SOUTHWEST AREA TRANSPORTATION AND LAND USE STUDY

Evaluation of the Business-As-Usual Scenario

Technical Memorandum - #2

EVALUATION OF THE BUSINESS-AS-USUAL SCENARIO

Using methodologies prescribed by the MPO, the Business-as-Usual (BAU) scenario was modeled and analyzed as the baseline forecast condition. As its name implies, the BAU scenario is intended to replicate in a generalized way the current land use policies of respective jurisdictions in allocating the predicted future population and employment figures across the MPO region.

This technical memorandum summarizes the key outcomes of the business-as-usual land use model as a baseline growth scenario using both land use and transportation performance measures. It also characterizes the resultant impacts of the BAU land use scenario on the regional transportation-related goals.

1. MAKEUP OF THE BAU

The BAU scenario was developed by the MPO in 2009 to help predict the effect of current trends in development within the Nashville region over the next 25 years. To varying degrees, input was received from local jurisdictions within the region in the form of future land use policies and resulting development thresholds to help develop the scenario. The BAU is comprised of three basic analytical components, parcel suitability, future land use, and character area, and results in the automated allocation of control totals of population and employment across all parcels in the target county. The BAU scenario must be analyzed one county at a time and only for an entire county.

1.1 Suitability

The suitability score of each parcel is determined by various factors which predict the attractiveness of a parcel for future development. Readily quantifiable factors such as current land value, the presence of utilities, and proximity to higher capacity roadways are used, but harder to quantify factors like perceived quality of schools or business incentives are not. Parcels that have existing development or severe environmental constraints are not included in the suitability analysis and are therefore not assigned any new growth allocation.

Each parcel is assigned a unique suitability score ranging from 1 (lowest suitability) to 100 (highest suitability) that is relative within each county and is based on the following 13 factors:

- Proximity to major intersections
- Proximity to regional roads
- Proximity to parks
- Proximity to transit stations (rail)
- Median per acre land value (by census block)
- Within ¼ mile of bus route
- Impact of flood zone
- Impact of steep slopes
- Presence of rare/endangered species
- Employee density in nearest 2 mile area
- Employee density in nearest ½ mile area
- Presence of sanitary sewer
- Presence of municipal water service

The suitability analysis assumes that none of these factors is more important or has any more impact on the likelihood of future development than any other. Neither does a poor score in any one factor rule out the likelihood of growth allocation. For example, a parcel may be located where the lack of sewer precludes development based on jurisdictional ordinance, but the suitability analysis only makes this development less likely based on the sewer provision factor.

The study area suitability score map is given as Figure 1.1.

1.2 Future Land Use

Generally derived from the local planning efforts of individual jurisdictions, future land use predicts what kind of development will occur. Future land use is not legally binding, but local zoning may be reflective of future land use policies. Future land use is assumed to remain constant through all planning horizons.

All parcels within the study area have been identified as having one of ten future land uses: Agricultural (AGR), Open Space (OS), General Residential (RES), Single Family Residential (SFR), Multi-Family Residential (MFR), Mixed Use (MU), General Commercial (GC), Office (O), Industrial (IND), and Institutional/Public (IPF). Figures 1.2 and 1.3 break down the future land use of Williamson County, showing that at the heart of this subregion is a large amount of rural and/or low-density residential land. The future land use map (Figure 1.2) illustrates how these low-density areas surround centers of more dense and diverse land uses and are occasionally bisected by commercial corridors.

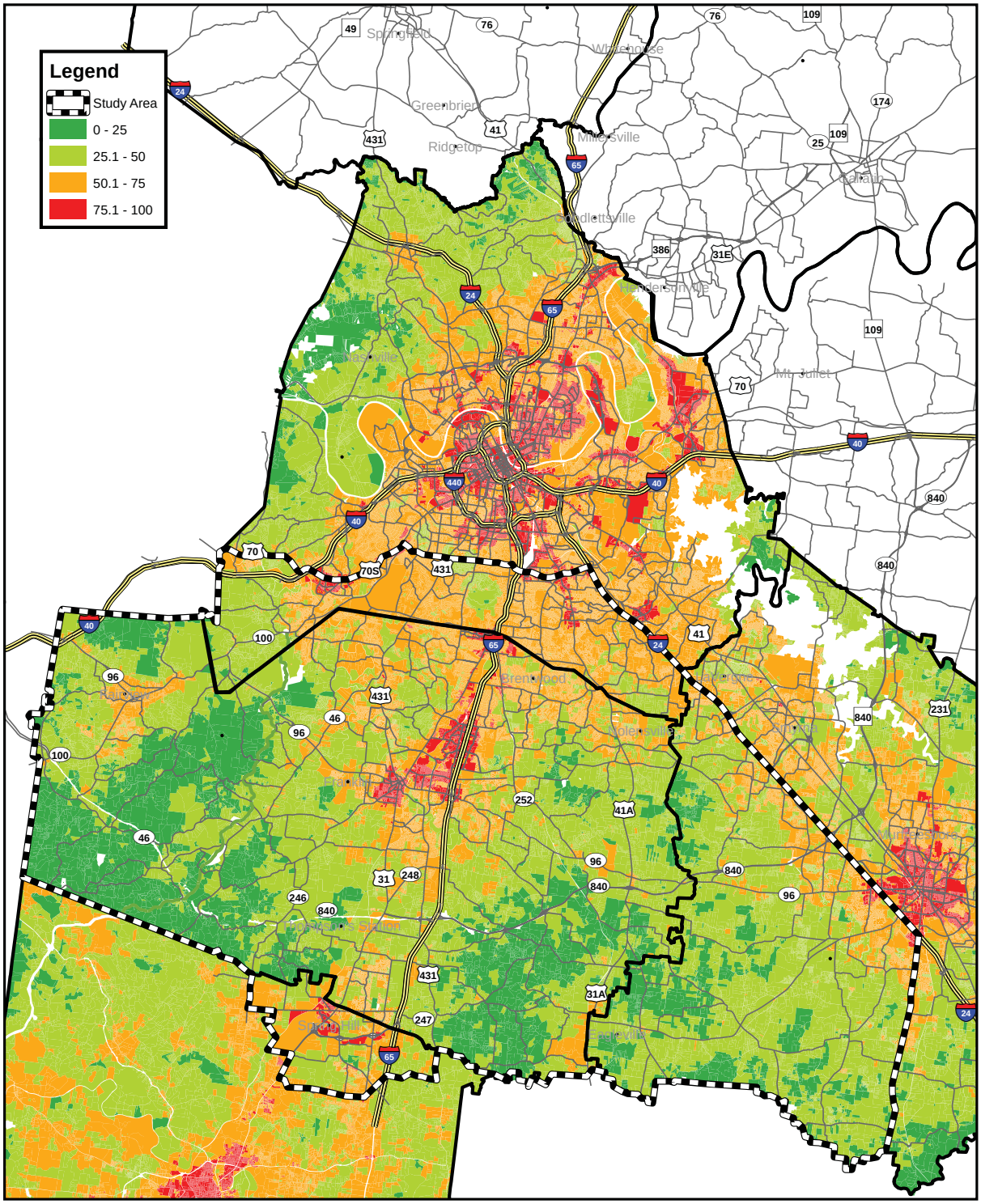

Figure 1.1 Parcel Suitability Scores, BAU

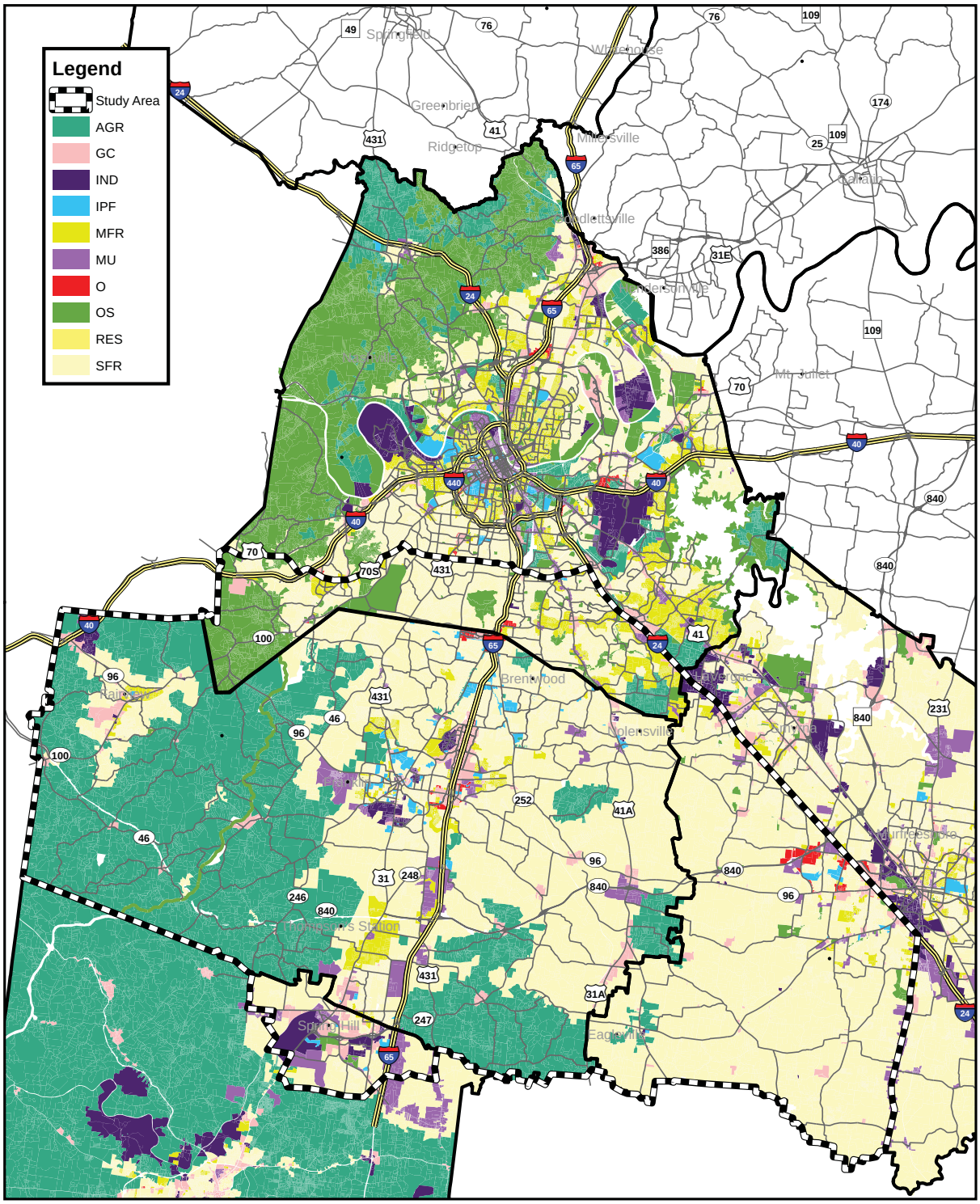

Figure 1.2 Future Land Use, BAU

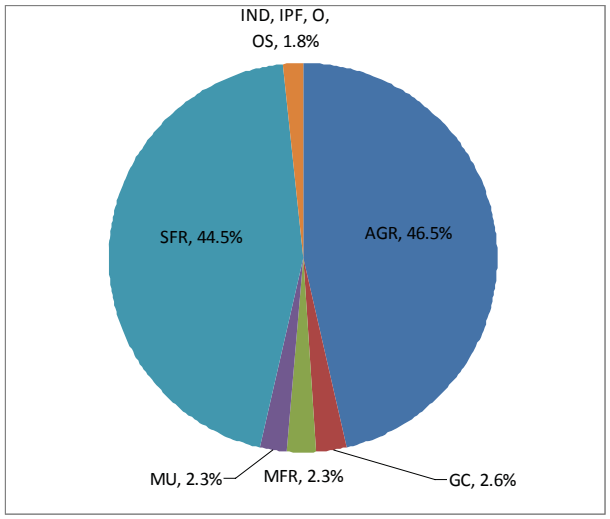

Figure 1.3 Future land use in Williamson County is dominated by agricultural and single family residential uses.

1.3 Character Area

The third component of the BAU scenario is character area, which defines the contextual character of future development for each parcel. Nine unique character areas exist within the MPO model, each having unique development thresholds based on jurisdiction and future land use.

The nine character areas are: Conservation Area (CA), Rural (R), Suburban (SU), Village (V), Activity Center (AC), Employment Center (EC), General Urban (GU), Traditional Town Center (TTC), and Urban Core (DTC).

As shown in the BAU Character Area Map (Figure 1.4), much of the subregion in the BAU scenario is classified with a suburban character area. Large portions of unincorporated Williamson County are rural, with portions of the western county being conservation area due to topography limitations. The rural character area is also prominent in western Rutherford County. Use of the general urban character area is limited to small inner-ring areas around downtowns, except in Davidson County where a significant portion of south Nashville is given as general urban, following Metro's urban services district.

Character Area	Typical Uses	Typical Development Densities
Conservation Area (CA)	Farms, large lot single family residential, open space	1 DU per 5 ac
Rural (R)	Farms, single family residential (incl. conservation subdivision), open space	1 DU per 1 ac - 1 DU per 5 ac
Suburban (SU)	Single family residential, limited multi-family residential, general commercial, mixed use (residential emphasis), office, limited light industrial	1 DU per 1 ac - 1 DU per 0.2 ac FAR = 0.2 - 0.3
Village (V)	Single family residential, small-scale commercial, limited institutional	1 DU per 1 ac - 1 DU per 0.25 ac FAR = 0.2 - 0.4
General Urban (GU)	Single family residential, multi-family residential, general commercial, mixed use (commercial emphasis), office, limited light industrial	1 DU per 0.5 ac - 1 DU per 0.1 ac FAR = 0.5 - 0.9
Employment Center (EC)	General commercial, office, light and heavy industrial	FAR = 0.2 - 0.9
Activity Center (AC)	General commercial, office, limited light industrial, limited residential	1 DU per 0.2 ac FAR = 0.9
Traditional Town Center (TTC)	Limited single family residential, multi-family residential, general commercial, mixed use (commercial emphasis), office, institutional, limited light industrial	1 DU per 0.2 ac - 1 DU per 0.1 ac FAR = 0.9
Urban Core (DTC)	Multi-family residential, mixed use (commercial emphasis), limited general commercial, office, institutional	1 DU per 0.1 ac FAR = 5.0

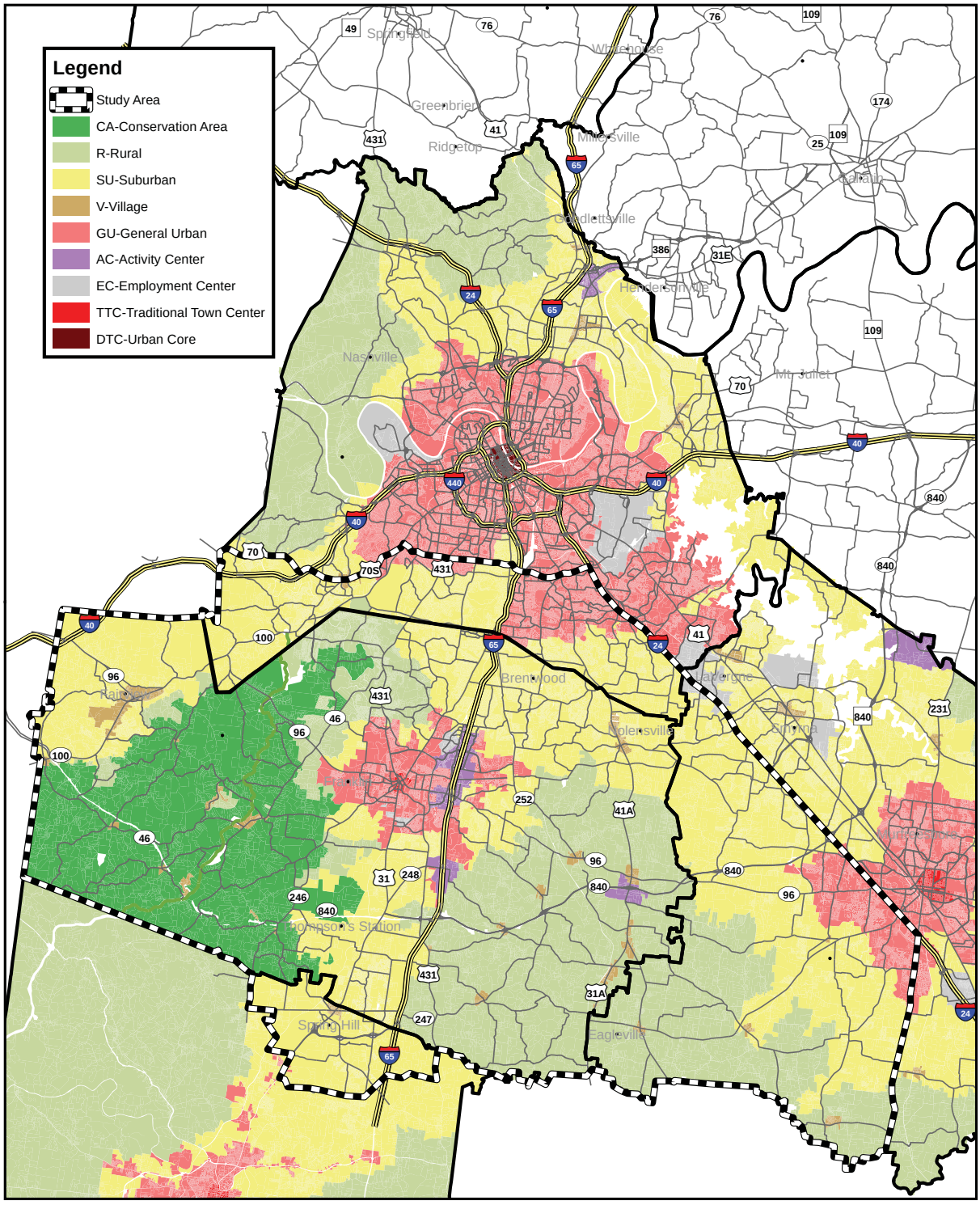

Figure 1.4 Character Area, BAU

1.4 BAU Development Summary

Given the descriptive title of business-as-usual, jurisdictions may be inclined to understand the scenario as a reflection of current practices projected into the future planning horizon. However, the BAU scenario may more accurately be understood as a snapshot of today's planning conditions under future demographic conditions. Some of the limitations of the model that preclude a true business-as-usual approach include:

- Static suitability – While today's local planning decisions actually account for things like new road construction, utility extensions, or transit services, the BAU model only considers suitability as it existed in 2009, and not in any future planning horizon.
- Other suitability considerations – The suitability analysis is also limited by several assumptions that are not reflective of a true business-as-usual methodology:
    - Suitability considers all factors equally. In reality, it is expected that the presence of utilities, for example, would be more critical to new development than transit service – particularly in more rural areas of the subregion.
    - Some important factors like school zoning are somewhat subjective, and difficult to include in the suitability analysis.
    - The concept of suitability in itself makes major assumptions as to the feasibility of development. For example, the presence of endangered species or the lack of utilities may prevent development altogether, not just make it less likely. This concept is a major reason that rural areas experience significant population growth in the BAU. Though suitability is average and densities are low, the amount of open land results in higher-than-expected residential growth where actual economic considerations may make such growth unlikely.
    - Some suitability factors may be linked and therefore "double counted". For example, a high land value (a suitability factor) may be the result of other suitability factors such as a lack of environmental constraints and access to regional roadways.

An aspect of the BAU model that does consider future conditions is the future land use/character area interaction that defines the parcel growth specifics. Generally, these components of the model appear verifiable by local planning offices. A common concern was the assumed residential densities found in general urban and suburban areas. For example, new development within the Crieve Hall, Tusculum, and Priest Lake areas of Nashville is assumed to have a density of 7.5 dwelling units per acre, and a density of 10 units per acre is assumed for residential development within the Franklin City Limits.

Overall, the BAU model is an objective tool used to predict allocations of countywide demographic control total values using a consistent methodology. As such, and despite its limitations, this scenario provides a baseline for alternative growth scenarios for the Southwest subregion.

2. BAU LAND USE RESULTS

2.1 Residential Growth Allocations

A primary role of the land use modeling procedure is to objectively allocate projected population and employment growth throughout the study area. As previously described, using a combination of each parcel's suitability for development, expected future land use, and contextual attributes (character area), the BAU model makes these allocation decisions.

Growth allocations were run independently for each county. That is, growth figures defined by control totals for each county were allocated within each county respectively. However, within each county, the growth is allocated based on this combination of suitability, future land use, and character area, irrespective of individual jurisdictions within the county.

Williamson County is the only county wholly within the study area, and therefore its growth attributes have the greatest influence on the BAU analysis of the subregion. Because only Williamson County jurisdictions are wholly represented within the study area, only the demographic allocations of these jurisdictions are reported. In the model, the seven jurisdictions within the county divided approximately 225,000 new residents and approximately 154,000 new jobs through the 2035 horizon year. The individual analysis areas have been given abbreviated names as follows:

BNT = Land within Brentwood City Limits (using the latest available, as defined in 2009). 21,144 acres

BNTUGB = Land outside of the City Limits, but identified as part of Brentwood's Urban Growth Boundary. 7,327 acres

FRK = Land within Franklin City Limits (using the latest available, as defined in 2009). 18,744 acres

FRKUGB = Land outside of the City Limits, but identified as part of Franklin's Urban Growth Boundary. 25,663 acres

FRV = Land within Fairview City Limits (using the latest available, as defined in 2009). 5,523 acres

FRVUGB = Land outside of the City Limits, but identified as part of Fairview's Urban Growth Boundary. 25,786 acres

NOL = Land within Nolensville Town Limits (using the latest available, as defined in 2009). 3,269 acres

NOLUGB = Land outside of the Town Limits, but identified as part of Nolensville's Urban Growth Boundary. 8,199 acres

SPH = Land within Spring Hill City Limits (within Williamson County only, using the latest available limits, as defined in 2009). 5,627 acres

SPHUGB = Land outside of the City Limits, within Williamson County, and identified as part of Spring Hill's Urban Growth Boundary. 4,819 acres

TST = Land within Thompson's Station Town Limits (using the latest available, as defined in 2009). 6,348 acres

TSTUGB = Land outside of the Town Limits, but identified as part of Thompson's Station's Urban Growth Boundary. 10,108 acres

WLM = Land within unincorporated Williamson County and outside of any identified municipal Urban Growth Boundary. 214,081 acres

The allocated new population and employment for each analysis area through the year 2035 are shown in Table 2.1.

It is expected that through the 25–year planning horizon, population growth in this subregion will be centered around the I-65 corridor and,

Area	Allocated Population	Allocated Employment
BNT	10,100	2,811
BNTUGB	4,470	1,779
FRK	21,642	108,070
FRKUGB	36,176	9,128
FRV	18,865	6,618
FRVUGB	15,561	3,973
NOL	9,733	2,753
NOLUGB	17,339	1,795
SPH	5,092	5,499
SPHUGB	2,453	-
TST	9,599	228
TSTUGB	3,707	686
WLM	70,068	10,685
TOTAL	**224,805**	**154,025**

Table 2.1 Population and Employment Allocations in Williamson County (2008-2035)

particularly, the fringe areas around Franklin. Nolensville and Thompson's Station are two cities with major population increases predicted by the BAU procedures. Most other cities (Brentwood, Franklin, Fairview, Spring Hill) are expected to have lesser population changes. In most cases, where new population is expected, it is assumed by the BAU to be at a density level much beyond what exists today. The BAU scenario allows residential densities in areas like Oak Hill, Forest Hills, Fairview, Nolensville, and unincorporated Williamson County at least twice the current zoning maximums.

With the exception of the Grassland community, unincorporated areas of Williamson County are expected to see generally moderate to low-density population increases. The BAU procedures result in a prediction of considerable growth in the western half of Williamson County, despite topographic, roadway, and utility provisional needs and challenges.

2.2 Measures of Effectiveness

To evaluate the BAU scenario as a baseline condition and measure the growth impacts against other development scenarios, a schedule of measures of effectiveness (MOEs) as previously developed by the MPO was used. Fifteen individual land use MOEs were used. A discussion of these MOEs is more meaningful in relation to the alternative growth scenarios, and is provided in Tech Memo 4.

As a qualitative measure, the results of the BAU analysis and the resulting MOEs are informative with respect to the regional goals. The growth scenario results can reasonably by compared against seven of the eight regional goals for adequacy. A summary of how the BAU meets the regional goals within the Southwest subregion is given as Table 2.2.

2.3 BAU Results Outside of Williamson County

Though Williamson County is the most measurable portion of the subregion because of its total inclusion within the study area, the interaction of other portions of the study area affect the regional model as well. A map of the population allocations through 2035 for the study area is given as Figure 2.1.

Figure 2.1 shows strong population growth in the adjoining portions of Davidson and Rutherford Counties. The Maury County portion of Spring Hill also shows some residential growth, though most of Spring Hill's residential growth is expected to continue inside Williamson County. Population growth from adjoining counties under the BAU scenario might have a lesser impact on Williamson County roads due to its proximity to the I-24 corridor. Growth southwest of Murfreesboro and in southeast Davidson County would likely have more of a dependence on this interstate than on I-65 or any other Williamson County arterial.

Regional Goal	Degree Met	Comment
Goal #1 Maintain and Preserve the Efficiency, Safety, and Security of the Region's Existing Transportation Infrastructure.	X	Population growth in the unincorporated areas is likely to introduce new traffic deficiencies on rural routes.
Goal #2 Manage Congestion to Keep People and Goods Moving.	X	High levels of congestion extend throughout the central and eastern sectors.
Goal #3 Encourage Quality Growth and Sustainable Land Development Practices.	—	69% of new population growth will occur within existing city limits.
Goal #4 Protect the Region's Health & Environment.	X	Over 50,000 acres of new development will occur within 50' of identified environmentally-sensitive locations.
Goal #5 Support the Economic Competitiveness of the Greater Nashville Area.	—	Deficiencies of the surface street network are likely to impact economic competitiveness.
Goal #6 Offer Meaningful Transportation Choices for a Diverse Population Including the Aging.	—	BAU does not preclude advancements in transit of non-motorized travel, particularly in growing areas.
Goal #7 Encourage Regional Coordination, Cooperation, & Decision Making.	✓	A relatively high dispersion of growth throughout the subregion will require ongoing coordination, particularly in urban growth boundary areas.
Goal #8 Practice Thoughtful, Transparent Financial Stewardship by Ensuring that Transportation Improvements meet Regional Goals.	N/A	

Table 2.2 Assessment of BAU Against Regional Goals

2.4 Employment Growth Allocations

The 2008-2035 employment allocations for the MPO area estimate that Williamson County's share of the new employment coming into the region (154,024 new jobs) will be only slightly less than that of Davidson County (177,127 new jobs). Considering those new jobs being attracted solely to the Southwest area, however, Williamson County accounts for 84% of the total.

Under the BAU scenario, employment growth within Williamson County will be dominated by Franklin, which is expected to garner 70% of all new jobs within the county. This figure rises to more than ¾ of all job growth when lands identified within the Franklin Urban Growth Boundary are considered. The next most attractive jurisdiction for employment growth is unincorporated Williamson County itself with cumulative job rises in rural communities like Triune and Leiper's Fork accounting for approximately 7% of new jobs.

Table 2.3 and Figure 2.2 show the study area distribution of allocated employment under the BAU scenario.

County		Allocated Employment (2008 - 2035)		
			% of County	% of Study Area
Davidson	Total	177,127	100%	N/A
	Study Area	11,872	7%	6%
Maury	Total	19,922	100%	N/A
	Study Area	1,600	8%	1%
Rutherford	Total	89,803	100%	N/A
	Study Area	16,470	18%	9%
Williamson	Total	154,024	100%	N/A
	Study Area	154,024	100%	84%

Table 2.3 Allocated Employment from 2008-2035 in the Southwest Subregion

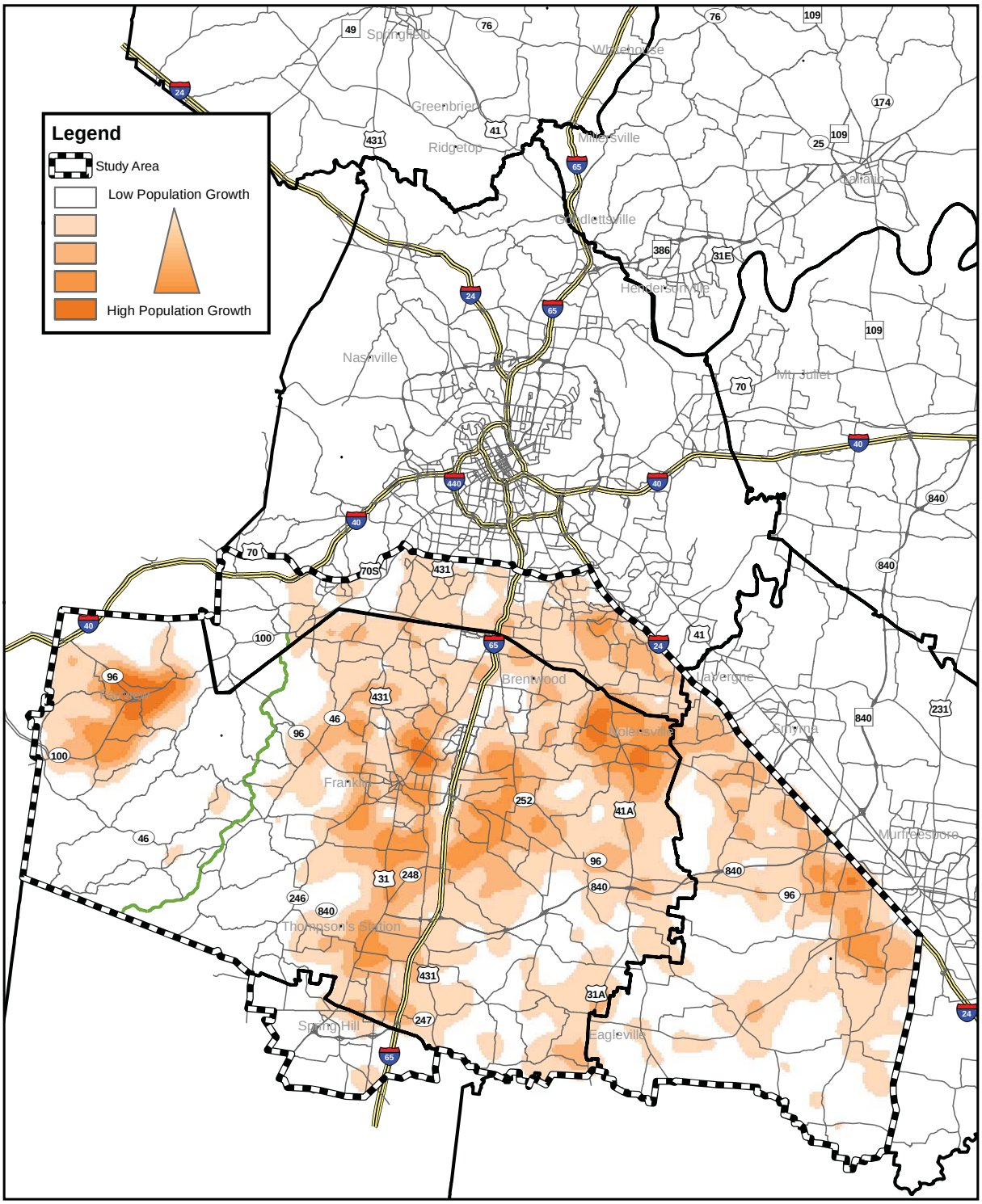

Figure 2.1 Allocated Population from 2008 to 2035

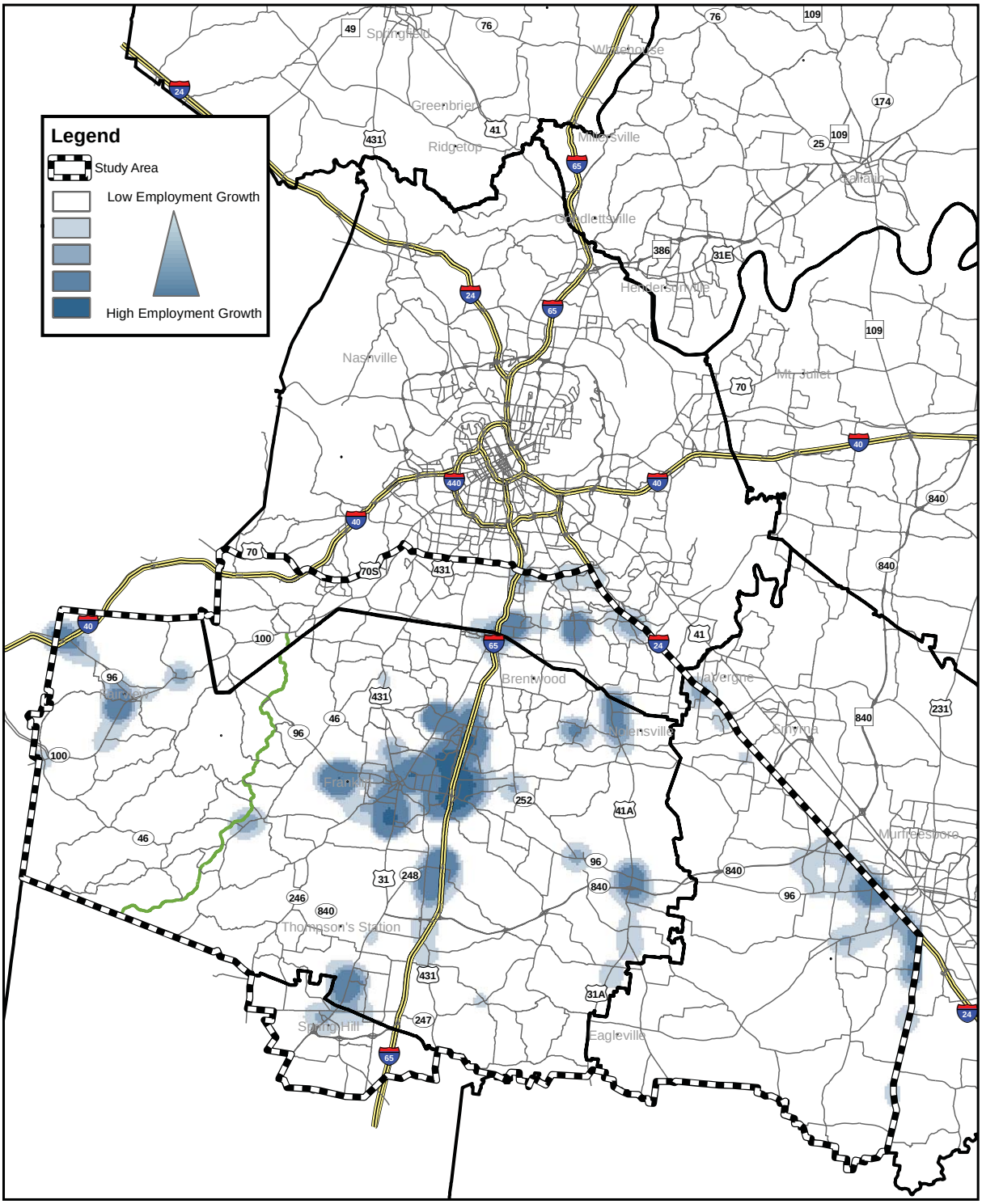

Figure 2.2 Allocated Employment from 2008 to 2035

3. BAU Transportation Results

The population and employment conditions of the BAU scenario will have transportation-related impacts that are somewhat predictable given the Franklin-centric aspect of the growth allocations. Overall, the predominately rural highways of unincorporated Williamson County will remain serviceable with relatively light levels of congestion on a daily basis. Analyses (from the MPO's travel demand model) show that during peak traffic periods, approximately 80% of the county's highways will remain below capacity (see Figure 3.1). An additional 16% will be nearing capacity, and traffic on 4% of the highways will exceed the capacity of the highway. As is typical, capacity issues will be limited to peak travel periods with the exception of a segment of Lewisburg Pike south of SR 840 where significant congestion may extend into off-peak periods.

As shown in Figure 3.2, growing congestion is expected on almost all classified routes in the unincorporated county that lead into and out of Franklin (Columbia Pike, Carters Creek Pike, Hwy 96 West, Del Rio Pike, Hillsboro Road, Clovercroft Road, Wilson Pike, Murfreesboro Road, Arno Road, and Peytonsville Road). Davidson County also has a predictable impact on the street network with several north-south routes crossing the county boundary nearing capacity by 2035 (Hwy 100, Old Harding Road, Sneed Road, Vaughn Road, and Hillsboro Road).

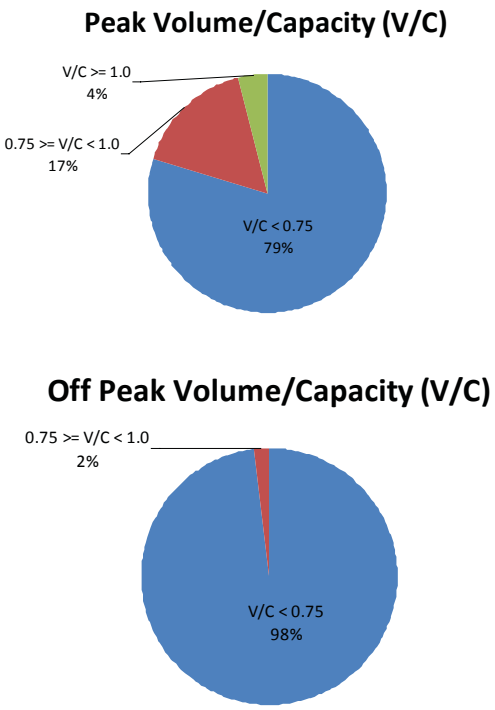

Figure 3.1. Proportional Volume to Capacity Ratios on Williamson County Roads (BAU 2035)

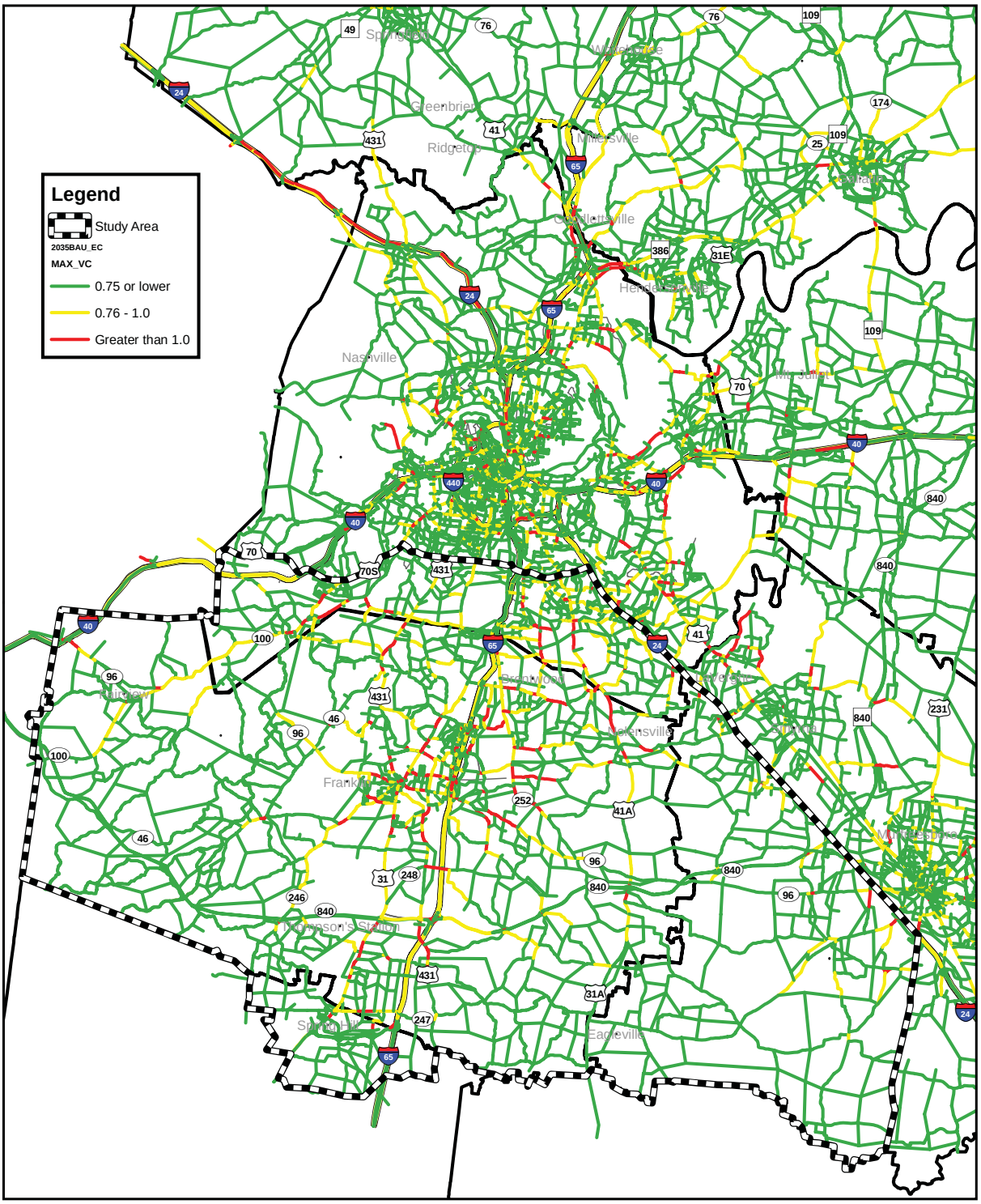

Figure 3.2 Volume to Capacity Ratios, BAU