Chapter 4:
Scenario Analysis

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There are a variety of trends seen in the region as well as across the nation that will influence the transportation network and future investment decisions. Development, demographic and socioeconomic characteristics all impact how people are able to and choose to travel to access the goods and services they need. Other items such as personal preferences, culture, and technology may also impact the future of our transportation network. This chapter serves to highlight recommendations that provide decision-makers with important information that will shape future transportation policies and investment decisions.

Scenario Analysis & Recommendations

Scenario Analysis

When planning for the future transportation network it is important to analyze various complex and rapidly changing forces that affect growth and development. Looking at population projections to the year 2045, the region may see an increase in population of over 66,390 residents (659,266 total), which is more than a 10% total increase in population. At the same time, aging Baby Boomers are downsizing and homeownership demand from younger generations, such as Millennials, is insufficient to fill the void. This is often attributed to younger generations renting for longer periods and often making different housing choices than their parents. These factors and many others impact the way that the region may grow.

For the 2045 Transportation Plan, MACOG utilized scenario planning to identify the performance implications on multiple scenarios. These assumed several potential future changes to the region including the impacts of significant historical growth compared to flat line future growth as well as varying the density of growth compared to traditional trends. The ultimate goal for the transportation plan was to build a knowledgebase of the ways that scenario planning methods, metrics, processes, and outcomes can enhance transportation decision making in the region.

Development of the scenarios for the long range plan began with public outreach where staff visited local events and farmer's markets to administer surveys and collect public input. Online surveys asked individuals how they felt the region is developing and what were the major issues or drivers influencing growth and development. The following section provides a brief description of the scenarios and the outcomes related to each scenario.

High Growth Scenario

For the development of the high growth scenario, historical growth rates from the decennial Censuses dating back to the 70's were reviewed to determine the highest compounded annual growth rates covering any 10-year period for each county, city, and town. The population growth rate was carried forward to 2045 and represents the potential extremes of population growth over the next 25 years of the transportation plan. The 2045 population control totals for the 4-counties was based on an annual growth rate of 1.7% in Elkhart County, 2.2% in Kosciusko County, 1.1% in Marshall County, and 0.7% in St. Joseph County. This resulted in a regional population of 879,323 by 2045.

With this growth in mind, MACOG held stakeholder meetings where elected officials, community planners, economic development corporations, and others were asked where growth was likely to occur in the areas they represented. Representatives of the counties, cities, and towns in attendance were given a number of blocks to represent the population growth they might see as predicted by the high growth calculations. These blocks were issued to them in 10-year increments (2015-2025, 2025-2035, and 2035-2045) to simulate incremental growth. After each round of distributing

the population growth for a 10-year period, stakeholders were then tasked with identifying areas of commercial, retail, and industrial growth in response to the assigned populations. With each round compounding on the last, distributing the population associated with the high growth scenario often resulted with representatives focusing on higher densities of residential development, especially in larger cities.

These maps from the stakeholder meetings were then digitized, with the data being used as inputs to the HelpVIZ land use model for Elkhart and St. Joseph County. Control totals for the combined future population of the two counties were calculated for 2025, 2035, and 2045 as well as the estimation of future trends in employment adjusted from Woods and Poole forecasts for each of the three horizon years.

For Kosciusko and Marshall County, the data was processed based on a methodology developed by the Hillsborough County MPO in Tampa, Florida. Allocation of population and employment to vacant developable lands was accomplished using a multi-step process that culminated in the allocation of growth based on the results of a gravity model. The gravity model distributed growth based on the attractiveness of Census Blocks multiplied by the attractiveness of an activity centroid, divided by the square of the distance between the two blocks. This process was repeated for each city and town within the rural counties after which the control totals for the cities and towns were subtracted from the control totals for each county and the process was repeated one additional time for each county. Figure 4-1 at the end of the chapter, highlights the population changes and development trends for the high-growth scenario.

Figure 4-2 is the level of service map for the high-growth scenario resulting from a no build modeling run of the travel demand model. Only programmed projects already completed or included in the 2020-24 TIP are included in the no build model.

Baseline Scenario

The baseline scenario represents the traditional socioeconomic data used by the travel demand model, essentially the preferred scenario. The Baseline scenario utilizes future growth forecasts as predicted by Woods and Poole. This scenario represents a conservative population growth based on traditional socioeconomic data. The growth includes an additional 66,390 people in the region over the next 25 years.

The forecasted population and employment data was fed into the land use model for Elkhart and St. Joseph County and for Kosciusko and Marshall County the data was processed based on a methodology originally developed by the Hillsborough County MPO in Tampa, Florida. Figure 4-3 highlights the population changes and development trends for the baseline scenario.

The level of service map depicted in Figure 4-4, shows the baseline scenario resulting from a no build modeling run of the travel demand model. Again, only programmed projects already completed or included in the 2020-24 TIP are included in the no build model.

Low Growth Scenario

A similar process was used for the low growth scenario, reviewing historical growth rates from the decennial Censuses to identify times of the lowest population growth in the region. This included at times, even a decline in population for some areas. Again, once the annual growth rates were estimated, the results were entered into the HelpVIZ land use model and the Hillsborough County MPO's population distribution practice in order to grow 2015 model population inputs to 2045 population forecasts.

After extensive review and analysis of the low growth scenario against the baseline scenario, numerous similarities between the two scenarios were noted. With similar population and employment forecasts, it was decided to remove the low growth scenario from the final tabulation of scenarios.

Urban Growth Scenario

A different approach was utilized for the urban growth scenario, which represented a focused development pattern geared toward infill. The base methodology employed for this scenario involved dividing the traffic analysis zones (TAZ)

for the baseline scenario into four categories - an urban core, a halo area surrounding the urban core, and rural areas of the region. Annual growth rates for each TAZ were then estimated, allowing the calculation of the standard deviation of growth by each category. As a starting point to synthesize high-density development, twice the standard deviation was added to each TAZ growth rate in the urban core, twice the standard deviation was subtracted from each TAZ growth rate in the rural areas, and a fraction of the standard deviation was used in the halo zones to keep the population growth in line with the total population of the baseline scenario.

After multiple iterations of the concept, a fourth category was added representing the central business district (CBD) of the major cities in the region. The final multipliers used added a standard deviation to the CBD and 0.25 standard deviations to the urban core. To balance the population growth, a single standard deviation was subtracted from the halo zones and two standard deviations were subtracted from the rural areas, keeping the overall total population similar to the total population of the baseline scenario. Figure 4-5 highlights the population changes and development trends for the urban growth scenario.

The level of service map, Figure 4-6, shows the urban growth scenario resulting from a no build modeling run of the travel demand model.

Results of the Scenario Analysis

The scenario planning results show how different growth trends and land use patterns impact the transportation network. Ultimately, MACOG is not selecting a preferred scenario but rather will use these results in conjunction with other information, such as further data analysis and public feedback, to answer policy questions and prioritize projects for the Transportation Improvement Plan over the next 25 years.

Not only is it informative to see a regional level of service map, understanding how each project performs in these scenarios provides additional details. The 2045 Transportation Plan project list was calculated with the outputs for each scenario in order to classify the worst level of service of each segment of a project by 2045. This resulted in a chart of transportation plan projects with a single, worst-case level of service for each of the three scenarios - baseline, high-growth, and urban growth, which can be found in Appendix H. These scenarios enable planners, the public, and decision makers to consider jointly the different variables that influence and are influenced by transportation to ensure careful consideration of different public policy and investment decisions to support a broader set of community goals.

Scenario Planning Maps

Figure 4-1: High Growth Scenario Population Map

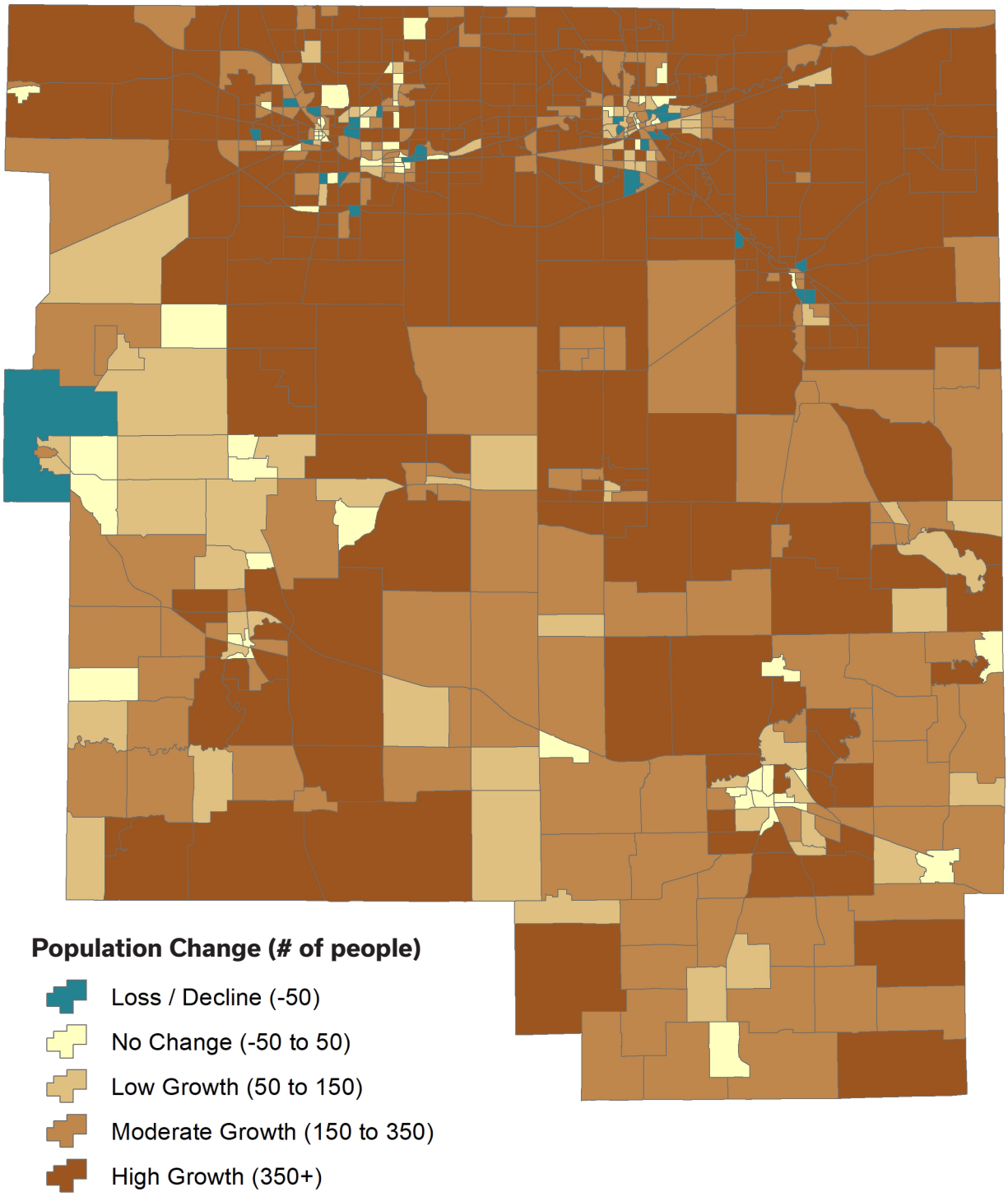

Figure 4-2: Level of Service Map - High-Growth Scenario

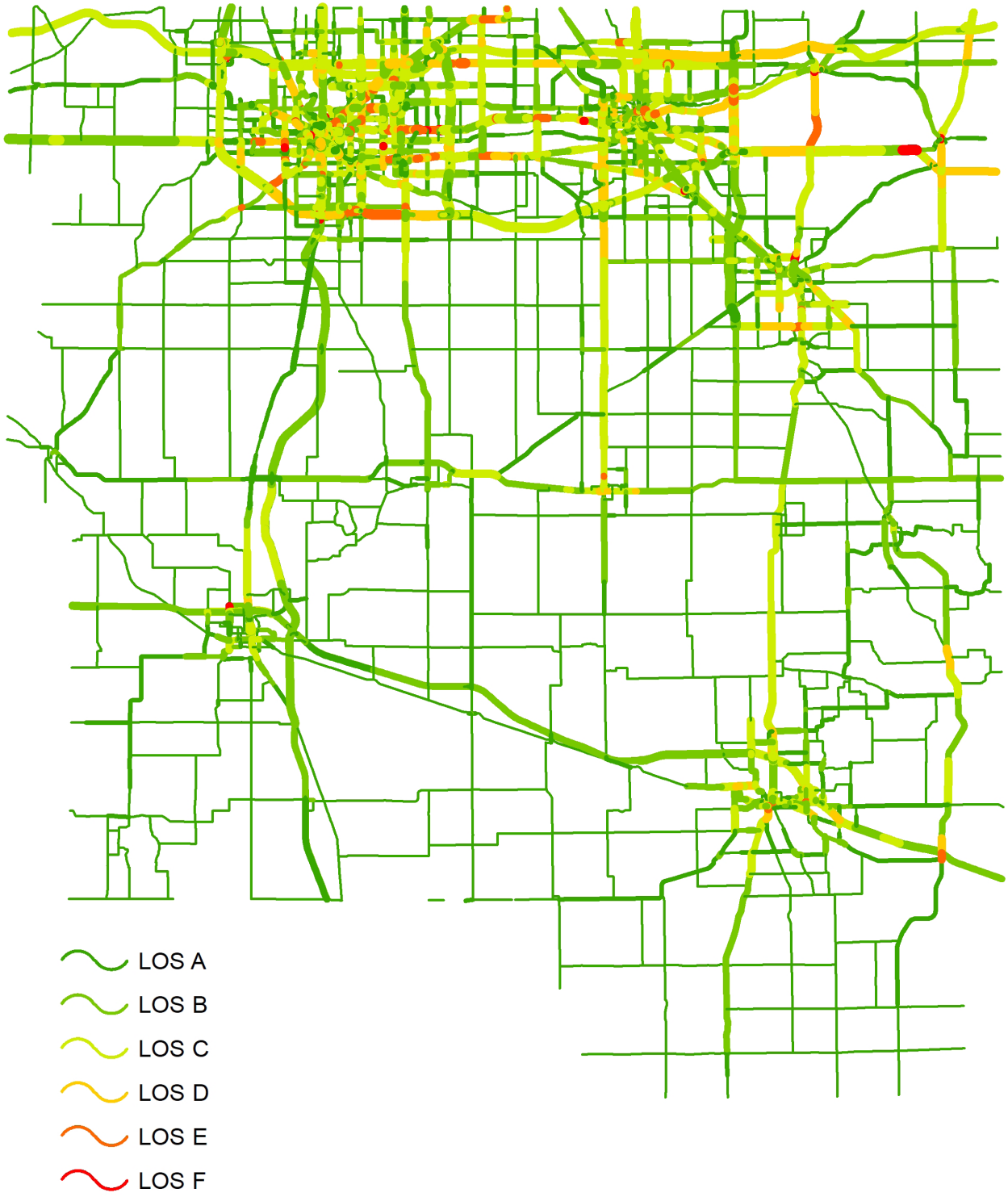

Figure 4-3: Baseline Scenario Population Map

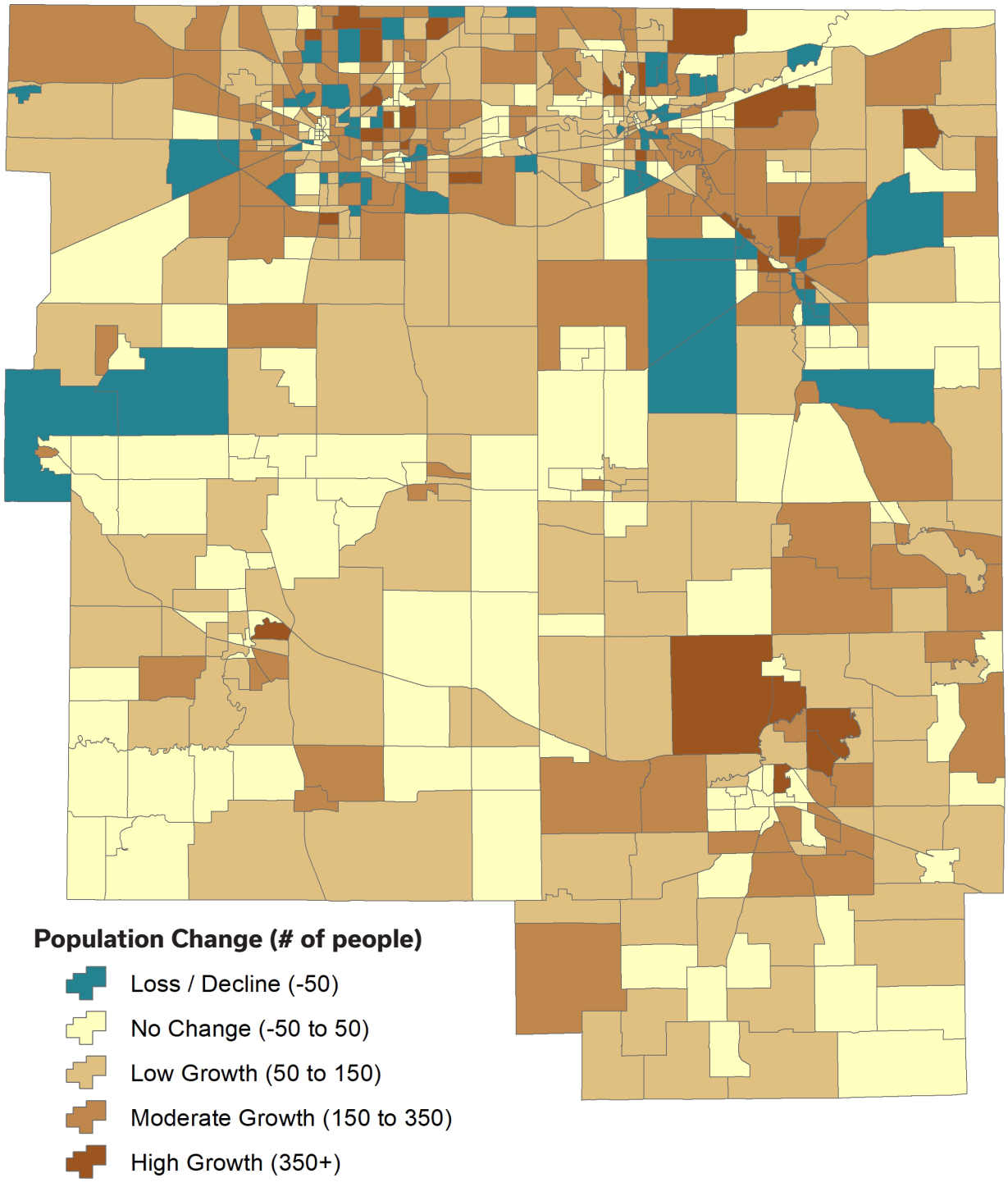

Figure 4-4: Level of Service Map - Baseline Scenario

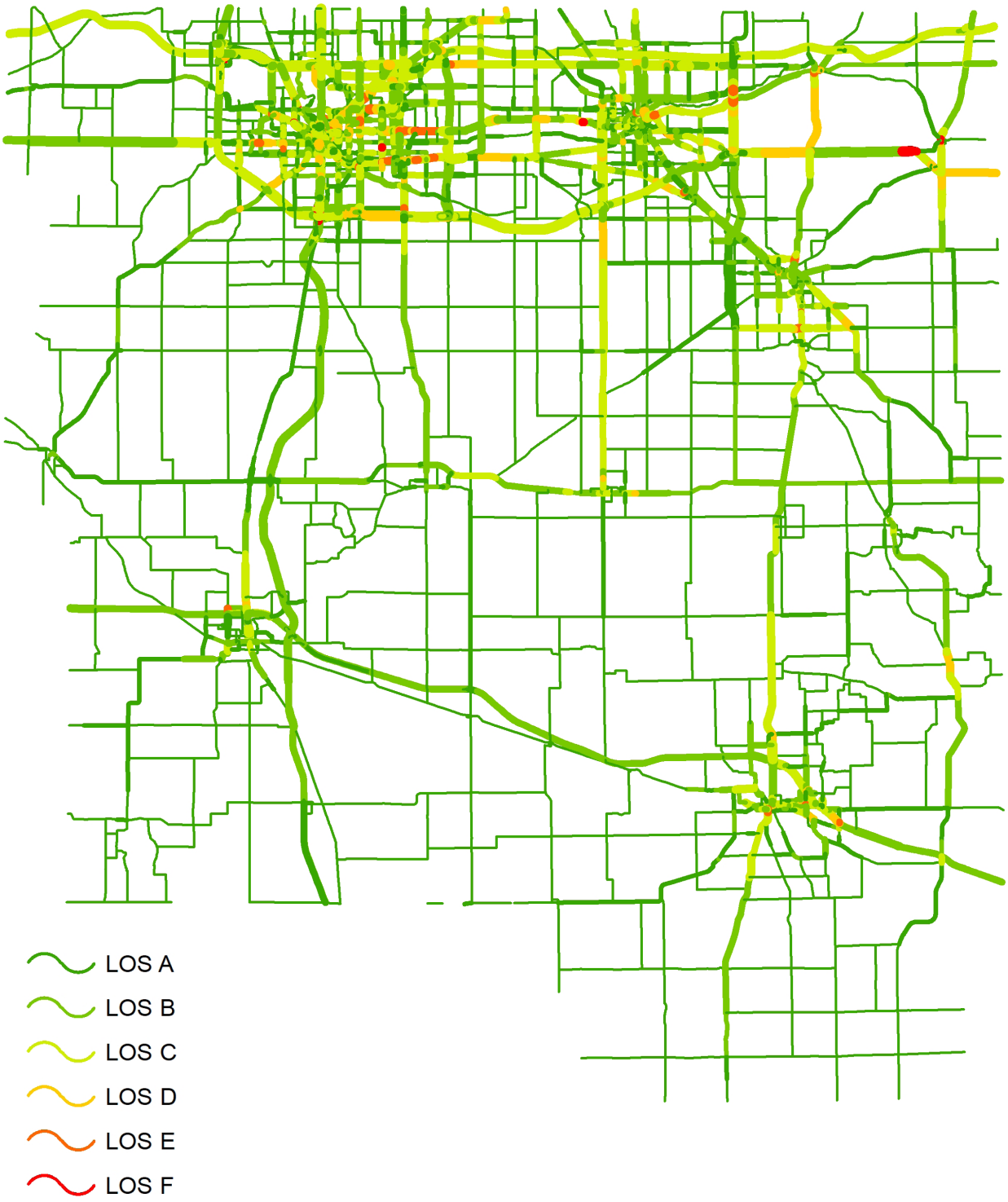

Figure 4-5: Urban Growth Scenario

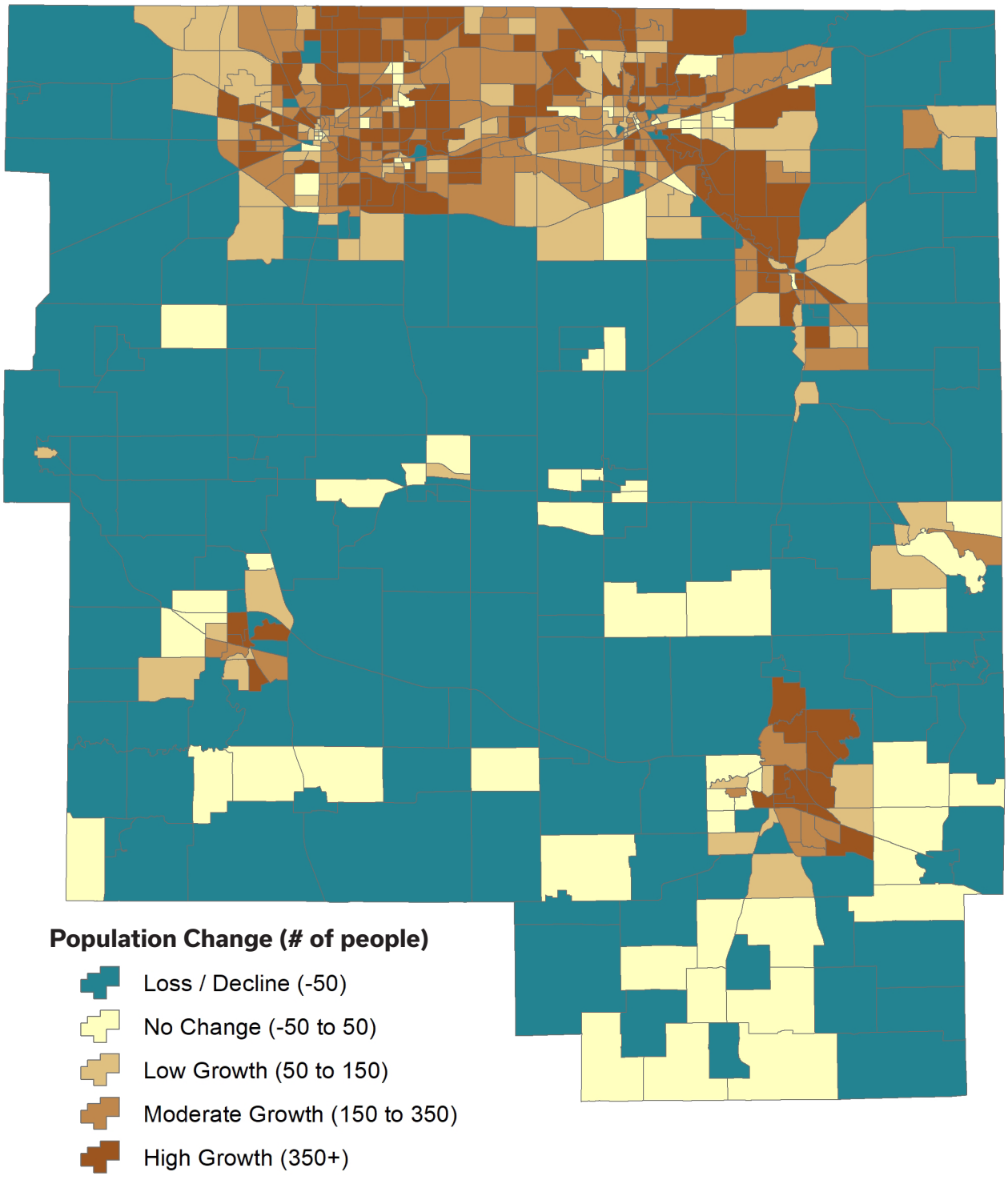

Figure 4-6: Level of Service Map - Urban Growth Scenario