Percent Fair or Poor Health**: All subareas indicated positive change, with a reduction in fair to poor general health status with Subarea B and C out-gaining their respective balances of the SSPZ. Subarea C showed the highest level of reduction in fair to poor health status with -1.7% (Scenario 4) and -1.9% (Scenario 5) followed by Subarea B with -1.3% (Scenario 4) and -1.8% (Scenario 5). Subarea A showed a decline of -0.4% for both Scenario 4 and 5.
- **Mental Health**: Both mental health indicators showed subareas improving more than the balance of the SSPZ areas except for Subarea A. Depression and psychological distress decreased by relatively similar amounts despite the prevalence of depression being much more common (around 25% of the countywide average reporting depression compared to less than 5% reporting psychological distress). Subarea C showed the highest level of change for depression (-1.6% for both scenarios), while Subarea B indicated -1.0% and -1.2% for Scenario 4 and 5, respectively. Conversely, Subarea B showed a slightly higher level of decline for psychological distress (Scenario 4: -0.9%; Scenario 5: -1.1%) in comparison to Subarea C (Scenario 4: -0.8%; Scenario 5: -0.9%). Figure 8 shows a choropleth map of the distribution of depression for the SSPZ subareas for Scenario 5.

Table 14: Difference in weighted means between Scenario 4 and baseline for general health and mental health status estimates by subareas in the SSPZ.

Health Outcome	*Subarea A*		*Subarea B*		*Subarea C*	
	Subarea	*Balance of SSPZ*	*Subarea*	*Balance of SSPZ*	*Subarea*	*Balance of SSPZ*
Percent of population reporting fair to poor general health status	-0.4%	-0.8%	**-1.3%**	-0.7%	**-1.7%**	-0.6%
Percent of population reporting depression	-0.3%	-0.6%	**-1.0%**	-0.6%	**-1.6%**	-0.5%
Percent of population reporting psychological distress	-0.2%	-0.4%	**-0.9%**	-0.3%	**-0.8%**	-0.3%

Green = area shows improved health for the subareas; black = Balance of SSPZ shows improved health; red = area shows worse health; **bold underlined and shaded** indicates the subarea outperforms the balance of the SSPZ

Table 15: Difference in weighted means between Scenario 5 and baseline for general health and mental health status estimates by subareas in the SSPZ.

Health Outcome	*Subarea A*		*Subarea B*		*Subarea C*	
	Subarea	*Balance of SSPZ*	*Subarea*	*Balance of SSPZ*	*Subarea*	*Balance of SSPZ*
Percent of population reporting fair to poor general health status	-0.4%	-0.8%	**-1.8%**	-0.7%	**-1.9%**	-0.6%
Percent of population reporting depression	-0.3%	-0.6%	**-1.2%**	-0.6%	**-1.6%**	-0.5%
Percent of population reporting psychological distress	-0.2%	-0.4%	**-1.1%**	-0.4%	**-0.9%**	-0.3%

Green = area shows improved health for the subareas; black = Balance of SSPZ shows improved health; red = area shows worse health; **bold underlined and shaded** indicates the subarea outperforms the balance of the SSPZ

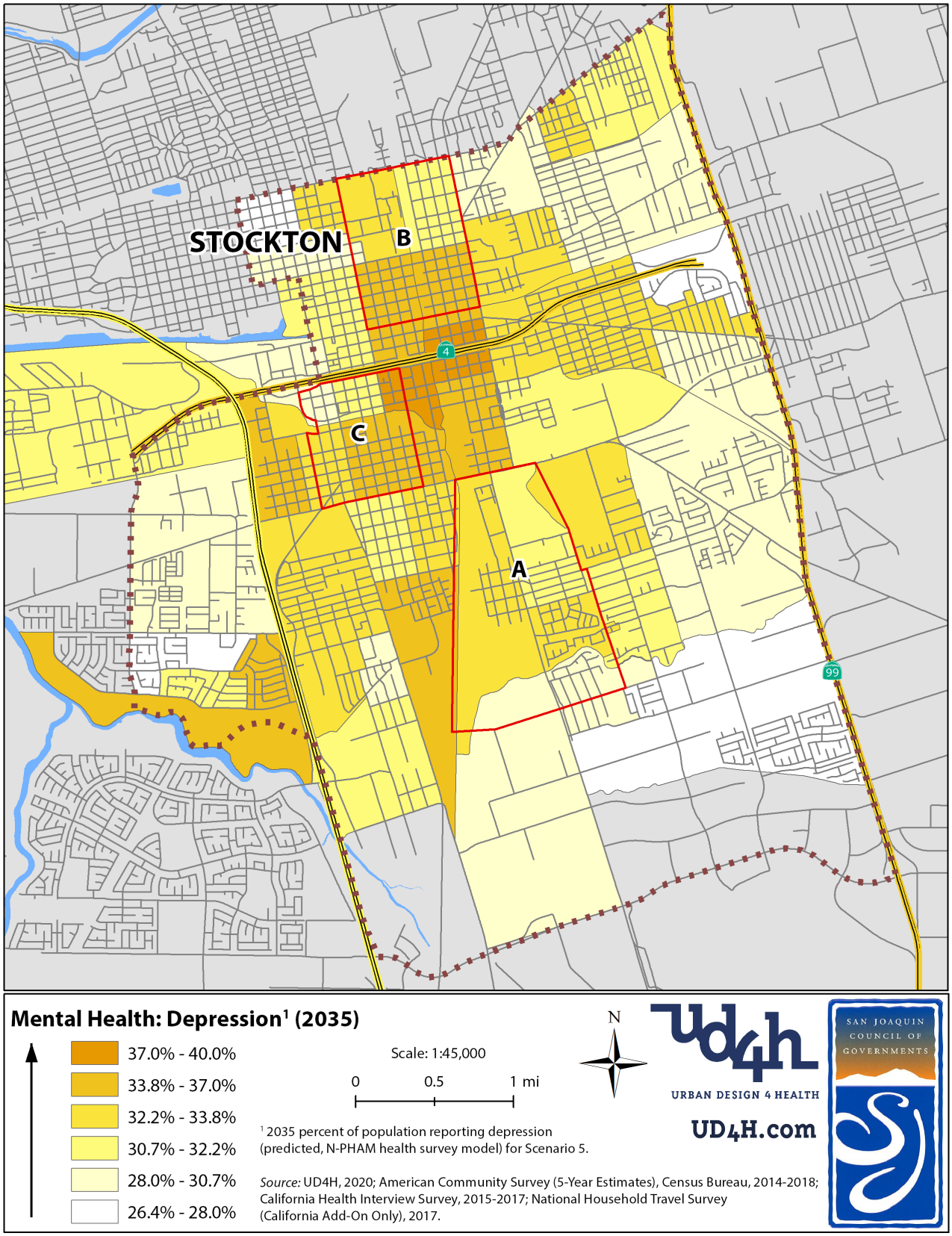

Figure 8: Estimated percentage reporting depression for Scenario 5 (2035).

All subareas within the SSPZ showed changes in the healthy direction for 16 of the 17 health indicators evaluated for both Scenario 4 and 5. Although the duration of recreational physical activity declined for each of the subareas, participation in this activity increased for all subareas for both scenarios. The results of Scenario 5 followed the same pattern as Scenario 4 but produced increased positive health outcomes except for a few (e.g., type 2 diabetes in Subarea A or depression in Subarea C) where both scenarios showed the same level of change.

Subarea B and Subarea C both outperformed the balance of the SSPZ on 15 of 17 indicators for both scenarios. Subarea A only outperformed its balance of the SSPZ on one indicator (weekly minutes of recreational physical activity). As shown in Section 5.1 and 5.2, Subarea A demonstrated significant improvements in health outcomes in Scenario 4 and 5. But the change in absolute values was lower than the balance of the SSPZ. Subarea A planned land use changes in 2035 were not as significant as the other subareas. This is in part due to its location in a lower density area of the SSPZ. Nevertheless, the forecasted changes in Subarea A still indicated upwards of 30% and 20% increases in active travel modes (participation in transport walking and bicycling) and decreases of nearly 10% in type 2 diabetes as the area transitions to moderate density mixed-use and compact residential and commercial design. Subarea B exhibited the highest levels of positive change on 7 of 8 physical activity measures, 5 of 6 of the health behavior measures, and 1 of 3 general and mental health measures. Subarea C indicated the highest levels of change in the healthy direction on 1 of 6 of the health behavior measures and 2 of 3 general and mental health measures. Subarea A only outperformed Subarea B and C on a single measure – duration of recreational physical activity – the same measure where it outperformed the balance of the SSPZ.

The health outcome results for both the subareas, and the SSPZ as a whole, for both Scenario 4 and 5 indicated significant positive health increases for 2035. Health outcome estimates for Scenario 4 exhibited large increases over those forecasted for Scenario 1, 2A, and 3 for nearly every measure evaluated. Scenario 5 increased these positive health changes even further. It should be noted that the shift upward in positive health indicators was largest between Scenario 4 and Scenario 1, 2A, and 3, while the differences between Scenario 4 and 5 were smaller. This was consistent with the considerable changes made in the densities of the development placetypes from Scenario 2A to Scenario 4, and the relatively smaller changes in densities between Scenario 4 and 5.

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6 Appendix A: Scenario 4 Development Placetype Characteristics

Table 16 summarizes the proposed residential building type mix to be assigned to each development placetype for Scenario 4. Table 17 reviews the proposed commercial building type mix to be assigned to each development placetype for Scenario 4.

Table 16: Summary of residential building type mix assigned to each development placetype for Scenario 4.

#	*Development Type*	*Total Residential*	*Total Non-Residential*	*Mixed-Use Residential*			*Multi-Family*				*Single Family*	
				15 Story	*5 Story*	*< 5 Story*	*Small Unit*	*Large Unit*	*Suburban*	*Duplex*	*Townhome*	*Single Family*
1	Downtown Residential	90%	10%	15%	20%	30%	25%	–	–	–	–	–
2	Suburban Multifamily	100%	0%	–	–	20%	60%	20%	–	–	–	–
3	Suburban Residential	100%	0%	–	–	–	–	–	–	–	80%	20%
4	Compact Neighborhood High	100%	0%	–	–	–	5%	20%	5%	10%	40%	20%
5	Compact Neighborhood Low	100%	0%	–	–	–	–	5%	15%	10%	25%	45%
6	Mixed-Use Corridor	30%	70%	–	10%	15%	5%	–	–	–	–	–
7	Downtown	25%	75%	10%	15%	–	–	–	–	–	–	–
8	Office Park	0%	100%	–	–	–	–	–	–	–	–	–
9	Town Neighborhood	75%	25%	–	10%	15%	20%	10%	–	5%	10%	5%

Table 17: Summary of commercials building type mix assigned to each development placetype for Scenario 4.

#	*Development Type*	*Total Residential*	*Total Non-Residential*	*Mixed-Use Office*			*Commercial*			*Office*	
				10 Story	*5 Story*	*2 Story*	*Main St. Commercial*	*Low-Density Commercial*	*Large Format Retail*	*Low-Rise Office*	*Civic Office*
1	Downtown Residential	90%	10%	5%	5%	–	–	–	–	–	–
2	Suburban Multifamily	100%	0%	–	–	–	–	–	–	–	–
3	Suburban Residential	100%	0%	–	–	–	–	–	–	–	–
4	Compact Neighborhood High	100%	0%	–	–	–	–	–	–	–	–
5	Compact Neighborhood Low	100%	0%	–	–	–	–	–	–	–	–
6	Mixed-Use Corridor	30%	70%	10%	20%	25%	15%	–	–	–	–
7	Downtown	25%	75%	25%	30%	20%	–	–	–	–	–
8	Office Park	0%	100%	5%	25%	50%	20%	–	–	–	–
9	Town Neighborhood	75%	25%	–	10%	5%	10%	–	–	–	–

7 Appendix B: Scenario 5 Development Placetype Characteristics

Table 18 summarizes the proposed residential building type mix to be assigned to each development placetype for Scenario 5. Table 19 reviews the proposed commercial building type mix to be assigned to each development placetype for Scenario 5.

Table 18: Summary of residential building type mix assigned to each development placetype for Scenario 5.

#	*Development Type*	*Total Residential*	*Total Non-Residential*	*Mixed-Use Residential*			*Multi-Family*				*Single Family*	
				15 Story	*5 Story*	*< 5 Story*	*Small Unit*	*Large Unit*	*Suburban*	*Duplex*	*Townhome*	*Single Family*
1	Downtown Residential	90%	10%	30%	35%	15%	10%	–	–	–	–	–
2	Suburban Multifamily	100%	0%	–	10%	40%	45%	5%	–	–	–	–
3	Suburban Residential	100%	0%	–	–	–	–	–	5%	10%	75%	10%
4	Compact Neighborhood High	100%	0%	–	–	–	10%	35%	5%	10%	30%	10%
5	Compact Neighborhood Low	100%	0%	–	–	–	–	10%	15%	15%	30%	30%
6	Mixed-Use Corridor	30%	70%	–	20%	10%	–	–	–	–	–	–
7	Downtown	25%	75%	15%	10%	–	–	–	–	–	–	–
8	Office Park	0%	100%	–	–	–	–	–	–	–	–	–
9	Town Neighborhood	75%	25%	–	25%	25%	10%	5%	–	5%	5%	–

Table 19: Summary of commercials building type mix assigned to each development placetype for Scenario 5.

#	*Development Type*	*Total Residential*	*Total Non-Residential*	*Mixed-Use Office*			*Commercial*			*Office*	
				10 Story	*5 Story*	*2 Story*	*Main St. Commercial*	*Low-Density Commercial*	*Large Format Retail*	*Low-Rise Office*	*Civic Office*
1	Downtown Residential	90%	10%	10%	–	–	–	–	–	–	–
2	Suburban Multifamily	100%	0%	–	–	–	–	–	–	–	–
3	Suburban Residential	100%	0%	–	–	–	–	–	–	–	–
4	Compact Neighborhood High	100%	0%	–	–	–	–	–	–	–	–
5	Compact Neighborhood Low	100%	0%	–	–	–	–	–	–	–	–
6	Mixed-Use Corridor	30%	70%	30%	25%	5%	10%	–	–	–	–
7	Downtown	25%	75%	40%	25%	10%	–	–	–	–	–
8	Office Park	0%	100%	15%	40%	35%	10%	–	–	–	–
9	Town Neighborhood	75%	25%	5%	10%	–	10%	–	–	–	–

8 Appendix C: Health Outcomes for Scenario 4 by Subarea in the SSPZ

Table 20, Table 21, and Table 22 show weighted baseline and Scenario 4 health outcomes for Subarea A for travel behavior and physical activity, health behaviors and cardiovascular disease, and general health and mental health status, respectively.

Table 20: Weighted travel behavior and physical activity estimates for baseline and Scenario 4 for Subarea A.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Daily minutes of walking for transportation	1.35 (0.19)	1.60 (0.05)	+0.25	+18.4%
Percent of daily walking for transport participation	13.6% (4.2%)	16.2% (3.6%)	+2.6%	+19.1%
Daily minutes of walking for leisure	13.36 (0.33)	13.71 (0.30)	+0.34	+2.6%
Percent of weekly walking for leisure participation	58.1% (0.6%)	58.7% (0.2%)	+0.6%	+1.0%
Daily minutes of bicycling for transportation	1.01 (0.02)	1.04 (0.005)	+0.02	+2.4%
Percent of daily bicycling for transport participation	0.7% (0.2%)	0.9% (0.1%)	+0.2%	+31.5%
Weekly minutes of recreational physical activity	56.62 (12.61)	56.60 (12.61)	-0.02	-0.03%
Percent of weekly recreational physical activity participation	0.1% (0.1%)	0.1% (0.1%)	+0.0%	+9.0%

Green = area shows improved health; red = area shows worse health

Table 21: Weighted health behaviors and cardiovascular disease estimates for baseline and Scenario 4 for Subarea A.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Average body mass index (BMI)	29.43 (0.43)	29.15 (0.21)	-0.28	-0.9%
Percent of the population with obese status (>30 BMI)	35.5% (2.6%)	33.6% (0.9%)	-1.9%	-5.4%
Percent of the population with overweight or obese status (>25 BMI)	71.2% (2.7%)	69.0% (2.0%)	-2.1%	-3.0%
Percent of the population with coronary heart disease	3.7% (0.5%)	3.5% (0.4%)	-0.2%	-5.2%
Percent of the population with high blood pressure	28.5% (3.1%)	26.8% (1.9%)	-1.8%	-6.2%
Percent of the population with type 2 diabetes	9.8% (1.8%)	8.9% (1.1%)	-0.9%	-9.0%

Green = area shows improved health; red = area shows worse health

Table 22: Weighted general health and mental health status estimates for baseline and Scenario 4 for Subarea A.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Percent of population reporting fair to poor general health status	30.1% (3.4%)	29.6% (3.3%)	-0.4%	-1.5%
Percent of population reporting depression	32.3% (1.6%)	32.0% (1.3%)	-0.3%	-0.9%
Percent of population reporting psychological distress	5.9% (0.7%)	5.7% (0.6%)	-0.2%	-3.5%

Green = area shows improved health; red = area shows worse health

Table 23, Table 24, and Table 25 show weighted baseline and Scenario 4 health outcomes for Subarea B for travel behavior and physical activity, health behaviors and cardiovascular disease, and general health and mental health status, respectively.

Table 23: Weighted travel behavior and physical activity estimates for baseline and Scenario 4 for Subarea B.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Daily minutes of walking for transportation	2.10 (0.62)	3.02 (0.90)	+0.92	+43.6%
Percent of daily walking for transport participation	20.8% (7.7%)	35.0% (10.4%)	+14.3%	+68.7%
Daily minutes of walking for leisure	13.77 (0.45)	15.74 (1.38)	+1.98	+14.4%
Percent of weekly walking for leisure participation	58.4% (0.1%)	60.9% (1.2%)	+2.5%	+4.2%
Daily minutes of bicycling for transportation	1.08 (0.04)	1.14 (0.04)	+0.06	+5.3%
Percent of daily bicycling for transport participation	1.4% (0.4%)	2.8% (0.9%)	+1.4%	+96.9%
Weekly minutes of recreational physical activity	47.94 (6.28)	47.90 (6.31)	-0.04	-0.1%
Percent of weekly recreational physical activity participation	0.2% (0.1%)	0.3% (0.2%)	+0.1%	+74.9%

Green = area shows improved health; red = area shows worse health

Table 24: Weighted health behaviors and cardiovascular disease estimates for baseline and Scenario 4 for Subarea B.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Average body mass index (BMI)	29.16 (0.58)	28.35 (0.67)	-0.81	-2.8%
Percent of the population with obese status (>30 BMI)	34.1% (4.0%)	28.7% (4.3%)	-5.4%	-15.9%
Percent of the population with overweight or obese status (>25 BMI)	67.2% (3.7%)	61.6% (4.6%)	-5.6%	-8.3%
Percent of the population with coronary heart disease	4.0% (0.6%)	3.5% (0.6%)	-0.5%	-11.5%
Percent of the population with high blood pressure	27.5% (3.8%)	23.0% (3.8%)	-4.5%	-16.5%
Percent of the population with type 2 diabetes	9.6% (2.2%)	7.7% (1.8%)	-1.9%	-19.5%

Green = area shows improved health; red = area shows worse health

Table 25: Weighted general health and mental health status estimates for baseline and Scenario 4 for Subarea B.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Percent of population reporting fair to poor general health status	29.8% (3.1%)	28.5% (2.4%)	-1.3%	-4.4%
Percent of population reporting depression	35.3% (3.1%)	34.3% (2.5%)	-1.0%	-3.0%
Percent of population reporting psychological distress	6.9% (0.8%)	6.0% (0.5%)	-0.9%	-12.9%

Green = area shows improved health; red = area shows worse health

Table 26, Table 27, and Table 28 show weighted baseline and Scenario 4 health outcomes for Subarea C for travel behavior and physical activity, health behaviors and cardiovascular disease, and general health and mental health status, respectively.

Table 26: Weighted travel behavior and physical activity estimates for baseline and Scenario 4 for Subarea C.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Daily minutes of walking for transportation	1.71 (0.25)	2.36 (0.30)	+0.65	+38.3%
Percent of daily walking for transport participation	20.6% (6.3%)	31.2% (5.1%)	+10.6%	+51.3%
Daily minutes of walking for leisure	12.92 (0.74)	13.63 (0.63)	+0.71	+5.5%
Percent of weekly walking for leisure participation	56.9% (1.0%)	58.1% (0.9%)	+1.1%	+2.0%
Daily minutes of bicycling for transportation	1.05 (0.02)	1.09 (0.02)	+0.05	+4.3%
Percent of daily bicycling for transport participation	1.0% (0.2%)	1.8% (0.2%)	+0.7%	+73.2%
Weekly minutes of recreational physical activity	39.80 (10.06)	39.74 (10.06)	-0.06	-0.2%
Percent of weekly recreational physical activity participation	0.1% (0.1%)	0.2% (0.1%)	+0.1%	+80.8%

Green = area shows improved health; red = area shows worse health

Table 27: Weighted health behaviors and cardiovascular disease estimates for baseline and Scenario 4 for Subarea C.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Average body mass index (BMI)	29.56 (0.35)	28.95 (0.34)	-0.61	-2.1%
Percent of the population with obese status (>30 BMI)	35.5% (2.8%)	31.3% (2.6%)	-4.2%	-11.7%
Percent of the population with overweight or obese status (>25 BMI)	70.3% (1.4%)	65.9% (1.4%)	-4.3%	-6.2%
Percent of the population with coronary heart disease	4.7% (1.0%)	4.2% (0.8%)	-0.5%	-11.2%
Percent of the population with high blood pressure	31.8% (5.5%)	27.8% (4.5%)	-4.0%	-12.5%
Percent of the population with type 2 diabetes	12.9% (3.2%)	10.7% (2.4%)	-2.2%	-17.3%

Green = area shows improved health; red = area shows worse health

Table 28: Weighted general health and mental health status estimates for baseline and Scenario 4 for Subarea C.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Percent of population reporting fair to poor general health status	36.9% (5.0%)	35.2% (4.8%)	-1.7%	-4.6%
Percent of population reporting depression	35.9% (2.9%)	34.3% (3.4%)	-1.6%	-4.4%
Percent of population reporting psychological distress	6.8% (0.9%)	6.0% (1.0%)	-0.8%	-12.1%

Green = area shows improved health; red = area shows worse health

9 Appendix D: Health Outcomes for Scenario 5 by Subarea in the SSPZ

Table 29, Table 30, and Table 31 show weighted baseline and Scenario 5 health outcomes for Subarea A for travel behavior and physical activity, health behaviors and cardiovascular disease, and general health and mental health status, respectively.

Table 29: Weighted travel behavior and physical activity estimates for baseline and Scenario 5 for Subarea A.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Daily minutes of walking for transportation	1.35 (0.19)	1.62 (0.07)	+0.27	+20.1%
Percent of daily walking for transport participation	13.6% (4.2%)	16.7% (4.1%)	+3.1%	+22.4%
Daily minutes of walking for leisure	13.36 (0.33)	13.74 (0.31)	+0.38	+2.8%
Percent of weekly walking for leisure participation	58.1% (0.6%)	58.7% (0.2%)	+0.6%	+1.0%
Daily minutes of bicycling for transportation	1.01 (0.02)	1.04 (0.01)	+0.03	+2.6%
Percent of daily bicycling for transport participation	0.7% (0.2%)	0.9% (0.1%)	+0.2%	+34.7%
Weekly minutes of recreational physical activity	56.62 (12.61)	56.60 (12.62)	-0.02	-0.03%
Percent of weekly recreational physical activity participation	0.1% (0.1%)	0.1% (0.1%)	+0.01%	+9.7%

Green = area shows improved health; red = area shows worse health

Table 30: Weighted health behaviors and cardiovascular disease estimates for baseline and Scenario 5 for Subarea A.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Average body mass index (BMI)	29.43 (0.43)	29.13 (0.19)	-0.30	-1.0%
Percent of the population with obese status (>30 BMI)	35.5% (2.6%)	33.4% (0.9%)	-2.1%	-5.8%
Percent of the population with overweight or obese status (>25 BMI)	71.2% (2.7%)	68.9% (1.9%)	-2.3%	-3.2%
Percent of the population with coronary heart disease	3.7% (0.5%)	3.5% (0.4%)	-0.2%	-5.6%
Percent of the population with high blood pressure	28.5% (3.1%)	26.7% (1.9%)	-1.9%	-6.6%
Percent of the population with type 2 diabetes	9.8% (1.8%)	8.9% (1.0%)	-0.9%	-9.6%

Green = area shows improved health; red = area shows worse health

Table 31: Weighted general health and mental health status estimates for baseline and Scenario 5 for Subarea A.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Percent of population reporting fair to poor general health status	30.1% (3.4%)	29.7% (3.3%)	-0.4%	-1.4%
Percent of population reporting depression	32.3% (1.6%)	32.0% (1.3%)	-0.3%	-0.8%
Percent of population reporting psychological distress	5.9% (0.7%)	5.7% (0.6%)	-0.2%	-3.5%

Green = area shows improved health; red = area shows worse health

Table 32, Table 33, and Table 34 show weighted baseline and Scenario 5 health outcomes for Subarea B for travel behavior and physical activity, health behaviors and cardiovascular disease, and general health and mental health status, respectively.

Table 32: Weighted travel behavior and physical activity estimates for baseline and Scenario 5 for Subarea B.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Daily minutes of walking for transportation	2.10 (0.62)	3.19 (0.95)	+1.09	+51.7%
Percent of daily walking for transport participation	20.8% (7.7%)	37.4% (10.7%)	+16.6%	+80.0%
Daily minutes of walking for leisure	13.77 (0.45)	15.96 (1.46)	+2.19	+15.9%
Percent of weekly walking for leisure participation	58.4% (0.1%)	61.1% (1.3%)	+2.7%	+4.6%
Daily minutes of bicycling for transportation	1.08 (0.04)	1.14 (0.04)	+0.06	+5.9%
Percent of daily bicycling for transport participation	1.4% (0.4%)	2.9% (1.0%)	+1.5%	+109.6%
Weekly minutes of recreational physical activity	47.94 (6.28)	47.90 (6.31)	-0.04	-0.1%
Percent of weekly recreational physical activity participation	0.2% (0.1%)	0.3% (0.2%)	+0.2%	+91.0%

Green = area shows improved health; red = area shows worse health

Table 33: Weighted health behaviors and cardiovascular disease estimates for baseline and Scenario 5 for Subarea B.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Average body mass index (BMI)	29.16 (0.58)	28.24 (0.67)	-0.92	-3.2%
Percent of the population with obese status (>30 BMI)	34.1% (4.0%)	28.0% (4.2%)	-6.1%	-18.0%
Percent of the population with overweight or obese status (>25 BMI)	67.2% (3.7%)	60.9% (4.6%)	-6.4%	-9.5%
Percent of the population with coronary heart disease	4.0% (0.6%)	3.5% (0.5%)	-0.5%	-13.3%
Percent of the population with high blood pressure	27.5% (3.8%)	22.4% (3.9%)	-5.1%	-18.7%
Percent of the population with type 2 diabetes	9.6% (2.2%)	7.5% (1.7%)	-2.1%	-22.0%

Green = area shows improved health; red = area shows worse health

Table 34: Weighted general health and mental health status estimates for baseline and Scenario 5 for Subarea B.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Percent of population reporting fair to poor general health status	29.8% (3.1%)	28.0% (2.1%)	-1.8%	-5.9%
Percent of population reporting depression	35.3% (3.1%)	34.1% (2.3%)	-1.2%	-3.5%
Percent of population reporting psychological distress	6.9% (0.8%)	5.8% (0.5%)	-1.1%	-15.3%

Green = area shows improved health; red = area shows worse health

Table 35, Table 36, and Table 37 show weighted baseline and Scenario 5 health outcomes for Subarea C for travel behavior and physical activity, health behaviors and cardiovascular disease, and general health and mental health status, respectively.

Table 35: Weighted travel behavior and physical activity estimates for baseline and Scenario 5 for Subarea C.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Daily minutes of walking for transportation	1.71 (0.25)	2.44 (0.31)	+0.74	+43.2%
Percent of daily walking for transport participation	20.6% (6.3%)	32.8% (5.2%)	+12.2%	+58.9%
Daily minutes of walking for leisure	12.92 (0.74)	13.75 (0.60)	+0.83	+6.4%
Percent of weekly walking for leisure participation	56.9% (1.0%)	58.2% (0.8%)	+1.3%	+2.3%
Daily minutes of bicycling for transportation	1.05 (0.02)	1.10 (0.02)	+0.05	+4.7%
Percent of daily bicycling for transport participation	1.0% (0.2%)	1.9% (0.2%)	+0.8%	+81.7%
Weekly minutes of recreational physical activity	39.80 (10.06)	39.73 (10.06)	-0.07	-0.2%
Percent of weekly recreational physical activity participation	0.1% (0.1%)	0.2% (0.1%)	+0.1%	+95.3%

Green = area shows improved health; red = area shows worse health

Table 36: Weighted health behaviors and cardiovascular disease estimates for baseline and Scenario 5 for Subarea C.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Average body mass index (BMI)	29.56 (0.35)	28.89 (0.35)	-0.67	-2.3%
Percent of the population with obese status (>30 BMI)	35.5% (2.8%)	30.9% (2.7%)	-4.6%	-12.9%
Percent of the population with overweight or obese status (>25 BMI)	70.3% (1.4%)	65.5% (1.5%)	-4.8%	-6.8%
Percent of the population with coronary heart disease	4.7% (1.0%)	4.1% (0.8%)	-0.6%	-12.3%
Percent of the population with high blood pressure	31.8% (5.5%)	27.4% (4.3%)	-4.4%	-13.8%
Percent of the population with type 2 diabetes	12.9% (3.2%)	10.5% (2.3%)	-2.4%	-18.9%

Green = area shows improved health; red = area shows worse health

Table 37: Weighted general health and mental health status estimates for baseline and Scenario 5 for Subarea C.

Health Outcome	*Weighted Mean (Weighted SD)*		*Absolute Change*	*Percent Change*
	Baseline	*Scenario 4*		
Percent of population reporting fair to poor general health status	36.9% (5.0%)	35.0% (4.8%)	-1.9%	-5.1%
Percent of population reporting depression	35.9% (2.9%)	34.3% (3.5%)	-1.6%	-4.6%
Percent of population reporting psychological distress	6.8% (0.9%)	5.9% (1.0%)	-0.9%	-12.9%

Green = area shows improved health; red = area shows worse health