ADOT Planning Assistance for Rural Areas Program

FINAL DOCUMENTATION SUMMARY

FLAGSTAFF REGIONAL Plan Update

ADOT MPD Task Assignment: MPD 13-11
Kimley-Horn and Associates, Inc. Project No. 091374042

ADOT

FMPO
FLAGSTAFF METROPOLITAN PLANNING ORGANIZATION

Kimley-Horn and Associates, Inc.

JUNE 2013

FINAL DOCUMENTATION SUMMARY

OF SUPPORT ACTIVITIES FOR THE FLAGSTAFF REGIONAL PLAN UPDATE

Prepared for

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1. INTRODUCTION

The Flagstaff Regional Plan 2030: Place Matters (Regional Plan) updated the Flagstaff Area Regional Land Use and Transportation Plan (2001). The vision and goals for the Regional Plan are directed toward creating a cohesive and sustainable land use and development pattern resulting in a context-sensitive and efficient transportation system that supports economic development, multimodal transportation, and improved safety and accessibility.

Kimley-Horn and Associates, Inc. was retained to provide technical support for development of the Flagstaff Regional Plan. These technical activities included the following:

1. Development and evaluation of land use scenarios using CommunityViz
2. Evaluation of transportation packages that address the transportation needs of the preferred land use scenarios
3. Completed an evaluation of the draft Regional Plan policies within the context of the proposed land use scenarios
4. Development of illustrations of the different place types and roadway cross sections that are identified in the Regional Plan.
5. Development of decision matrix flow charts to illustrate the selection of appropriate transportation infrastructure within each place type identified in the Regional Plan.

Each of these activities is summarized within this document.

2. LAND USE SCENARIO ANALYSIS

The primary activity completed by Kimley-Horn and Associates, Inc. was the development of land use scenarios and their evaluation using CommunityViz.

2.1 Overview

The Regional Plan followed a land use scenario planning process to reflect how the growth patterns affect livability indicators such as water use, vehicle miles traveled, development footprint, and housing mix. The land use scenarios represent potential futures for the Flagstaff area at build-out (estimated to be 80 to 100 years in the future), which are driven by values identified by the public.

CommunityViz was used to evaluate a set of measures of effectiveness indicators for various land use scenarios. The indicator output is based on *new growth and development* that is anticipated in the region, and is not a measure of existing conditions, nor does it include existing development. For example, the water demand is based on that to be consumed by new development, and not by existing development in the region.

Development scenarios are not intended to represent actual futures, but are to be compared against each other so to select a preferred scenario. The scenarios are a useful tool in seeing how different land uses impact other features valued by the community; more suburban development means more vehicles miles traveled, greater emissions and greater water demand. Higher density development results in few vehicle miles traveled, fewer emissions, and less water demand.

Additionally, it is important to understand that these scenarios are based on many assumptions which may change over the years as the region grows.

2.2 Development Scenarios

Based on public and Citizens Advisory Committee input, the following land use scenarios were developed for evaluation in CommunityViz. Characteristics of each of the scenarios are described below.

1. Scenario A: Growing Out

- Development patterns look a lot like today's
- Development utilizes the most acres due to lower densities

2. Scenario B: Growing In and Out

- Development is similar to today's, but with denser activity centers
- Development utilizes less acres than Scenario A, as more of new population is accommodated in smaller lot sizes, town homes and some apartments

3. Scenario C: Growing In

- Development patterns are more dense with urban centers
- Uses the least acres due to high densities

4. Scenario D: Growing In (revised Scenario C)

- Development patterns are higher density than Scenario A and B, but less than C
- Development utilizes less acres than Scenario A and B, however, this scenario includes less single family residential development than any other place type, and also includes more mixed use development

A report was prepared, entitled *Development Scenarios Summary*, Flagstaff Regional Plan 2012 (June 2012). The report summarizes measures of effectiveness indicators for Scenarios A, B, C, and D. The Development Scenarios Summary is included in Appendix A1.

2.3 Preferred Land Use Scenario (Scenario E)

Following submittal of the *Development Scenarios Summary* in June 2012, the Flagstaff Regional Plan Citizens Advisory Committee (CAC) spent the duration of 2012 and early 2013 refining elements of the Regional Plan, including the land use element. This effort culminated in the release of the draft Regional Plan on March 28, 2013. A "Growth Illustration Map" was included in the draft Regional Plan that generally reflects a revised version of Scenario D.

City and FMPO staff desired to evaluate the "Growth Illustration Map" as reflected in the draft Regional Plan. While the "Growth Illustration Map" generally reflected Scenario D, several modifications were made to the map based on input from City staff and the CAC during the course of 2012 and early 2013. As such, Kimley-Horn developed an additional scenario for evaluation in Community Viz. This new scenario, also referred to as Scenario E or the Preferred Scenario, addressed the following issues that were identified by the CAC and staff.

- Activity Node S4 (Flagstaff Mall) – areas southeast of S4 should be employment
- Activity Node 11 (West Route 66, west of Woody Mountain Road) – area south of Activity Node 11 should be employment

The preferred Scenario E included the following modifications as compared to Scenario D.

Scenario E: Preferred Land Use Scenario

- Development patterns are higher density than Scenario B, but less than C and D.
- Within the eastern portion of the region, (Section 10), reduce the amount of land designated as Heavy Industrial (IH).
- At the east end of Butler Avenue (Section 20), change about 1/3 of the section from Suburban Neighborhood Light-Residential (SNL) to Suburban Neighborhood (SN) to increase the population in this area.
- In the western portion of the region, reduce the size of the Business Park along Route 66. Add commercial corridor to recognized commercial development and office employment in this area.
- In the vicinity of NAU, add Urban Neighborhood – Residential and Non-Residential (UN) to increase the campus population that is anticipated as NAU expands.
- Near the Airport, change some of the Business Park – Non-Residential (BP) land use to Institutional-Non-Residential (INS) to reflect potential office complexes and government facilities.
- Along the centrally located Cedar Avenue, change some of the Institutional-Non-Residential (INS) to Neighborhood Center-Non-Residential (NC) to make this more consistent with current plans for this corridor.

Several other additional modifications and iterations were made to balance population and employment numbers with control totals.

The Scenario E indicators report and land use map are included in Appendix A2. The Scenario E Indicators Report shows a summary of performance measure indicators for Scenarios A, B, D, and E, and highlights the differences between the preferred Scenario E and Scenario D as was depicted in the draft Regional Plan.

3. EVALUATION OF TRANSPORTATION PACKAGES

In support of FMPO as they developed the Regional Plan transportation element, Kimley-Horn analyzed a set of roadway networks that were developed and modeled by FMPO. The purpose of the analysis was to compare alternative transportation packages to inform selection of a transportation package in the draft Regional Plan. Transportation packages included the following:

1. Existing Base (Summer 2010)
2. Future Base Network (Build-out Population)
3. Many Roads (additional capacity is provided through constructing a connected network of smaller roadways)
4. Wider Roads (additional capacity is provided through provision of additional capacity to key corridors and major arterials)

5. Several iterations of the above scenarios were developed with varying levels of transit, bicycle, and pedestrian levels of service

A detailed description of the transportation packages and model output is included in Appendix B.

Each of the transportation packages identified above (and in more detail in Appendix B) was modeled by FMPO in the regional travel demand model. Model output was provided to Kimley-Horn and Associates for a comparative analysis using CommunityViz.

The following general conclusions were drawn from the transportation package evaluation:

1. Transit, bicycle and pedestrian level of service provide significant benefits to relieving overall congestion in the Flagstaff region.

2. The transportation networks as reflected in the transportation packages provide significant congestion relief as compared to the base network. The results lead to a conclusion that a combination of providing additional capacity to key corridors ("wider roads"), and constructing the "many roads" (providing additional connectivity) provides significant benefits.

3. VMT per capita for packages is approximately the same as the future base case; however, delay per capita is dramatically improved.

4. The delay per capita varies between Package 1 (Many) and Package 4 (Wide); however, when transit, pedestrian and bike are added, delay between the packages becomes very similar.

4. POLICY EVALUATION

In support of the Regional Plan, Kimley-Horn completed an evaluation of the draft Regional Plan policies. The purpose of the policy evaluation was to review each of the draft policies for consistency, clarity, satisfaction of mandated plan elements, and necessary topic areas. The policy review informed changes that needed to be made as the draft Regional Plan was compiled. The policy review summary is included in Appendix C.

5. PLACE TYPE VISUALIZATIONS SUPPORT

In support of the Regional Plan, Kimley-Horn developed a series of illustrations that represent each place type as presented in the draft Regional Plan. The set of final illustrations that were provided to the City of Flagstaff, for inclusion in the Regional Plan, are included in Appendix D.

6. DECISION MATRIX FLOWCHART

To support implementation of the Regional Plan, FMPO will be developing a Regional Transportation Plan that is consistent with and informed by the Regional Plan. To assist with the establishing a strong connection between the Regional Plan and the Regional Transportation Plan, FMPO asked Kimley-Horn to develop a decision-matrix flow chart that can be used to select appropriate transportation infrastructure for each Regional Plan place type. The decision-matrix flow chart for the Urban place type is included as Appendix E.

Appendix A1 – Development Scenarios Indicator Report, June 2012

Development Scenarios
SUMMARY

FLAGSTAFF REGIONAL Plan 2012

JUNE 2012

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Executive Summary

The Flagstaff Regional Plan (Regional Plan) will update the Flagstaff Area Regional Land Use and Transportation Plan (2001). The vision and goals for the Regional Plan are directed toward creating a cohesive and sustainable land use and development pattern resulting in a context-sensitive and efficient transportation system that supports economic development, multimodal transportation, and improved safety and accessibility.

The purpose of this report is to summarize the indicators for each scenario. It should be emphasized that the indicator output is based on the new growth and development, and does not factor in the existing conditions. For example, the water demand in Scenario A is based on that to be consumed by new development, and not existing development in the region.

Furthermore, these scenarios are not intended to represent actual futures, but are to be compared against each other so to select a preferred scenario. The scenarios are a useful tool in seeing how different land uses impact other features valued by the community; more suburban development means more vehicles miles traveled, greater emissions and water demand. Higher density development results in few vehicle miles traveled.

The scenarios are a useful tool in seeing how different land uses impact other features valued by the community; more suburban development means more vehicles miles traveled, greater emissions and water demand. Higher density development results in few vehicle miles traveled.

Additionally, it is important to understand that these scenarios are based on many assumptions which may change over the years as the region grows. The assumptions and formulas for each indicator are presented with the indicator methodology and summarized in the Appendix.

DEVELOPMENT SCENARIOS

The Regional Plan is following a land use scenario planning process to reflect how the growth patterns affect livability indicators such as water use, vehicle miles traveled, development footprint, and housing mix. The land use scenarios represent potential futures for the Flagstaff area at build-out (estimated to be 80 to 100 years in the future), which are driven by values identified by the public. The public identified the following scenarios for evaluation. Characteristics of each of the scenarios are described below.

Scenario A: Growing Out

- Development patterns look a lot like today's
- Development utilizes the most acres due to lower densities

Scenario B: Growing In and Out

- Development is similar to today's, but with denser activity centers
- Development utilizes less acres than Scenario A, as more of new population is accommodated in smaller lot sizes, town homes and some apartments.

Scenario C: Growing In[1]

- Development patterns are more dense with urban centers
- Uses the least acres due to high densities

Scenario D: Growing In (revised Scenario C)

- Development patterns are higher than Scenario A and B, but less than C.
- Development utilizes less acres than Scenario A and B, however, this scenario includes less single family residential development than any other place type, and also includes more mixed use development

1. Scenario C was evaluated during Phase I. Phase I analysis identified that it was too similar to Scenario B. Scenario B was subsequently removed from further consideration in Phase II and Phase III. Scenario C was introduced in Phase II to replace Scenario C.

At a July 2011 public charette, workshop attendees participated in a "chip game" during which they were asked to place "place types" onto a map of the region for each scenario, consistent with the scenario descriptions above. There were 13 place types to choose from, each reflecting a different land use and density assumption. Example place types include rural neighborhoods, suburban neighborhoods, urban neighborhoods, urban centers, or commercial corridors. Through this activity, the workshop participants identified which land areas and parcels in the region they would like to see develop the future, and what the development should look like.

Following the public charette, Regional Plan staff synthesized the input received and developed land use maps for each scenario. Each scenario map was then used to create and measure various indicators through the CommunityViz® software.

SCENARIO INDICATORS

Indicators were identified to evaluate each development scenario so that they could be compared and contrasted consistent with public values. There were three phases of scenario evaluation. Within each evaluation phase, new indicators were incrementally added to get at a greater understanding of what the future could look like in the Flagstaff area. The following is the list of indicators:

PHASE 1 INDICATORS	PHASE 2 INDICATORS *(in addition to Phase 1 indicators)*	PHASE 3 INDICATORS *(in addition to Phase 1 & 2 indicators)*
Land use	Land consumed in Arizona Game and Fish Department conservation categories	Capital costs
Mobility	Land consumed in wildlife corridors	Operation and maintenance costs
Housing mix	Population within various proximity to parks	Development of open space costs
Water demand	Developed unprotected open space	Housing and transportation costs
Environment (emphasis on vehicle emissions)		Energy consumption
		Utility costs
		Property tax revenues
		Sales tax revenues
		Other revenues
*These scenarios represent build-out, which is expected to be in 80 to 100 years. Estimating costs to that level of detail over that many years is highly speculative and can be misleading. Therefore, the costs and revenues were developed at a planning level to help paint a picture for the future, but they should not be treated as a full fiscal impact analysis.		

CommunityViz® planning software is an extension for ArcGIS Desktop, a geographic information system (GIS) software. Planners, resource managers, local and regional governments, and many others use CommunityViz® to help them make decisions about development, land use, transportation, conservation and more. A GIS-based decision-support tool, CommunityViz® "shows" you the implications of different plans and choices.

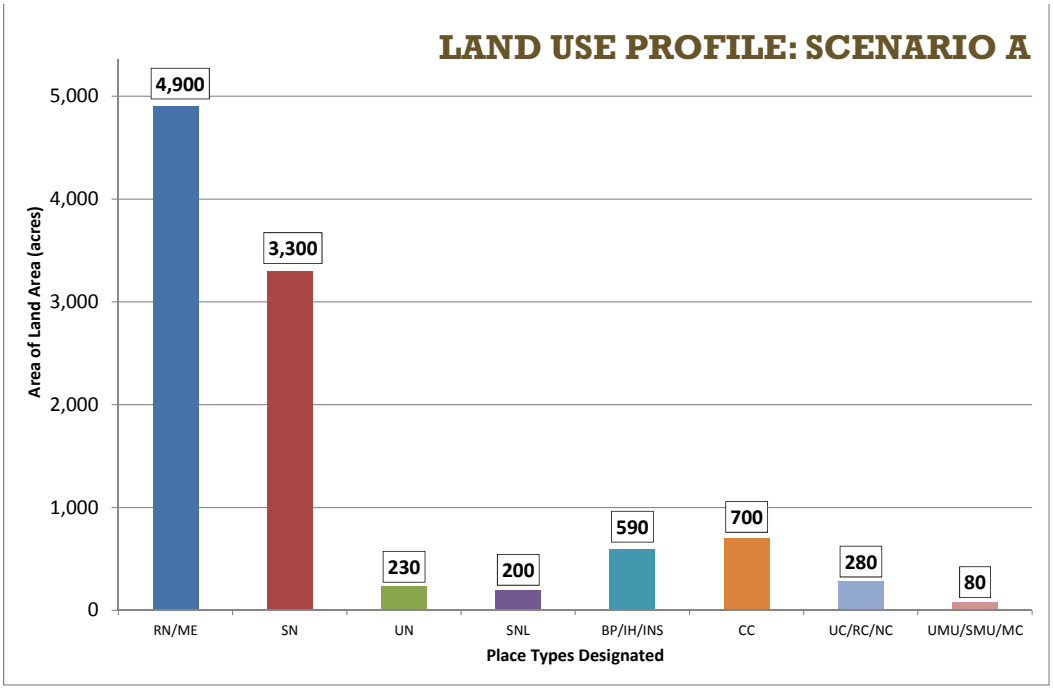
Each scenario was evaluated using CommunityViz®, a Geographic Information System (GIS)-based software. CommunityViz® allows for a systematic application of the indicators across each scenario. Indicators are created by writing formulas using one or more assumptions and spatial data. Indicators results are then presented in chart or tabular format.

CommunityViz®, formulas were created for each of the above indicators. The formulas for the indictors were held constant between the scenarios. The difference in indicator output between scenarios is based on the different land use place type variables within each development scenario.

As an example of indicator output, Scenario A includes more square footage of suburban residential development than Scenario B and D. Suburban residential development is less dense and requires more land area. As a result, there are also higher emissions, water demand, and vehicle miles traveled.

SCENARIO A: GROWING OUT

Scenario A represents a future where the current growth patterns are continued. As the graph on page 5 illustrates, there is more single family residential development than any other Place Type (82%).



RN - Rural Neighborhood – Residential

ME - Mountain Estates – Residential

SN - Suburban Neighborhood – Residential

UN - Urban Neighborhood – Residential and Non-Residential

SNL - Suburban Neighborhood Light – Residential

BP – Business Park – Non-Residential

IH – Industrial-Heavy – Non-Residential

INS – Institutional – Non-Residential

CC – Commercial Corridor – Non-Residential

UC – Urban Center – Non-Residential

RC – Regional Center – Non-Residential

NC – Neighborhood Center – Non-Residential

UMU - Urban Mixed Use – Residential and Non-Residential

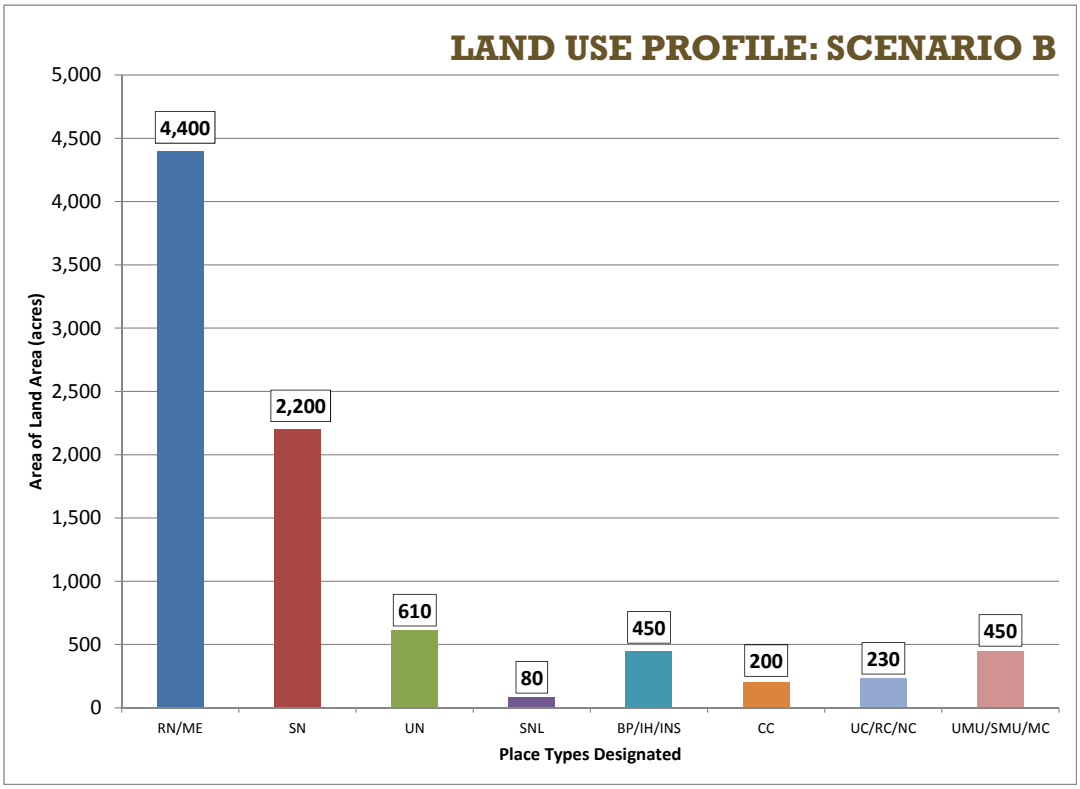
SMU - Suburban Mixed Use – Residential and Non-Residential

MC - Metro Core – Residential and Non-Residential

The distribution of Place Types in this scenario creates a future with primarily low-density development and favors automobile-use more than other modes of transportation. The result is more vehicle miles traveled, fuel consumption, and emissions. Additionally, this pattern of development creates a higher building footprint and consumes more open space. Since most of the development will be single family residential, there will also be more water and energy use under Scenario A. This scenario will have the greatest impact on the surrounding environment and is the least supportive of community goals for a healthier environment and increased transportation options.

SCENARIO B: GROWING IN AND OUT

Scenario B represents a future where the current growth pattern is somewhat continued, but more emphasis is placed on higher-density development in the urban core than in Scenario A. As the graph on page 6 illustrates, there is more single family residential development than any other Place Type (77%).



RN - Rural Neighborhood – Residential

ME - Mountain Estates – Residential

SN - Suburban Neighborhood – Residential

UN - Urban Neighborhood – Residential and Non-Residential

SNL - Suburban Neighborhood Light – Residential

BP – Business Park – Non-Residential

IH – Industrial-Heavy – Non-Residential

INS – Institutional – Non-Residential

CC – Commercial Corridor – Non-Residential

UC – Urban Center – Non-Residential

RC – Regional Center – Non-Residential

NC – Neighborhood Center – Non-Residential

UMU - Urban Mixed Use – Residential and Non-Residential

SMU - Suburban Mixed Use – Residential and Non-Residential

MC - Metro Core – Residential and Non-Residential

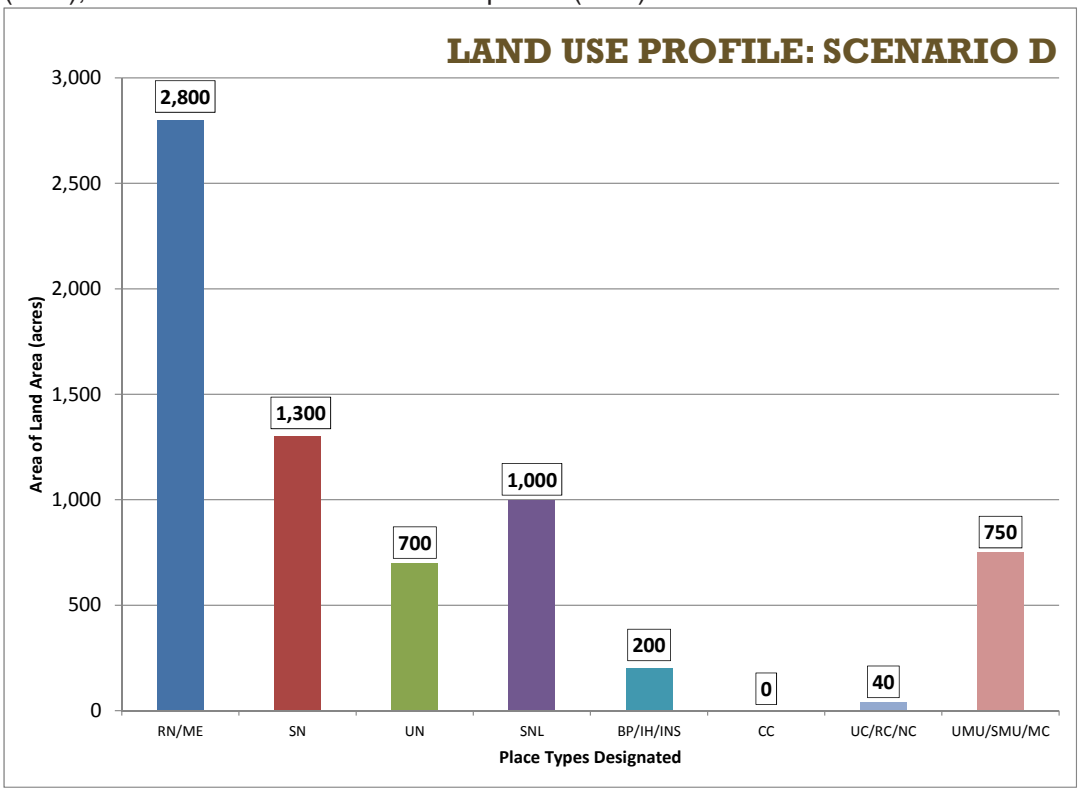
The distribution of Place Types in this scenario creates a future with primarily low-density development, but offers more mixed-use development, which allows for a greater mix of housing and transportation options. Additionally, since this scenario has higher-densities there is less of a building footprint and consumes less open space. Compared to Scenario A, this scenario has less vehicle miles traveled, fuel consumption, and emissions. Since there is less single family residential development under this scenario than Scenario A, this scenario will likely have less water and energy use. Scenario B will still have an impact on the surrounding environment, although less significant than Scenario A, and is more supportive of community goals for a healthier environment and increased transportation options.

SCENARIO C: GROWING IN

The purpose of this scenario was to present a future with high densities. Although this scenario was discontinued after Phase 1 because the inputs were too similar to Scenario B, it was instrumental in allowing the staff and public to realize what changes needed to be made to get to a scenario that really emphasized higher densities.

SCENARIO D: GROWING IN (REVISED SCENARIO C)

Scenario D represents a future with higher-density development than what is found in Scenarios A and B. As the graph below illustrates, there is still more single-family residential development than any other Place Type (75%), but also more mixed-use development (21%).



RN - Rural Neighborhood – Residential

ME - Mountain Estates – Residential

SN - Suburban Neighborhood – Residential

UN - Urban Neighborhood – Residential and Non-Residential

SNL - Suburban Neighborhood Light – Residential

BP – Business Park – Non-Residential

IH – Industrial-Heavy – Non-Residential

INS – Institutional – Non-Residential

CC – Commercial Corridor – Non-Residential

UC – Urban Center – Non-Residential

RC – Regional Center – Non-Residential

NC – Neighborhood Center – Non-Residential

UMU - Urban Mixed Use – Residential and Non-Residential

SMU - Suburban Mixed Use – Residential and Non-Residential

MC - Metro Core – Residential and Non-Residential

The distribution of Place Types in this scenario creates a future that is still primarily low-density development, but offers much more mixed-use development, which allows for a greater mix of housing and transportation options. Because of the higher densities, this scenario has the smallest building footprint and consumes the least amount of open space. Additionally, since this scenario has the least amount of single family residential development, there is less vehicle miles traveled, fuel consumption, emissions, and demands for water and energy than in the other two scenarios. Scenario D will have the least impact on the surrounding environment, and is the most supportive of community goals for a healthier environment and increased transportation options.

The following table summarizes the indicators for Phases 2 and 3 and ranks each to easily compare between the scenarios.

Green – indicates the most desirable value for that indicator across the three scenarios

Yellow – indicates the middle or neutral value for that indicator across the three scenarios

Red – indicates the least desirable outcome for that indicator across the three scenarios

SUMMARY OF INDICATOR OUTPUTS (PHASES 2 AND 3)						
Indicator	Scenario A	Scenario B	Scenario D	Percent Difference Comparison		
DEVELOPMENT YIELDS				A>B	A>D	B>D
Single Family	20,600	15,100	11,600	-26.7%	-43.7%	-23.2%
Multifamily - Apartment	3,800	6,900	8,900	81.6%	134.2%	29.0%
Multifamily - Townhome	3,500	5,700	7,000	62.9%	100.0%	22.8%
Total Acres Identified for Growth	16,000	14,200	13,500	-11.3%	-15.6%	-4.9%
Average Residential Density	3.50	4.50	5.50	28.6%	57.1%	22.2%
Average Non-residential Density	0.30	0.35	0.54	16.7%	80.0%	54.3%
Total Area	10,280	8,620	6,790	-16.1%	-33.9%	-21.2%
Total Residential Area	8,640	7,340	6,050	-15.0%	-30.0%	-17.6%
Total Non-Residential Area	1,640	1,280	740	-22.0%	-54.9%	-42.2%
TRANSPORTATION/MOBILITY				A>B	A>D	B>D
Transit Trips	8,100	15,800	23,400	95.1%	188.9%	48.1%
Walk Trips	27,600	31,800	38,200	15.2%	38.4%	20.1%
Consumed Wildlife Corridor Land	4,800	3,600	3,100	-25.0%	-35.4%	-13.9%
High Conservation Area	4,200	3,400	2,200	-19.0%	-47.6%	-35.3%
Population within 1/2 mile of Active Parks	24,200	33,100	39,000	36.8%	61.2%	17.8%
Consumed Unprotected Open Space (OS)	2,300	2,000	1,000	-13.0%	-56.5%	-50.0%
Total Protected OS Acres Consumed^	600	300	100	-50.0%	-83.3%	-66.7%
FISCAL				A>B	A>D	B>D
Transit Capital Costs	$429,190,000	$753,470,000	$991,900,000	75.6%	131.1%	31.6%
Transit O&M Costs	$9,135,000	$16,040,000	$21,110,000	75.6%	131.1%	31.6%
Cost of Developing Protected Open Space	$11,296,000	$8,986,000	$20,086,000	-20.4%	77.8%	123.5%

In regards to costs and revenues, there is not a significant difference between the scenarios at this level of analysis. However, it should be noted that Scenario D experiences higher costs for preservation of open space and transit. Scenario D purchases more open space for conservation purposes than the other two scenarios. Scenario D is also the most supportive of multiple modes of transportation, including transit. There is potentially a high cost for providing an efficient, region-wide transit system. However, overall costs for Scenario D are less than those for Scenarios A and B. It should be noted that the costs and revenues evaluated for this analysis were at the planning level for comparison purposes. There are many intricate factors that could potentially impact the costs and revenues that were not considered for this analysis. Furthermore, given that these costs are for build-out, they are highly speculative and likely to change over the years.

The intent of creating the indicators and presenting the results is to help the public and officials make informed policy decisions that will guide development towards a desired future. Many of the indicators are similar and do not show a lot of variation between scenarios. The ones where differences are found are those that define the scenario, such as housing mixture, development type, and density. These inputs had a significant impact on the use of alternate modes of transportation and related costs. Since the scenarios are relatively similar, it comes down to the community and what they wish the future of Flagstaff to be. This report can be useful in helping them make an informed decision.

Introduction

Arizona Growing Smarter statutes (A.R.S. 9-461.05) require updates to general and comprehensive plans a minimum of every 10 years. The Flagstaff Area Regional Plan 2012 (Regional Plan) will update the existing Flagstaff Area Regional Land Use and Transportation Plan (November 2001).

The Regional Plan will meet A.R.S. requirements for all mandated plan elements. In addition, a goal of the City of Flagstaff (City), Coconino County, and the Flagstaff Metropolitan Planning Organization (FMPO) is to incorporate "livability principles" that are broadly supported by the community, including the integration of transportation, urban form, and economic development. The Regional Plan will lead to a sustainable land-use and development pattern, and a context-sensitive and efficient multimodal transportation system that supports economic development, improved safety, and accessibility.

The Regional Plan will establish a vision and guide the City, Coconino County, and FMPO to developing and implementing the policies, improvements, and priorities of the community to make the area an attractive place for residents to live and businesses to prosper.

The Regional Plan is following a regional visioning and scenario-based planning process that facilitates analysis of, and public input on, land-use scenarios that exemplify differences in how the region could grow and develop over the coming decades. Each of the development scenarios reflect differences in land use, density and open space, and the transportation network. The scenarios are:

- Scenario A: Growing Out
- Scenario B: Growing In and Out
- Scenario C: Growing In
- Scenario D: Growing In (revised)

A scenario approach to Plan development enables an assessment of the relationship between land use choices and transportation and other outcomes, and provides residents, business leaders, and elected officials the opportunity to explore and debate the regional growth visions, their tradeoffs, and alternative futures.

Scenario planning is used in comprehensive planning to assist in identifying regional goals and community values, as well as exploring alternatives for growth, development, and transportation investments in and around Flagstaff.

REPORT ORGANIZATION & PURPOSE

This document describes the planning process and the alternative development scenarios being considered for the Flagstaff region. This document serves as a resource for stakeholders as they contemplate the region's future, and select a preferred growth scenario that meets community-stated initiatives to link development with quality of life and improve community cohesiveness and supporting infrastructure.

Scenario Planning Overview

CommunityViz®, a Geographic Information System (GIS)-based software program, was used to analyze the scenarios against a set of performance measurement indicators, enabling a comparison and contrast of each of the development scenarios. Three successive phases of analysis were conducted, each building upon the former. This document is organized around each of the analysis phases, where each phase is presented and discussed separately.

PHASE 1 INDICATORS	PHASE 2 INDICATORS *(in addition to Phase 1 indicators)*	PHASE 3 INDICATORS *(in addition to Phase 1 & 2 indicators)*
Land use	Land consumed in Arizona Game and Fish Department conservation categories	Capital costs
Mobility	Land consumed in wildlife corridors	Operation and maintenance costs
Housing mix	Population within various proximity to parks	Development of open space costs
Water demand	Developed unprotected open space	Housing and transportation costs
Environment (emphasis on vehicle emissions)		Energy consumption
		Utility costs
		Property tax revenues
		Sales tax revenues
		Other revenues

Scenario planning provides a forum, process, set of tools, and measurable outcomes for the region to contemplate future growth possibilities. Development scenarios prepared for the region are fictional stories about future growth—they are not forecasts or predictions. They are possible future outcomes that might come to pass based on existing conditions and trends, or on regional goals and community values. The essential requirement of any development scenario is that it be plausible, within the realm of what exists or what could be. Scenario planning also allows the community to measure results and evaluate the trade-offs associated with competing development scenarios. This ability provides stakeholders with an opportunity to identify and discuss strengths and weaknesses associated with the various development scenarios, and enables more informed decision-making for formulating the region's

From the FHWA Scenario Planning Guidebook, February 2011

Scenario planning is a process that can help transportation professionals to prepare for what lies ahead. It provides a framework for developing a shared vision for the future by analyzing various forces (e.g., health, transportation, livability, economic, environmental, land use), that affect communities.

The hallmark of scenario planning is identifying land-use patterns as variables (rather than as static inputs) that could affect transportation networks, investments, and operations. Other variables might include demographic, economic, political, and environmental trends. Considering and analyzing alternative possibilities for each variable helps stakeholders to understand how a state, community, region, or study area might look and function in the future.

preferred development scenario. This document presents on the new future values. Scenario indicators reflect the impacts of new growth. They do not include existing population and land uses.

SCENARIO DEVELOPMENT PROCESS

Scenario development is an integrative process that involves City and County staff, regional stakeholders, and citizens. The project team, along with the Citizen Advisory Committee (CAC), worked with citizens and several working groups to understand the challenges and opportunities facing the region and help create the alternative development scenarios.

STAKEHOLDER AND CITIZEN INPUT

The project team facilitated several community workshops in a charrette format from July 14 – 22, 2011 to capture community values and attitudes toward growth in the region. Approximately 260 people attended the workshops, consisting of the general public and representatives from Northern Arizona University (NAU), Flagstaff City Council, Coconino County Board of Supervisors, City and County Planning and Zoning Commissions, Flagstaff Chamber of Commerce, and local business owners. At each event, a brief presentation by the project team was followed by a hands-on, development chip game table-top exercise on maps used to idealize three different growth scenarios that could be possible in the Flagstaff region. Groups worked together to identify general development themes and to place new growth in areas of the region most suited for new development or redevelopment. The project team collected the maps at the end of each event for the purpose of building three alternative development scenarios. These maps were then used to determine the collective development goals for each scenario.

DEVELOPMENT CHIP GAME

The table-top exercise consisted of a scenario development chip/sticker game. Participants were provided a set of Place Type chips/stickers, and asked to place them on a Flagstaff area map. Place Type chips/stickers represent different land use assumptions that vary in use and population and employment density. Participants were asked to set place chips on the map that represent an increase in the population of Flagstaff of approximately 70,000 people and up to 37,000 jobs, or a total future population of 150,000 people. While each development scenario represented a different distribution of Place Types chips/stickers, the total increase in population and employment were held constant across scenarios allowing each scenario to be compared equally as the growth allocation is distributed uniquely. The total increases in population and employment are based on an assessment of zoned and planned permitted growth, water capacity assumptions, and population projections.

NOTE: Population and employment projections for this scenario development process were based on a population of 150,000 and 75,000 amount of employment. The year for reach this growth is not identified.

Phase 1 Development Scenarios & Analysis

PLACE TYPES

Eight place types were presented to the public at the July 2011 workshops. These are listed below.

RURAL NEIGHBORHOODS/ MOUNTAIN ESTATES (RN/ME) – Predominantly single-family housing on the urban fringe. Livestock and horses are permitted and they are typically abutting National Forest lands. Most of the natural features are retained and public services are not required such as water and sewer. There are no industrial uses present in this Place Type and limited commercial activity is present as a result of the limited population density.

SUBURBAN NEIGHBORHOODS (SN) – Predominant housing type is single-family home; however there are areas of mixed housing type such as duplexes, townhomes, low-rise apartments, and manufactured homes. Neighborhood shopping and services are present along with religious and education institutions, such as churches and schools. Typical City services are available such as water, sewer service, and recreation facilities.

URBAN NEIGHBORHOODS (UN) – Consists of small block, mixed-use, walkable neighborhoods with housing types that include townhomes and apartments/condominiums. Neighborhood shopping and services are present along with religious and educational institutions, such as churches and schools. Typical City services are available such as water, sewer service, and recreation facilities.

INDUSTRIAL BUSINESS INSTITUTIONAL PARK – This Place Type involves a variety of work places that include light industrial, research and development, offices, institutions, secondary processing of materials, finished product assembly, transportation, and wholesale/ warehouse. This Place Type can also have heavy industrial which includes hazardous uses which can be offensive or unsightly.

COMMERCIAL CORRIDOR (CC) – All the commercial and service uses that serve the needs of the entire region, which include tourism and travel related businesses. This Place Type tends to be auto-oriented and the businesses and services serve the day-to-day needs of the surrounding neighborhoods.

URBAN CENTER (UC) – Provides services to residents and visitors beyond the immediate area and has twice the number of jobs as typical commercial locations. This Place Type is the center for government, business, institution, and places for culture and entertainment. This Place Type is accessible by all modes of travel.

REGIONAL CENTER (RC) – Provides services to residents and visitors beyond the immediate area and is accessible to multiple modes of travel such as cars, transit, pedestrians, and cyclists.

NEIGHBORHOOD CENTER (NC) – Provides services to local residents and pass-by traffic and includes a proportion of housing in the form of townhomes and apartments. This Place Type is accessible by all modes of travel.

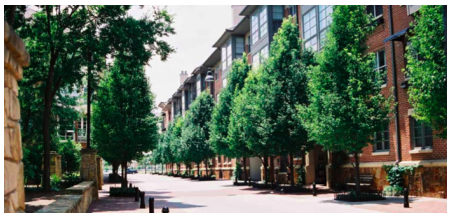
To display mixed-use land uses, participants were instructed to layer chips upon each other. As such, following the July 2011 workshops, to accurately represent the mixing of these land use concepts in the model, the planning team introduced two new place types—suburban mixed-use and urban mixed-use. In addition, to accurately reflect "Industrial, Business Park, and Institutional" chips, the planning team split this place type split into three separate place types: Business Park, Industrial-Heavy, and Institutional. Below are more detailed descriptions of each of these five additional place types used in the CommunityViz® model.

BUSINESS PARK (BP) – This Place Type includes office uses that are mostly included in the service industry classification and light industrial.

INDUSTRIAL-HEAVY (IH) – Provides a distribution of future uses that can include hazardous uses which can be offensive or unsightly.

INSTITUTIONAL (INS) – All government, educational, and even large-scale religious campus development would be considered institutional.

SUBURBAN MIXED-USE (SMU) – This provides a mix of land uses and housing types in more periphery locations of the city with lower densities than found in the center city. These areas can be conducive to multimodal transportation techniques and walkable neighborhoods.



URBAN MIXED-USE (UMU) – Much like Suburban Mixed-Use, there is a variety of housing types and land use types, however they are found in more dense locations of the city that have access to frequent transit, regional bike networks, and higher job concentrations.

As discussed previously, during the workshops, the public placed the place type chips on maps to represent new growth in each scenario. After the workshops, the planning team coded the placement of these chips into a shapefile to be used in the CommunityViz® analysis. As such, the number of place type chips used during the workshops determined the number of acres of new growth in each scenario, and ultimately resulted in the differences between the three scenarios. The table below shows the resulting number of acres of new growth by place type in each scenario.

Acres of Potential New Growth Indicator Methodology

To determine the acreage of new growth for each place type, the parcel area (in square feet) for each place type was summed and then divided by 43,560 to convert to acres. The parcel area was calculated in GIS when the parcel shapefile was created. The formula used to calculate acres for each place type is as follows:

Sum of Parcel Area for the respective Place Type / 43,560

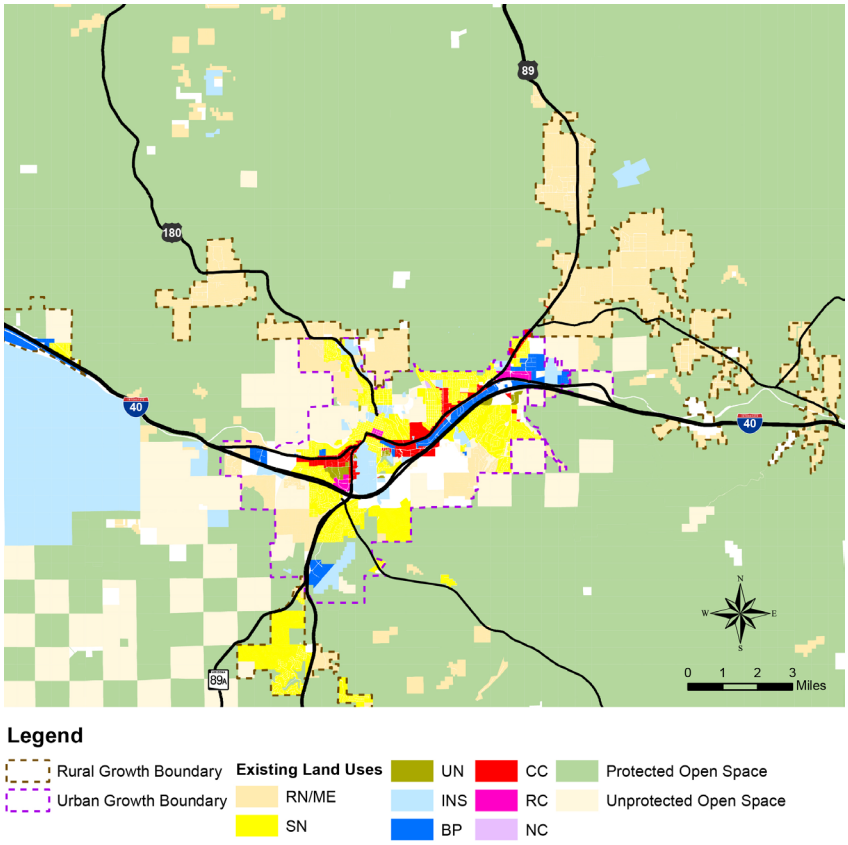
The results are shown in the table below.

PLACE TYPES	EXISTING	ACRES OF POTENTIAL NEW FUTURE GROWTH*		
		SCENARIO A	SCENARIO B	SCENARIO C
RN/ME	14,800	5,700	2,300	800
SN	4,800	3,300	2,300	1,800
UN	130	100	500	800
BP/IH/INS	1,900	400	200	300
CC	800	800	200	80
UC/RC/NC	230	300	200	100
UMU/SMU	0	80	500	800
TOTAL ACRES	**22,660**	**10,680**	**6,200**	**4,680**

*Values for the scenarios do not include existing. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.

The methodology on page 15 is used for each scenario, and the results are shown in the Land Use Profile graphs, which are shown with each scenario description in the Development Scenario Summaries section below. To place the changes in each scenario in context, a map showing the existing land uses and a profile graph illustrating the number of acres for each place type (from the table above) have been provided.

EXISTING LAND USES



RN - Rural Neighborhood – Residential

ME - Mountain Estates – Residential

SN - Suburban Neighborhood – Residential

UN - Urban Neighborhood – Residential and Non-Residential

SNL - Suburban Neighborhood Light – Residential

BP – Business Park – Non-Residential

IH – Industrial-Heavy – Non-Residential

INS – Institutional – Non-Residential

CC – Commercial Corridor – Non-Residential

UC – Urban Center – Non-Residential

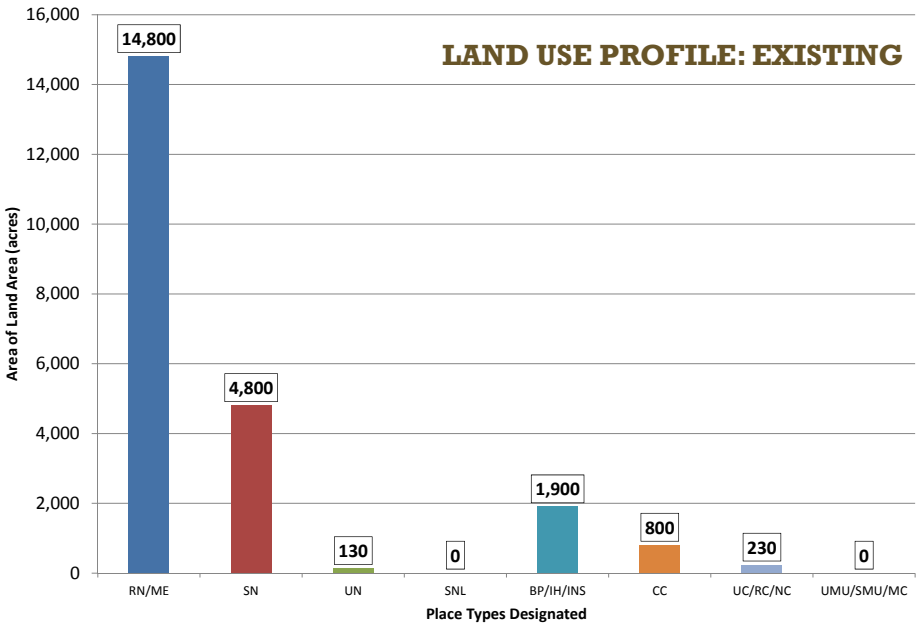
RC – Regional Center – Non-Residential

NC – Neighborhood Center – Non-Residential

UMU - Urban Mixed Use – Residential and Non-Residential

SMU - Suburban Mixed Use – Residential and Non-Residential

MC - Metro Core – Residential and Non-Residential



DEVELOPMENT SCENARIO SUMMARIES

Considering stakeholder and citizen input, as provided during the community workshops (July 2011), general themes developed in the planning process, and other information volunteered by partnering groups, the project team prepared three development scenarios. This section introduces each of the scenarios: Scenarios A, B, and C.

Population Indicator Methodology

The Population indicator is based on the parcel size (in square feet), which was calculated in GIS when the parcel shapefile was created. Assumptions for each Place Type were made to determine how many people there are in each parcel, based on the parcel size. The assumptions include:

- Site Efficiency (varies for each Place Type)
- Percentage of Residential (varies for each Place Type)
- Density (varies for each Place Type)
- Average Household Size = 2.6 people per household

The formula used to calculate population is as follows:

See Indicator Formulas table in the Appendix.

Employment Indicator Methodology

The Employment indicator is based on the non-residential square feet, which is based on the parcel size and an assumption for the percentage of non-residential use for each Place Type. Assumptions for each Place Type were made to determine the number of employees, which were then summed to get total employment. The assumptions include:

- Percentage of each non-residential use (retail, industrial, institutional, office, and service) for each Place Type
- Employment rate of each non-residential use for each Place Type

The formula used to calculate employment is as follows:

See Indicator Formulas table in the Appendix.

Average Residential and Non-Residential Density

Average densities were determined based on the total residential or non-residential area. The total area for residential Place Types was weighted by the Density assumption for each Place Type. The total area for non-residential Place Types was weighted by the FAR assumption for each Place Type. The following formulas were used for residential and non-residential density respectively:

See Indicator Formulas table in the Appendix.

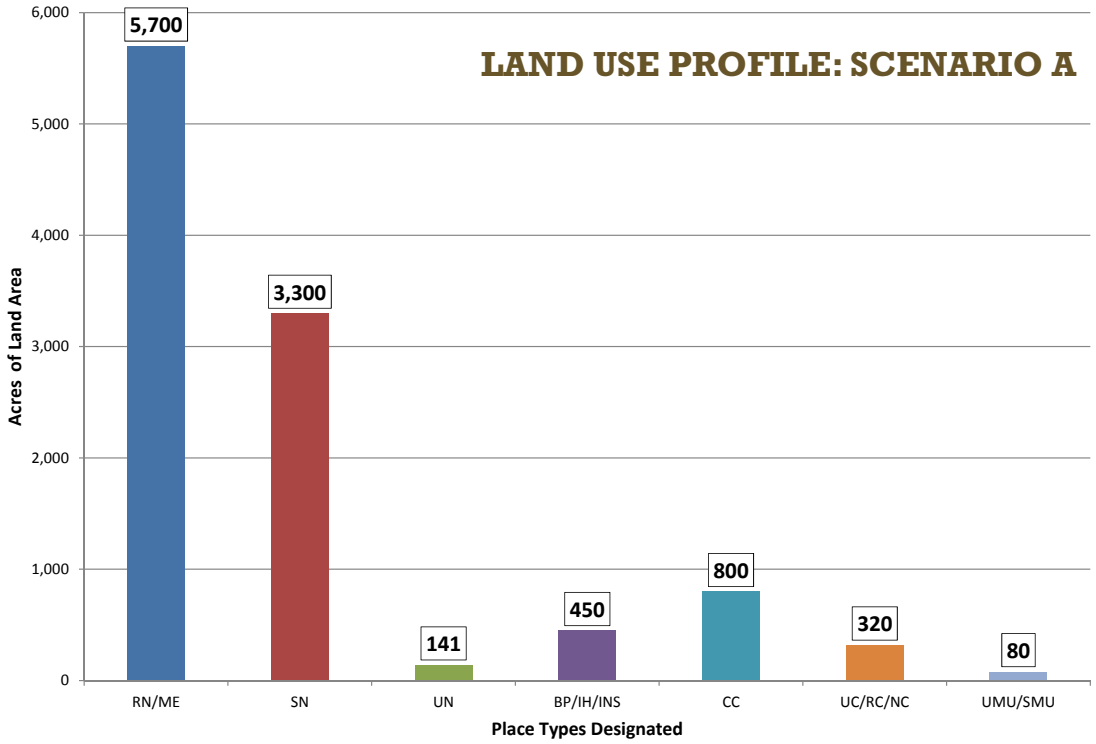
The results are shown in the tables for each scenario description.

Scenario A: Growing Out

Scenario A identifies how the region will look if development occurs in a dispersed pattern that is similar to what is currently seen in Flagstaff. The development pattern in Scenario A is reflective of the goals of the 2001 Regional Plan. New growth would largely take the form of single-use, low-density development that is generally isolated and automobile-oriented.

Common features of Scenario A include: green field development patterns, outward expansion of public utilities, and transportation investments that favor the automobile over other modes of travel such as transit, walking, and biking. Place Types and the distributions of the Place Types closely follow the existing pattern of development currently found in the Flagstaff region.

SCENARIO A	
New Population	70,900
Avg. Residential Density (units per acre)	3.10
New Employment	37,200
Avg. Non-Residential Density (employees per acre)	0.29



RN - Rural Neighborhood – Residential

ME - Mountain Estates – Residential

SN - Suburban Neighborhood – Residential

UN - Urban Neighborhood – Residential and Non-Residential

SNL - Suburban Neighborhood Light – Residential

BP – Business Park – Non-Residential

IH – Industrial-Heavy – Non-Residential

INS – Institutional – Non-Residential

CC – Commercial Corridor – Non-Residential

UC – Urban Center – Non-Residential

RC – Regional Center – Non-Residential

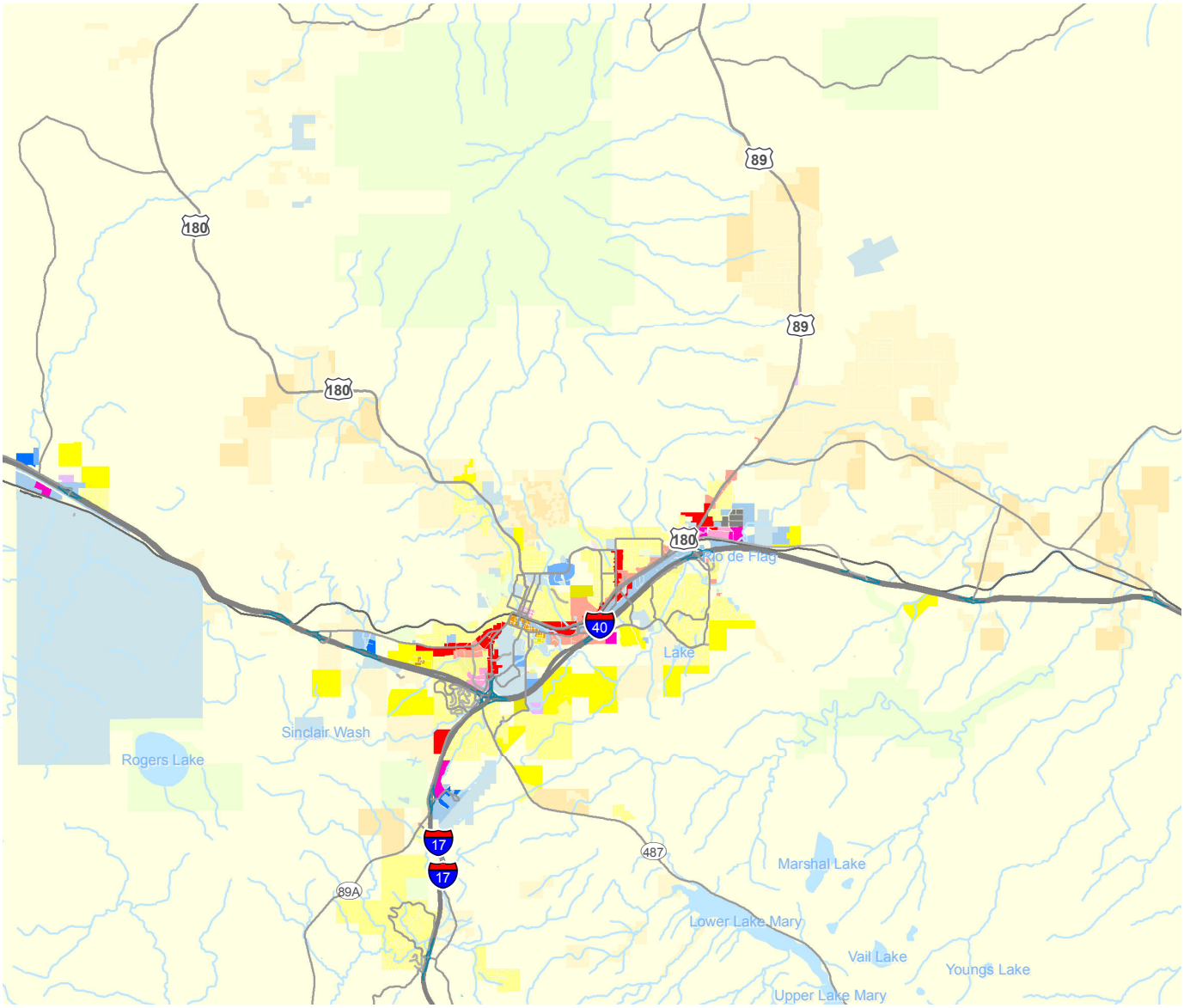
NC – Neighborhood Center – Non-Residential

UMU - Urban Mixed Use – Residential and Non-Residential

SMU - Suburban Mixed Use – Residential and Non-Residential

MC - Metro Core – Residential and Non-Residential

SCENARIO A + EXISTING LAND USES MAP



Legend

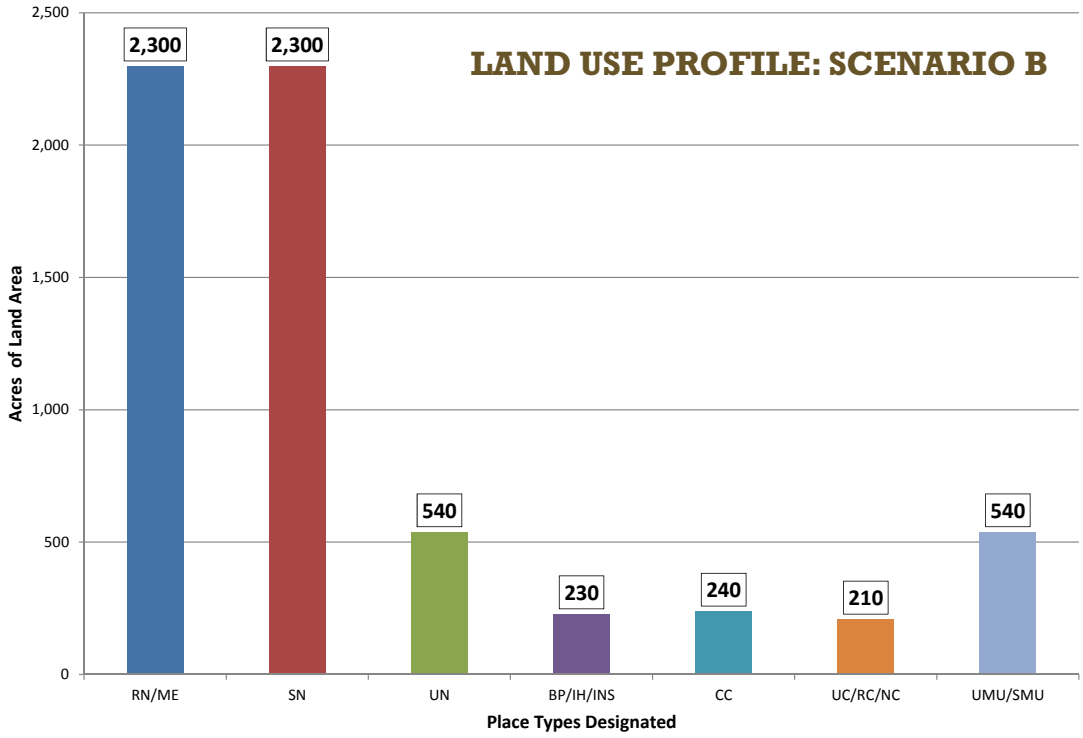
- Rural/Mountain Estates
- Suburban Neighborhood
- Urban Neighborhood
- Institutional
- Business Park
- Industrial - Heavy
- Commercial Corridor
- Urban Center
- Regional Center
- Neighborhood Center
- Urban Mixed-Use
- Suburban Mixed-Use
- Open Space - Protected
- Open Space - Unprotected

Scenario B: Growing In and Out

Scenario B identifies how the region will look with increased emphasis on higher-density housing types than what is currently found in Flagstaff, allowing for changes to transportation patterns and access to jobs. The development pattern under this scenario is reflective of the goals of the new Regional Plan. New growth would still consist primarily of single-use, low-density development; however, an increased supply of mixed-use and higher-density housing and employment will allow for more walkable communities and alternative modes of travel.

Common features of the scenario include: green field development patterns with an increase in infill development, reduced expansion of public utilities, and transportation investments that begin focusing on other modes while still giving the automobile the majority of infrastructure funding. New Place Types and land use concepts are introduced in the scenario, such as vertical mixed-use development in areas of concentrated population and employment.

SCENARIO B	
New Population	69,600
Avg. Residential Density (units per acre)	5.30
New Employment	36,800
Avg. Non-Residential Density (employees per acre)	0.39



RN - Rural Neighborhood – Residential

ME - Mountain Estates – Residential

SN - Suburban Neighborhood – Residential

UN - Urban Neighborhood – Residential and Non-Residential

SNL - Suburban Neighborhood Light – Residential

BP – Business Park – Non-Residential

IH – Industrial-Heavy – Non-Residential

INS – Institutional – Non-Residential

CC – Commercial Corridor – Non-Residential

UC – Urban Center – Non-Residential

RC – Regional Center – Non-Residential

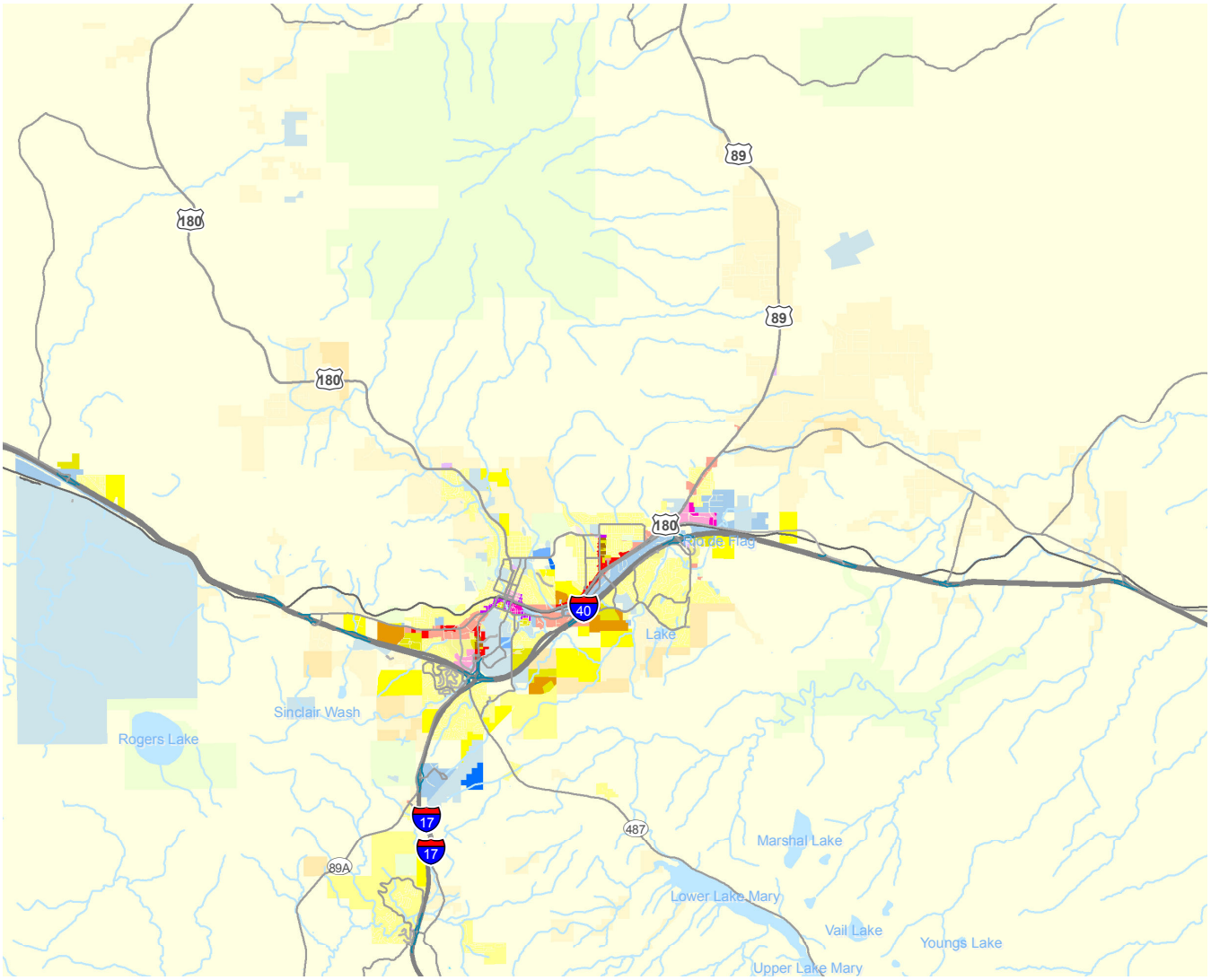
NC – Neighborhood Center – Non-Residential

UMU - Urban Mixed Use – Residential and Non-Residential

SMU - Suburban Mixed Use – Residential and Non-Residential

MC - Metro Core – Residential and Non-Residential

SCENARIO B + EXISTING LAND USES MAP



Legend

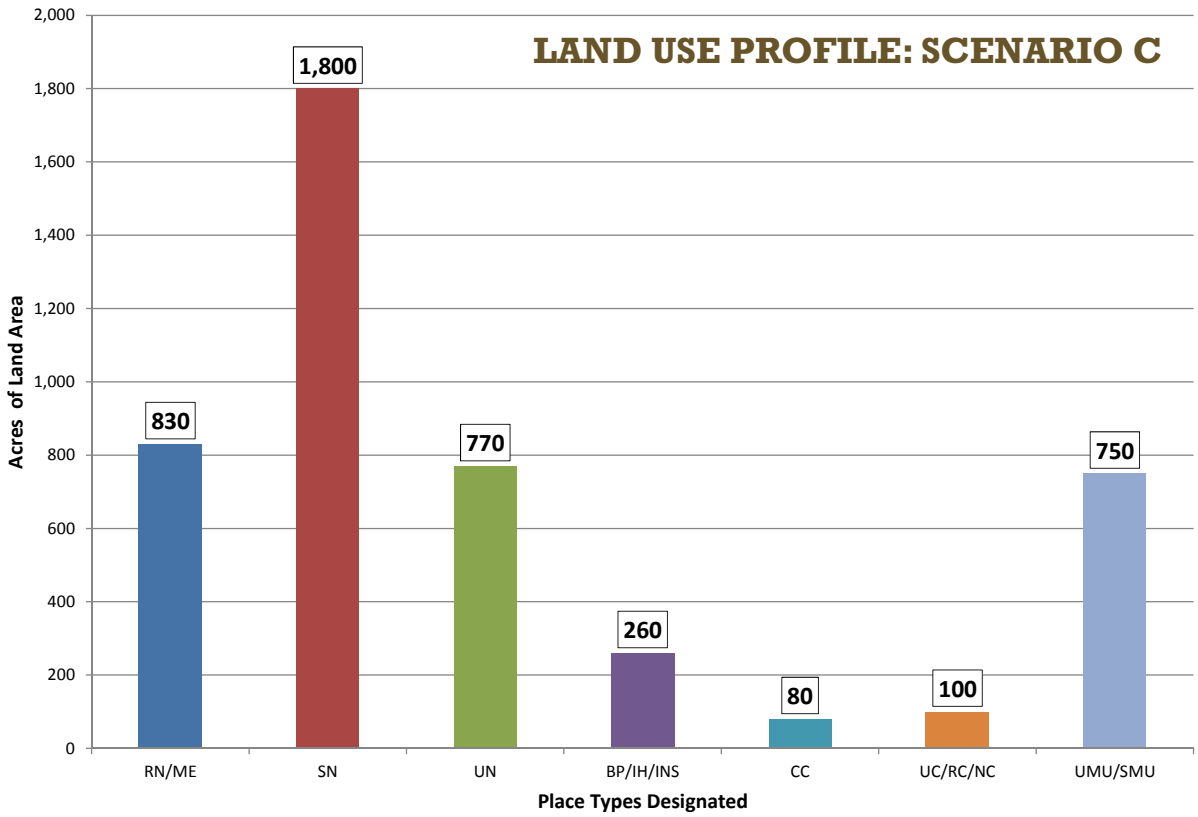
Rural/Mountain Estates	Industrial - Heavy	Urban Mixed-Use
Suburban Neighborhood	Commercial Corridor	Suburban Mixed-Use
Urban Neighborhood	Urban Center	Open Space - Protected
Institutional	Regional Center	Open Space - Unprotected
Business Park	Neighborhood Center	

Scenario C: Growing In

Scenario C has an increased focus on high-density housing and employment opportunities in the urban core, limiting the amount of land needed for new development and reducing the impact to both the transportation and public utility networks. Single-use development is still available but not at the same proportion available in Scenario A.

Common features of this development scenario include: concentrated development areas, land preservation outside developed centers, a variety of development types and intensities, and more travel options (i.e. walking, bicycle, transit, and automobile).

SCENARIO C	
New Population	71,800
Avg. Residential Density (units per acre)	8.20
New Employment	39,700
Avg. Non-Residential Density (employees per acre)	0.43



RN - Rural Neighborhood – Residential

ME - Mountain Estates – Residential

SN - Suburban Neighborhood – Residential

UN - Urban Neighborhood – Residential and Non-Residential

SNL - Suburban Neighborhood Light – Residential

BP – Business Park – Non-Residential

IH – Industrial-Heavy – Non-Residential

INS – Institutional – Non-Residential

CC – Commercial Corridor – Non-Residential

UC – Urban Center – Non-Residential

RC – Regional Center – Non-Residential

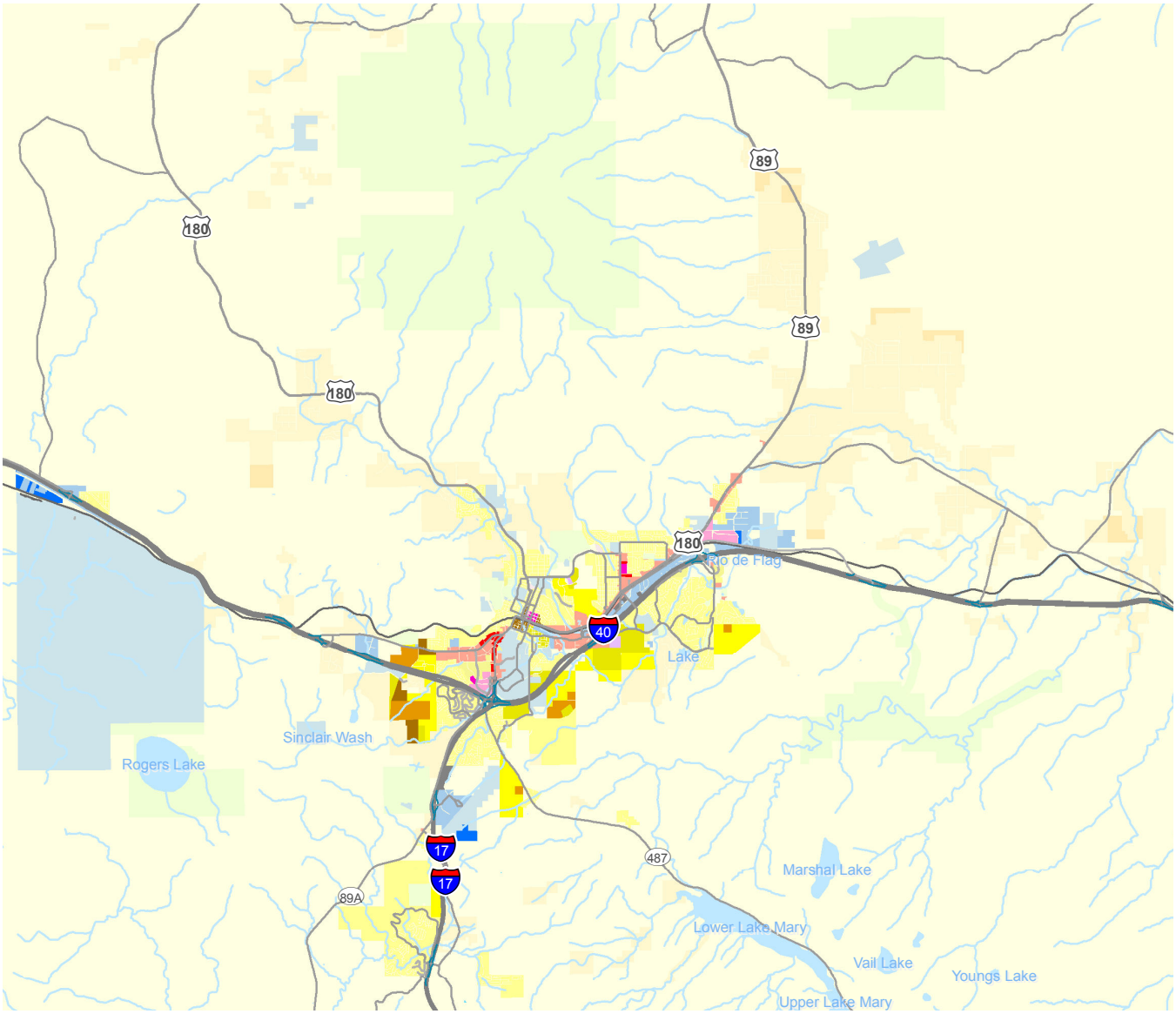
NC – Neighborhood Center – Non-Residential

UMU - Urban Mixed Use – Residential and Non-Residential

SMU - Suburban Mixed Use – Residential and Non-Residential

MC - Metro Core – Residential and Non-Residential

SCENARIO C + EXISTING LAND USES MAP



Legend

Rural/Mountain Estates	Industrial - Heavy	Urban Mixed-Use
Suburban Neighborhood	Commercial Corridor	Suburban Mixed-Use
Urban Neighborhood	Urban Center	Open Space - Protected
Institutional	Regional Center	Open Space - Unprotected
Business Park	Neighborhood Center	

SCENARIO INDICATOR SUMMARIES

The next step in the planning process was to analyze, compare and contrast the development scenarios against a set of performance measurement indicators. Performance indicators were created to quantify and explain the differences between the development scenarios. Summary statistics for comparing the output of indicators for each regional growth scenario were created using CommunityViz® software.

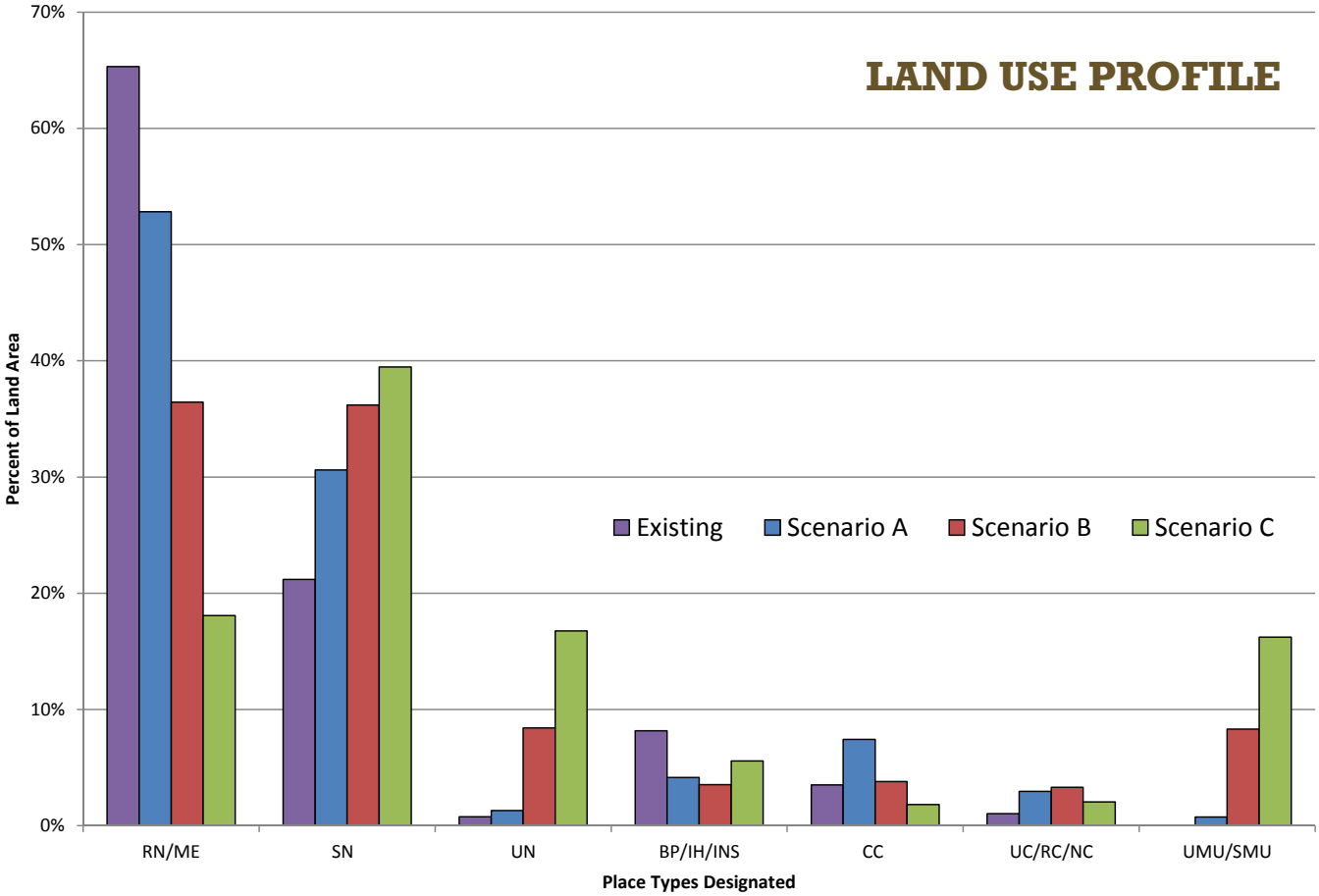
Performance indicators were developed for growth themes, including land use, mobility, housing mix, water demand, and environment. Assumptions for each performance indicator by Place Type are presented in the Appendix.

Performance indicators are not meant to predict the future, but rather to present possible outcomes based on assumptions related to the type of growth that characterizes each scenario.

Land Use

Overall, there are apparent land use differences between all of the scenarios. Rural living and mountain estates, which are prevalent in Scenario A, are limited and are replaced by an increased number of urban and mixed-use development types in Scenarios B and C. The addition of these new Place Types into the land use toolbox allows Flagstaff to adapt to some of the changes in national patterns of land use and transportation planning.

On the non-residential side of the land use discussion, we see below that the form of retail uses is moving from being located in the automobile-oriented 'commercial corridor' in Scenario A to be located in the mixed-use land use types in Scenarios B and C. This can have a dramatic effect in the look of our urban environments as this land use change occurs.



NOTE: The values for the scenarios represent new growth only. It does not include the existing. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.

Mobility

Mobility generally refers to the ability of residents and visitors to move from place to place within and to points outside of the region. Indicators used to evaluate the principle of mobility include: daily trips by mode, vehicle miles traveled, annual fuel consumption, and trips generated in congested areas.

Mobility performance indicators identify comparisons between scenarios at the broadest level in scenario planning. However, using the FMPO's Travel Demand Model to provide inputs, we can further understand potential mobility impacts at even the corridor level.

TRIPS INDICATOR METHODOLOGY

The Trips indicator focuses on the number of future trips created by the new growth. It does not take into consideration existing development and trips generated from those developments. It was assumed that 10 trips were made by each household, each day. This resulted in total trips for each scenario. The formula to calculate total trips is as follows:

New Households * Person Trip Generation assumption (which is 10)

To calculate the mode share of those trips, assumptions for mode share were made for each Place Type. The mode share for trips in this analysis included transit, bicycling, walking, and vehicles. The following formulas were used to determine trips for each transportation mode.

- Transit Trips: Total Trips * % Transit Trip Share assumption by Place Type
- Bicycle Trips: Total Trips * % Bicycle Trip Share assumption by Place Type
- Walking Trips: Total Trips * % Walk Trip Share assumption by Place Type
- Vehicle Trips: Total Trips * % Vehicle Trip Share assumption by Place Type

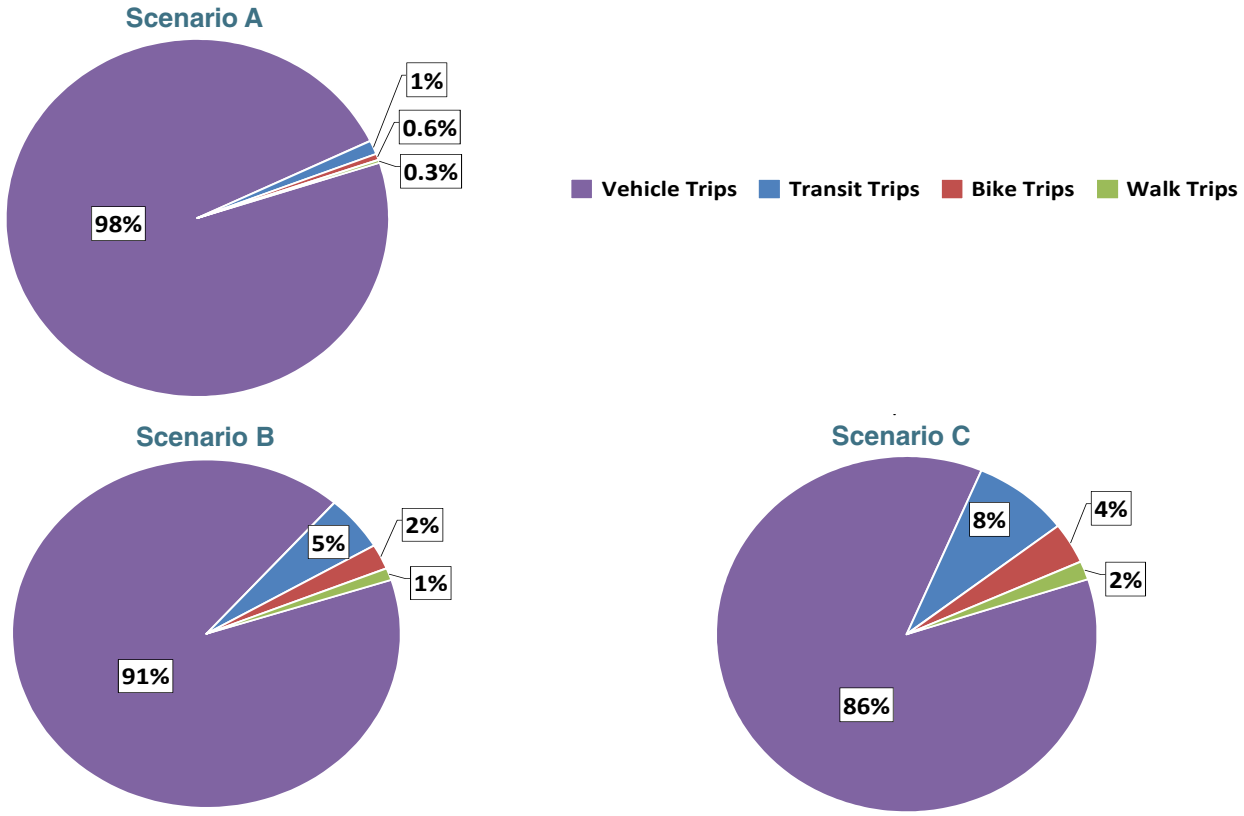
The results are shown in the table below.

INDICATOR	EXISTING^	POTENTIAL NEW FUTURE TRIPS*		
		SCENARIO A	SCENARIO B	SCENARIO C
AUTO TRIPS (DAILY)	526,000	267,000	245,000	239,000
TRANSIT TRIPS (DAILY)	1,700	3,400	13,700	22,600
BIKE TRIPS (DAILY)	10,900	1,500	6,000	10,300
WALK TRIPS (DAILY)	59,400	700	3,000	4,600
TOTAL TRIPS GENERATED (DAILY)	**598,000**	**272,600**	**267,700**	**276,500**

*Values for the scenarios do not include existing. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.
^Existing values are based on values in the Flagstaff MPO 3d Model Daily Summary

The total number of trips made by personal vehicles decreases as density increases, which is expected. People living in higher densities tend to make fewer trips by vehicle.

% Daily Person Trips by Mode



As land use patterns shift from less dense to more dense in Scenarios A to C and as land use form changes from a more single-use to a mixed-use form, trip patterns begin to change. Increased desire to bike, walk, or take transit becomes apparent.

VEHICLE MILES TRAVELED (VMT) INDICATOR METHODOLOGY

The VMT indicator focuses on the number of future miles traveled as a result of the new growth. It does not take into consideration existing development. The VMT is based on new households and assumptions made for each Place Type. The assumptions are as follows:

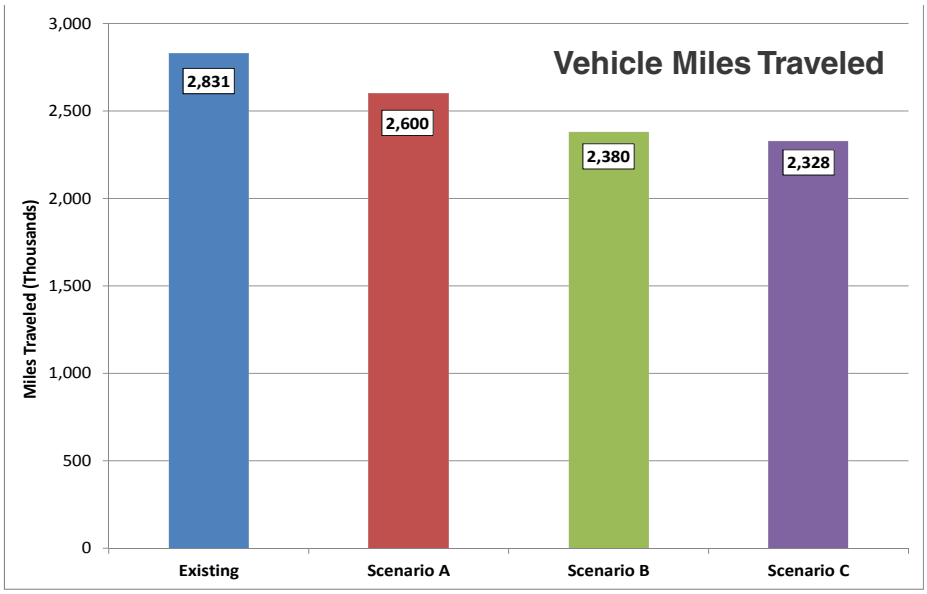
- Average Vehicle Trips per Household (varies for each Place Type)
- Average Vehicle Trip Length = 9.76 miles (US Bureau of Transportation Statistics, 2006)

The formula to calculate VMT is as follows:

New Households * Average Vehicle Trips assumption * Average Vehicle Trip Length assumption

The results are shown in the following graph.

NOTE: The values for the scenarios represent new growth only. It does not include the existing. The existing condition for this indicator is analyzed under Phase 2.



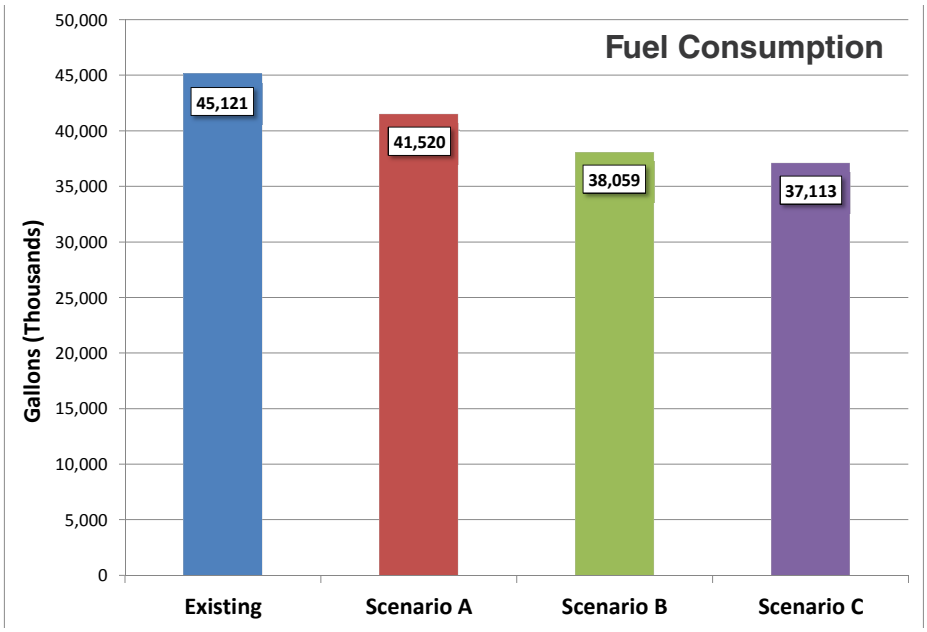
As a larger proportion of new growth shifts from locating in more suburban areas to urban areas, the VMT of the people living in new development will be reduced as trip patterns change and travel distances become shorter.

FUEL CONSUMPTION INDICATOR METHODOLOGY

The Fuel Consumption indicator presents the potential future amount of fuel consumed as a result of the new growth. It does not take into consideration existing development. The Fuel Consumption is based on the VMT, calculated above, and the assumption for Passenger Car Fuel Efficiency, which is 22.9 miles/gallon (US Bureau of Transportation Statistics, 2005). The formula to calculate Fuel Consumption is as follows:

VMT * Passenger Car Fuel Efficiency * 365

The results are shown in the following graph.



In Scenarios B and C, fuel consumption decreases as a result of fewer automobile trips and increased transit, bike, and pedestrians trips.

NOTE: The values for the scenarios represent new growth only and do not reflect existing population and land uses. It does not include the existing. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.

Housing Mix

A place to live versus a community are two very different concepts. Communities offer places for residents to live, work, and play. They also are distinguished by the physical and design characteristics of the buildings and neighborhoods they contain, and the social and qualitative aspects of human interaction that they nurture. A variety of housing types provides options for people to suit their needs. For example, the elderly, college-age, or couples without children may prefer to live in a townhome as opposed to a single family house. In addition, a healthy housing mix can work in combination with other goals of the Regional Plan. For instance, if the majority of housing is single family detached units, it would be in direct conflict with goals to preserve open space or encourage multimodal transportation. Apartments and townhomes can be developed at higher densities thus requiring less land be developed and encourages people to use alternate forms of transportation (Victoria Transport Policy Institute).

NEW HOUSEHOLDS AND HOUSING MIX INDICATOR METHODOLOGY

The New Households indicator calculates the number of potential new future households. The calculation does not take into consideration existing housing units. Assumptions for each Place Type were made to determine the number of housing units in each parcel, based on the parcel size. The assumptions include:

- Site Efficiency (varies for each Place Type)
- Percent Residential (varies by Place Type)
- Density (varies by Place Type)

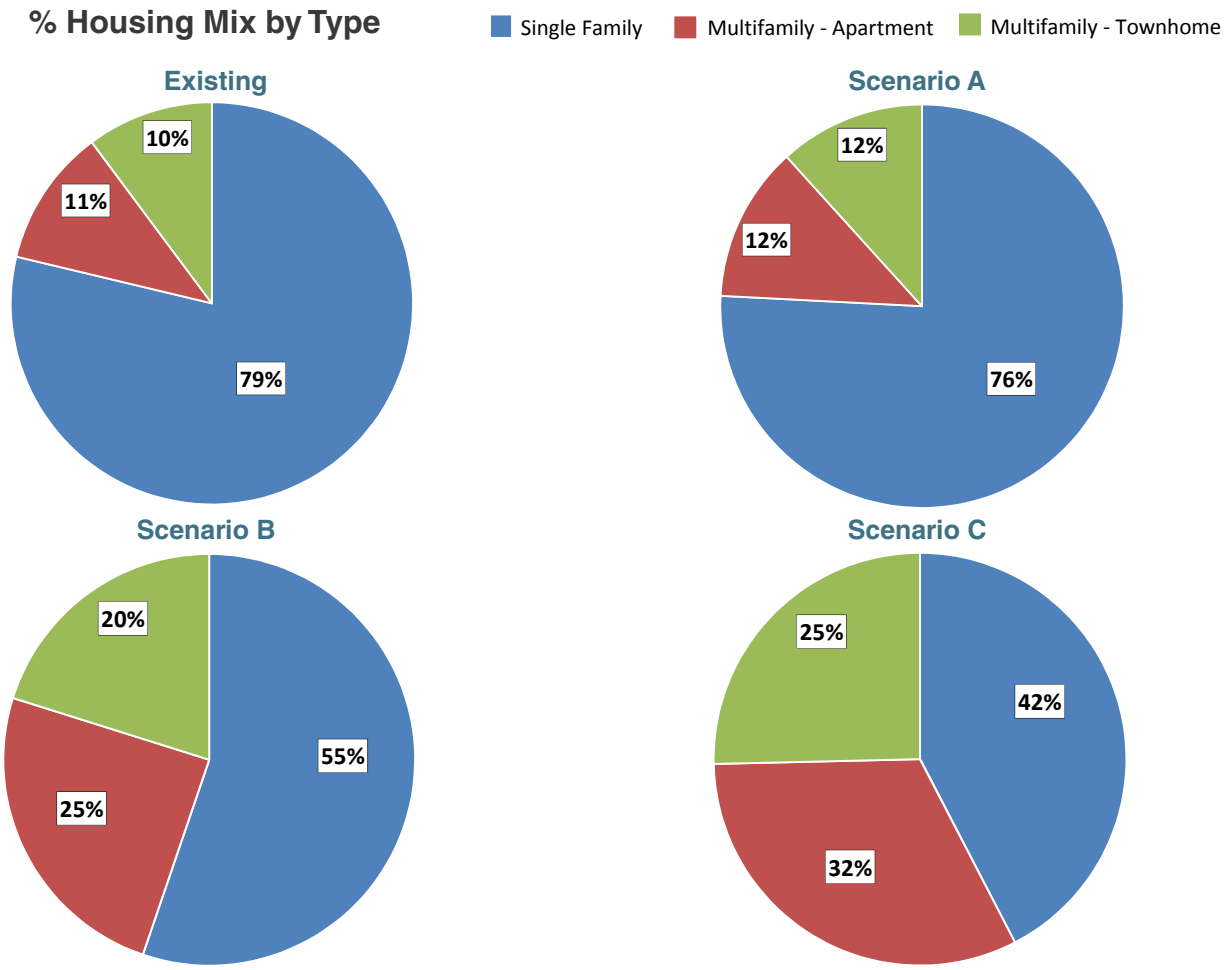
The formula used to calculate new households is as follows:

((Parcel Area * Site Efficiency assumption by Place Type * % Residential assumption by Place Type) / 43,560) * Density assumption by Place Type

Along with new households, the housing mix was also calculated. For the purpose of this analysis, the housing mix consists of those homes that are single family, apartment, or townhomes. The formulas used to determine housing mix is as follows:

- New Households * % Single Family assumption by Place Type
- New Households * % Apartment Family assumption by Place Type
- New Households * % Townhome Family assumption by Place Type

The results of this calculation are presented in the following table and charts.



INDICATOR	EXISTING	POTENTIAL NEW FUTURE HOUSEHOLDS AND HOUSING MIX*		
		SCENARIO A	SCENARIO B	SCENARIO C
SINGLE FAMILY HOUSEHOLDS	23,300	20,700	14,800	11,700
MULTIFAMILY - APARTMENT UNITS	3,300	3,300	6,600	8,900
MULTIFAMILY - TOWNHOME UNITS	3,000	3,000	5,400	7,000
TOTAL HOUSEHOLDS	**29,600**	**27,000**	**26,800**	**27,600**

*Values for the scenarios do not include existing. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.

Diversity in housing mix is an important characteristic of cities. Housing mix can accommodate people of different incomes, household composition, and age. Families may prefer single-family homes, while young single professionals may prefer apartments, and those who are retired may prefer a low-maintenance townhome.

The values for the scenarios represent new growth only and do not reflect existing population and land uses. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.

Water Demand

In the Flagstaff area, water is an essential element that can either limit future growth or enable it. Preserving our precious resources, including water, is an important concept to compare when looking at future growth.

WATER DEMAND INDICATOR METHODOLOGY

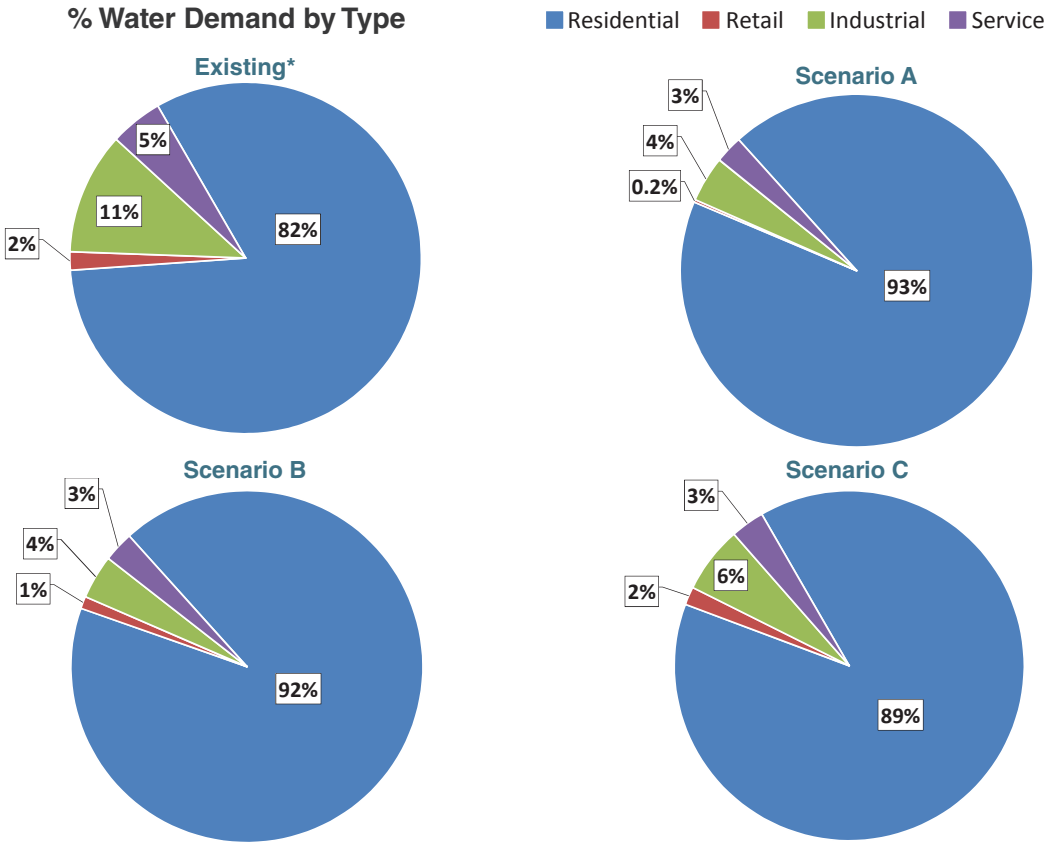
The Water Demand indicator calculates the potential new water demand based on the new development. The calculation does not take into consideration existing development. Assumptions for each Place Type were made to determine the demand based on Place Type. The assumptions are included in the table to the right:

The formula used to calculate water demand is as follows:

Sum (New Households * Daily Water Use by Place Type) + (Retail Square Feet * Retail Daily Water Use assumption by Place Type / 43,560) + (Industrial Square Feet * Industrial Daily Water Use assumption by Place Type / 43,560) + ((Service Square Feet + Office Square Feet + Institutional Square Feet) * Service Daily Water Use assumption by Place Type / 43,560)

	WATER USE RATES	GALLONS / DAY
RESIDENTIAL HOUSEHOLDS	Rural Neighborhood/Mountain Estates/Suburban Neighborhood/ Suburban Neighborhood Light	218/Household
	Urban Neighborhood/ Regional Center/Neighborhood Center/Suburban Mixed-Use	174/Household
	Urban Center/Metro Core/Urban Mixed-Use	161/Household
NON-RESIDENTIAL USES	Retail	874/Acre
	Industrial	5497/Acre
	Office	874/Acre

Source: City of Flagstaff 2009 Water Demand Analysis: Integrated Water Master Plan



*NOTE: The values for the scenarios represent new growth only and do not reflect existing population and land uses. They also do not include the existing large water uses, such as the University. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.

INDICATOR	EXISTING	POTENTIAL NEW FUTURE WATER DEMAND*		
		SCENARIO A	SCENARIO B	SCENARIO C
DAILY RESIDENTIAL WATER DEMAND (GALLONS)	6,320,000	5,830,000	5,390,000	5,340,000
DAILY RETAIL WATER DEMAND (GALLONS)	128,000	14,300	65,900	100,000
DAILY INDUSTRIAL WATER DEMAND (GALLONS)	865,000	264,000	237,000	370,000
DAILY SERVICE WATER DEMAND (GALLONS)	373,000	159,000	163,000	187,000
DAILY TOTAL WATER DEMAND (GALLONS)	**7,686,000**	**6,267,300**	**5,855,900**	**5,997,000**

*Values for the scenarios do not include existing. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.

Environment

Environment is a broad category that includes the physical features of the region and the ability of policies and programs to protect certain environmentally-sensitive areas. Indicators used to evaluate the principle of environment in Phase 1 include building footprint and air quality emissions. Building footprint indicates the amount of land the building occupies. The decrease in building footprint from Scenario A to C is associated with the higher residential and non-residential densities found in the latter scenarios. The difference between the existing building footprint and the footprints in each of the scenarios is due to the distribution of Place Types (refer to the Acres of Potential New Future Growth table).

BUILDING FOOTPRINT INDICATOR METHODOLOGY

The Building Footprint indicator calculates the acres consumed by the potential new future buildings. Assumptions for each Place Type were made to determine the acres of buildings in each scenario, based on the parcel size. The assumptions include:

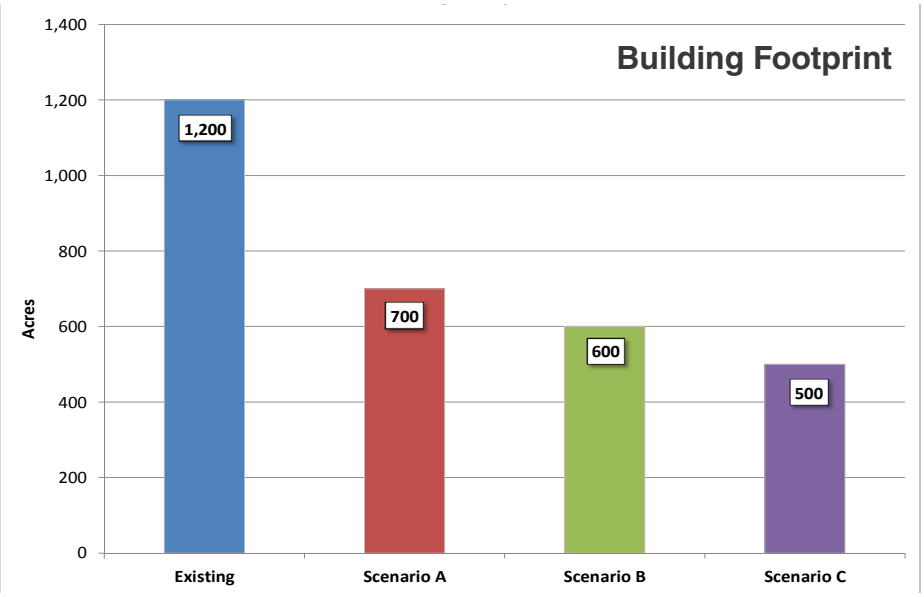
- Site Efficiency (varies for each Place Type)
- Floor Area Ratio (FAR) (varies by Place Type)
- Number of Stories (varies by Place Type)

The formula used to calculate the building footprint is as follows:

((Parcel Area * Site Efficiency assumption by Place Type * FAR assumption by Place Type) / Number of Stories assumption by Place Type) / 43560

The results are displayed in the following chart.

Building footprint indicates the amount of land occupied by the buildings. The decrease in building footprint from A to C is associated with the higher residential and non-residential densities found in the latter scenarios.



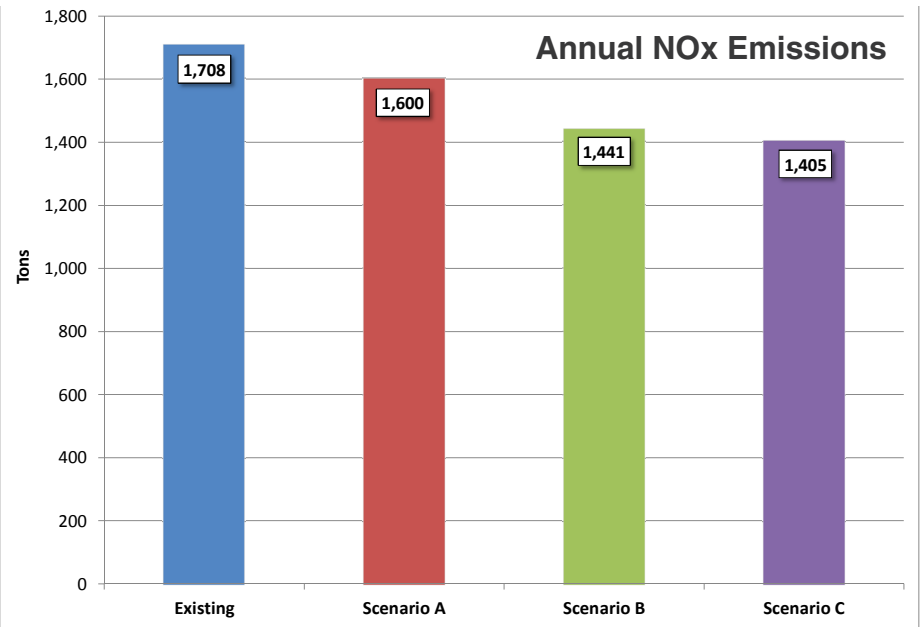
ANNUAL NITROGEN OXIDE (NOX) EMISSIONS INDICATOR METHODOLOGY

This indicator calculates the potential NOx emissions as a result of new development. This indicator does not take into consideration existing development. The formula used to calculate the NOx Emissions is as follows:

VMT * 1.5 (avg. NOx emission per mile traveled in grams) * 365 (days) * 0.0022046226 (grams to lbs) / 2000 (lbs/ton)

The results are displayed in the following chart.

Nitrogen Oxides (NOx) is a collection of gases that are produced from cars, trucks and buses, power plants, and off-road equipment. As the demand for the private automobile increases so will the amount of NOx produced in our region.

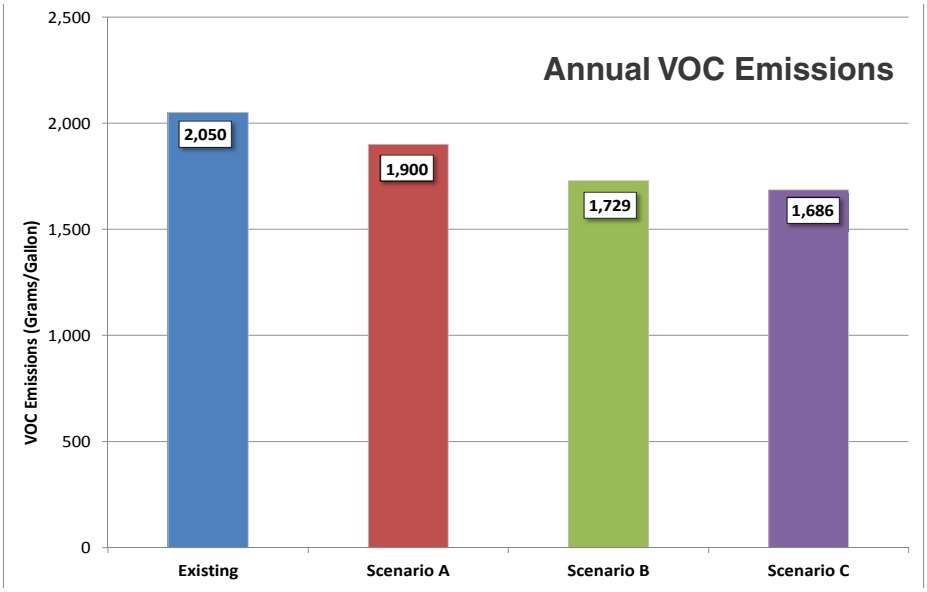


ANNUAL VOLATILE ORGANIC COMPOUND (VOC) EMISSIONS INDICATOR METHODOLOGY

This indicator calculates the potential VOC emissions as a result of new development. This indicator does not take into consideration existing development. The formula used to calculate the VOC Emissions is as follows:

VMT * 1.8 (avg VOC emission per mile traveled in grams) * 365 (days) * 0.0022046226 (grams to lbs) / 2000 (lbs/ton)

The results are displayed in the following chart.



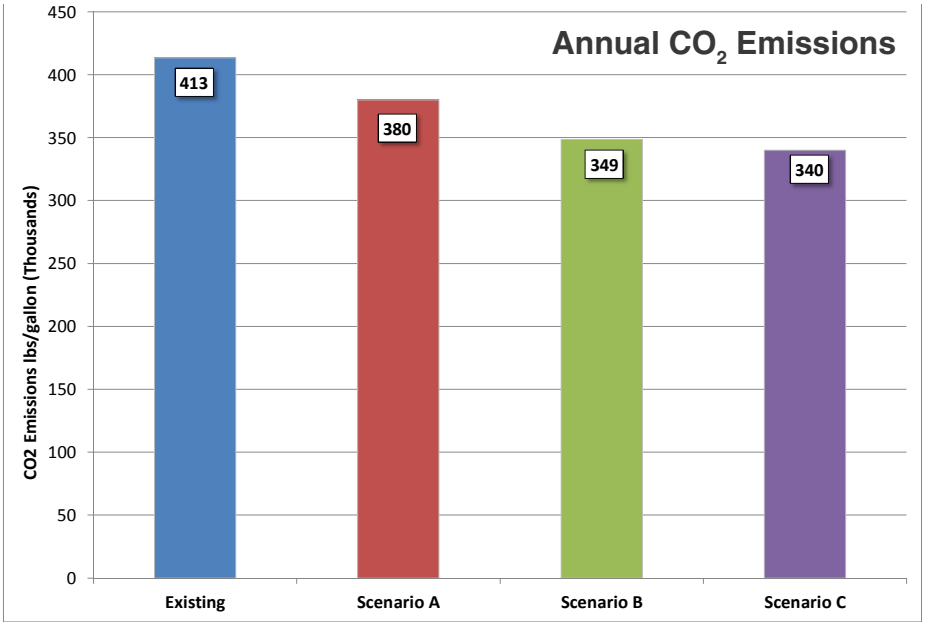
Volatile Organic Compounds (VOC) also contribute to poor air quality in the region and lead to increased levels of ground-level ozone.

ANNUAL CARBON DIOXIDE (CO_2) EMISSIONS INDICATOR METHODOLOGY

This indicator calculates the potential CO_2 emissions as a result of new development. This indicator does not take into consideration existing development. The formula used to calculate the CO_2 Emissions is as follows:

VMT * 0.8 (avg CO2 emission per mile traveled in lbs) * 365 (days) / 2000 (lbs/ton)

The results are displayed in the following chart.



Carbon Dioxide (CO_2) is a naturally occurring gas produced in the earth's atmosphere. CO_2 concentrations increase as a result of the buring of fossil fuels.

NOTE: The values for the scenarios represent new growth only. It does not include the existing. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.

PHASE 1 CONCLUSION

Scenario planning provides citizens, elected officials, public administrators and other stakeholders with the ability to compare future growth opportunities. Using CommunityViz® scenario software and the results gathered through the public input process, the strengths and weaknesses of the three alternative growth scenarios were analyzed and compared. These development scenario alternatives ranged from a more typical growth pattern of single-family housing and automobile-oriented retail, to a more mixed-use growth pattern with increased demand for alternative modes of travel such as walking, biking, and taking transit.

After a process to normalize densities and employment between the scenarios, it was discovered that Scenario C was too similar to Scenario B. To be effective, the scenarios had to be different enough that they would determine policy differences. As a result, a new scenario was developed, Scenario D, for the second phase of analysis.

› Phase 2 Analysis

The Phase 2 analysis included an additional scenario (Scenario D), two new Place Types, additional environmental performance indicators, and adjustments to Phase I indictors. The following section describes and illustrates the Phase 2 analysis.

PLACE TYPES

In addition to the 12 Place Types that were included in the Phase 1 analysis, two more Place Types were included for Phase 2. The two new Place Types are described below.

SUBURBAN NEIGHBORHOOD LIGHT (SNL) – This Place Type was included to reflect the actual style of suburban neighborhood development currently existing in Flagstaff. It consists mainly of lower-density single-family residential housing; however religious and educational institutions may be present. Typical City services are available such as water, sewer service, and recreation facilities.

METRO CORE (MC) – Provides services to residents in the Flagstaff Metropolitan Area and pass-by traffic and is accessible to multiple modes of travel. This is the most intense building Place Type.

As discussed previously, during the workshops, the public placed the place type chips on maps to represent new growth in each scenario. After the workshops, the planning team coded the placement of these chips

into a shapefile to be used in the CommunityViz® analysis. As such, the number of place type chips used during the workshops determined the number of acres of new growth in each scenario, and ultimately resulted in the differences between the three scenarios. The table below shows the resulting number of acres of new growth by place type in each scenario.

Acres of Potential New Growth Indicator Methodology

To determine the acreage of new growth for each Place Type, the parcel areas (which is in square feet) for each Place Type were summed and then divided by 43,560 to convert to acres. The parcel area was calculated in GIS when the parcel shapefile was created. The formula used to calculate acres for each Place Type is as follows:

Sum of Parcel Area for the respective Place Type / 43,560

The results are shown in the table below. As is evident from the table below, the addition of the new Place Types and the redistribution of the previous Place Types changed the amount of acres in each Place Type. This change is what caused the changes in each of the indicators.

PLACE TYPES	EXISTING	ACRES OF POTENTIAL NEW FUTURE GROWTH*		
		SCENARIO A	SCENARIO B	SCENARIO D
RN/ME	14,800	4,900	4,400	2,800
SN	4,800	3,300	2,200	1,300
UN	130	230	610	700
SNL	0	200	80	1,000
BP/IH/INS	1,900	590	450	200
CC	800	700	200	0
UC/RC/NC	230	280	230	40
UMU/SMU/MC	0	80	450	750
20%+ TOTAL ACRES	22,660	10,280	8,620	6,790

*Values for the scenarios do not include existing. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.

This methodology is used in each of the Land Use Profile graphs, which are shown with each scenario description in the Development Scenario Summaries section below.

DEVELOPMENT SCENARIO SUMMARIES

The Phase 2 analysis included the addition of Scenario D, as well as changes to Scenarios A and B. However, the general concepts behind A and B remain the same. Scenario C was not considered in the Phase 2 analysis because it was too similar to Scenario B to drive different policy decisions. Under the Phase 2 analysis it was assumed that the Northern Arizona University would reach its stated goal of 25,000 students, with a respective growth in employment at the institution. This change, along with other changes for normalization, is reflected in the following scenarios.

Population Indicator Methodology

The Population indicator is based on the parcel size (in square feet), which was calculated in GIS when the parcel shapefile was created. Assumptions for each Place Type were made to determine how many people there are in each parcel, based on the parcel size. The assumptions include:

- Site Efficiency (varies for each Place Type)
- Percentage of Residential (varies for each Place Type)
- Density (varies for each Place Type)
- Average Household Size = 2.6 people per household (FMPO)

The formula used to calculate population is as follows:

(((Parcel Area * Site Efficiency assumption by Place Type * % Residential assumption by Place Type) / 43,560) * Density assumption by Place Type) * Average Household Size assumption by Place Type

Employment Indicator Methodology

The Employment indicator is based on the non-residential square feet, which is based on the parcel size and an assumption for the percentage of non-residential use for each Place Type. Assumptions for each Place Type were made to determine the number of employees, which were then summed to get total employment. The assumptions include:

- Percentage of each non-residential use (retail, industrial, institutional, office, and service) for each Place Type
- Employment rate of each non-residential use for each Place Type

The formula used to calculate employment is as follows:

((Non-Residential Square Feet * Percent Institutional assumption) / Institutional Employment Rate assumption) + ((Non-Residential Square Feet * Percent Industrial assumption) / Industrial Employment Rate assumption) + ((Non-Residential Square Feet * Percent Office assumption) / Office Employment Rate assumption) + ((Non-Residential Square Feet * Percent Retail assumption) / Retail Employment Rate assumption) + ((Non-Residential Square Feet * Percent Service assumption) / Service Employment Rate assumption)

Average Residential and Non-Residential Density

Average densities were determined based on the total residential or non-residential area. The total area for residential Place Types was weighted by the Density assumption for each Place Type. The total area for non-residential Place Types was weighted by the FAR assumption for each Place Type. The following formulas were used for residential and non-residential density respectively:

(Sum (Total Residential Area by Place Type * Density by Place Type)) / (Sum (Total Residential Area by Place Type))

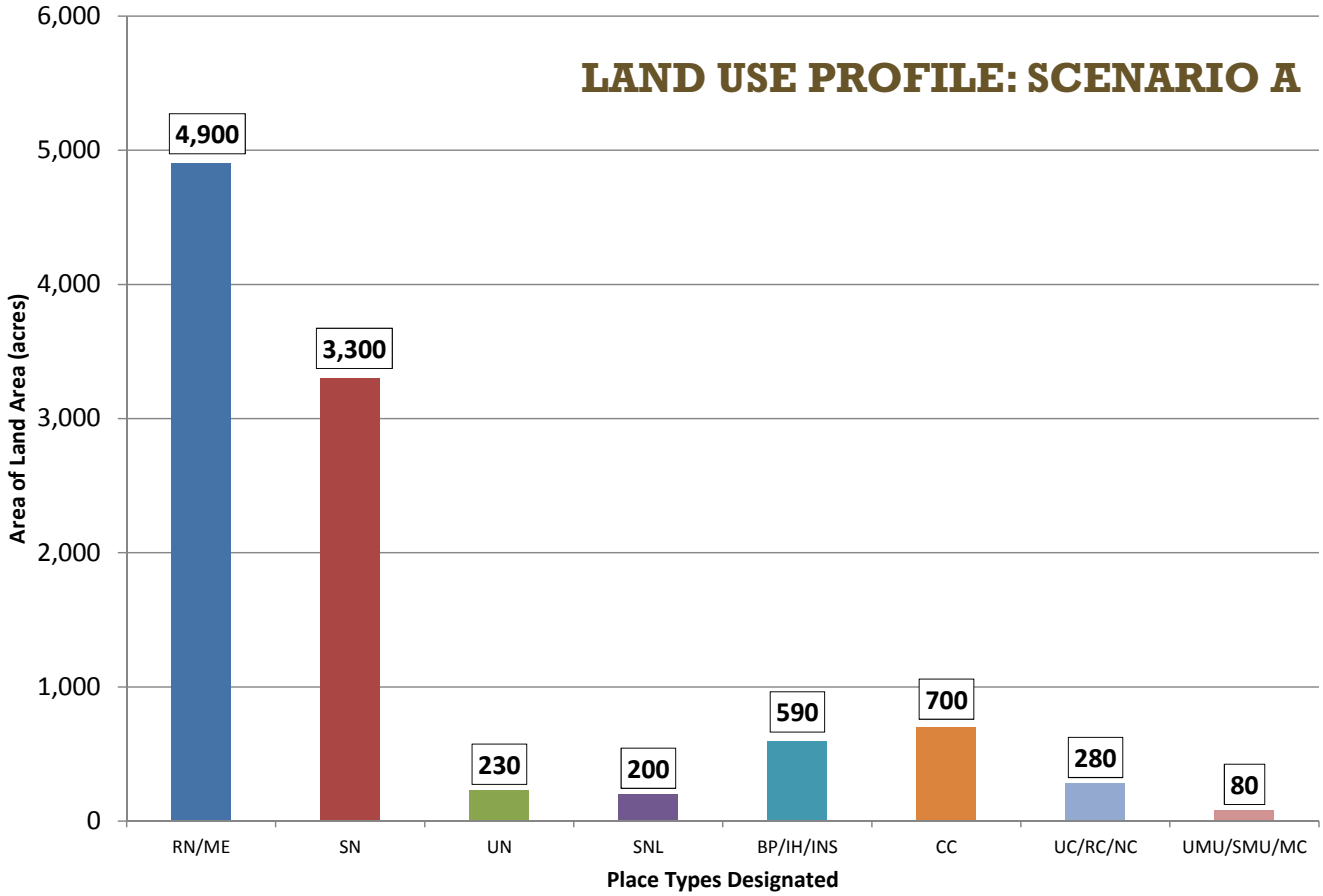
(Sum (Total Non-Residential Area by Place Type * FAR by Place Type)) / (Sum (Total Non-Residential Area by Place Type))

The results are shown in the tables for each scenario description.

Scenario A: Growing Out

As stated for Phase 1, Scenario A identifies how the region will look if development occurs in a dispersed pattern of development that is similar to what is currently seen in Flagstaff. The development pattern under this scenario is reflective of the goals of the 2001 Regional Plan New growth would largely take the form of single-use, low-density development that is generally isolated and automobile-oriented.

SCENARIO A	
New Population	72,500
Avg. Residential Density (units per acre)	3.5
New Employment	38,700
Avg. Non-Residential Density (employees per acre)	0.30



RN - Rural Neighborhood – Residential

ME - Mountain Estates – Residential

SN - Suburban Neighborhood – Residential

UN - Urban Neighborhood – Residential and Non-Residential

SNL - Suburban Neighborhood Light – Residential

BP – Business Park – Non-Residential

IH – Industrial-Heavy – Non-Residential

INS – Institutional – Non-Residential

CC – Commercial Corridor – Non-Residential

UC – Urban Center – Non-Residential

RC – Regional Center – Non-Residential

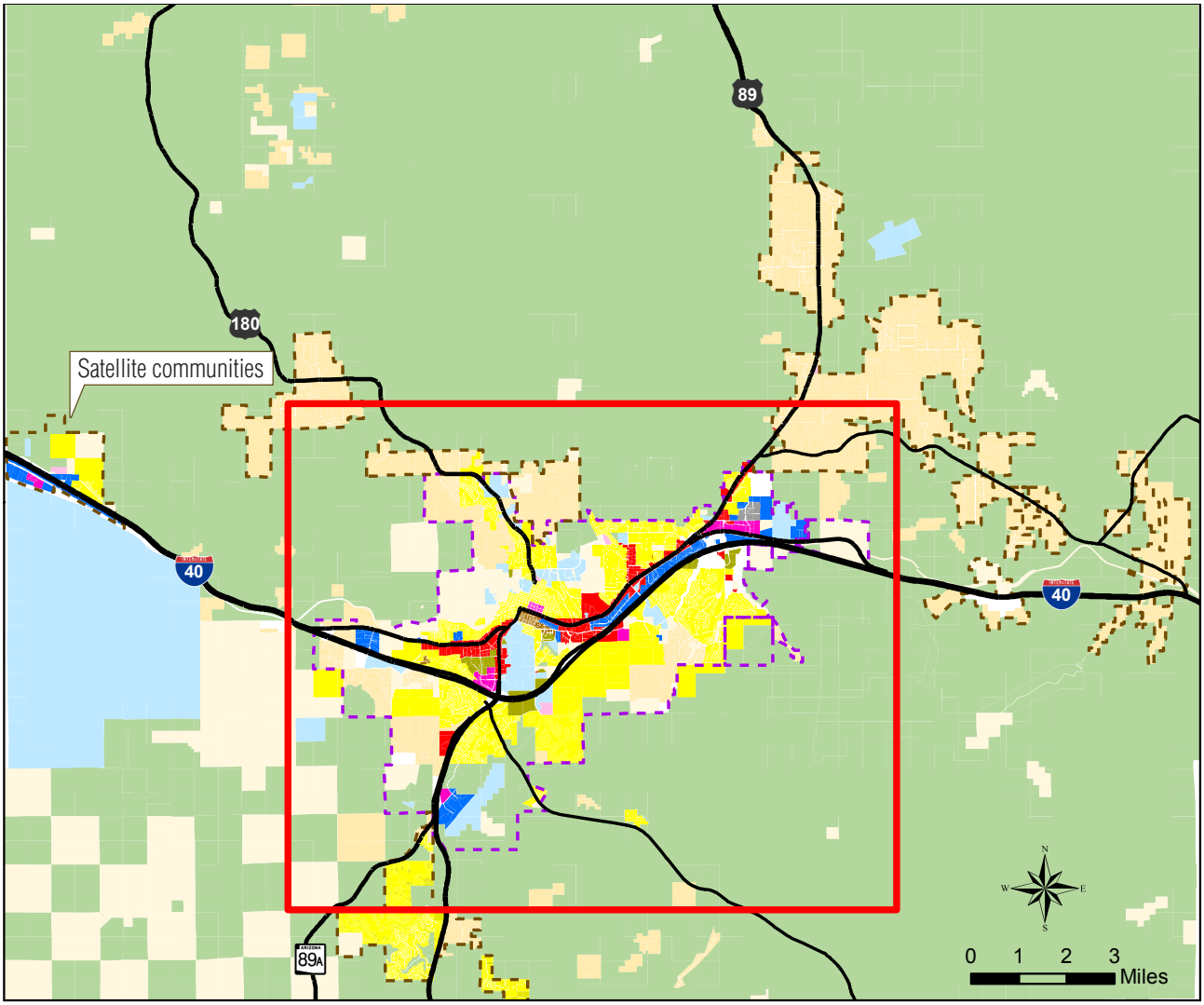
NC – Neighborhood Center – Non-Residential

UMU - Urban Mixed Use – Residential and Non-Residential

SMU - Suburban Mixed Use – Residential and Non-Residential

MC - Metro Core – Residential and Non-Residential

SCENARIO A: REGION + LAND USE MAP

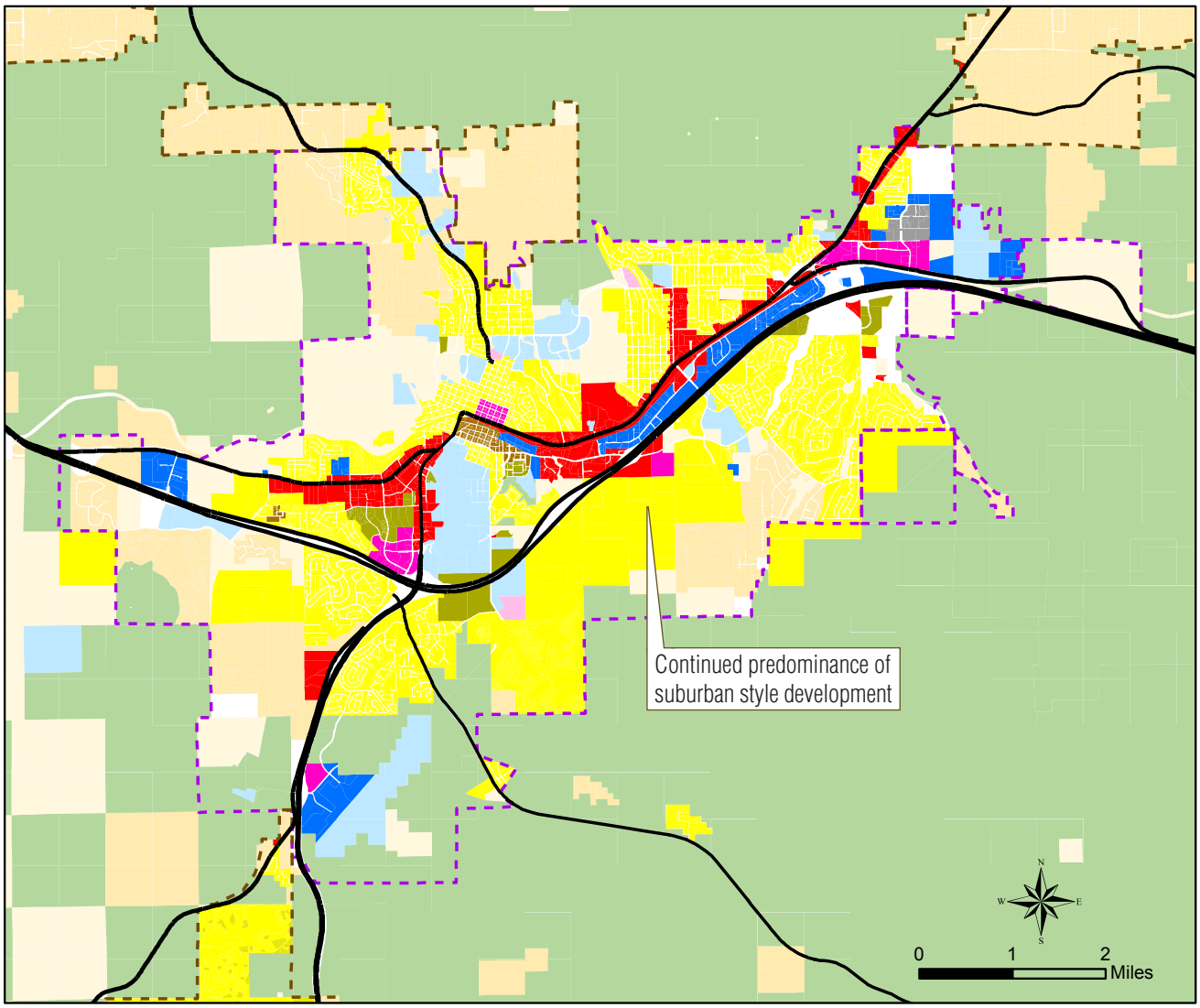


Legend

- Rural Growth Boundary
- Urban Growth Boundary
- Rural/Mountain Estates
- Suburban Neighborhood Light
- Suburban Neighborhood
- Urban Neighborhood
- Institutional
- Business Park
- Industrial - Heavy
- Commercial Corridor
- Regional Center
- Neighborhood Center
- Suburban Mixed-Use
- Protected Open Space
- Unprotected Open Space

Scenario A has more growth on the perimeter of the Rural and Urban Growth Boundaries. In addition, there is very little mixed use development (UMU/SMU/MC). The resulting land use pattern under Scenario A is less conducive to supporting alternate modes of transportation, including transit, bicycling, and walking.

SCENARIO A: CITY + LAND USE MAP



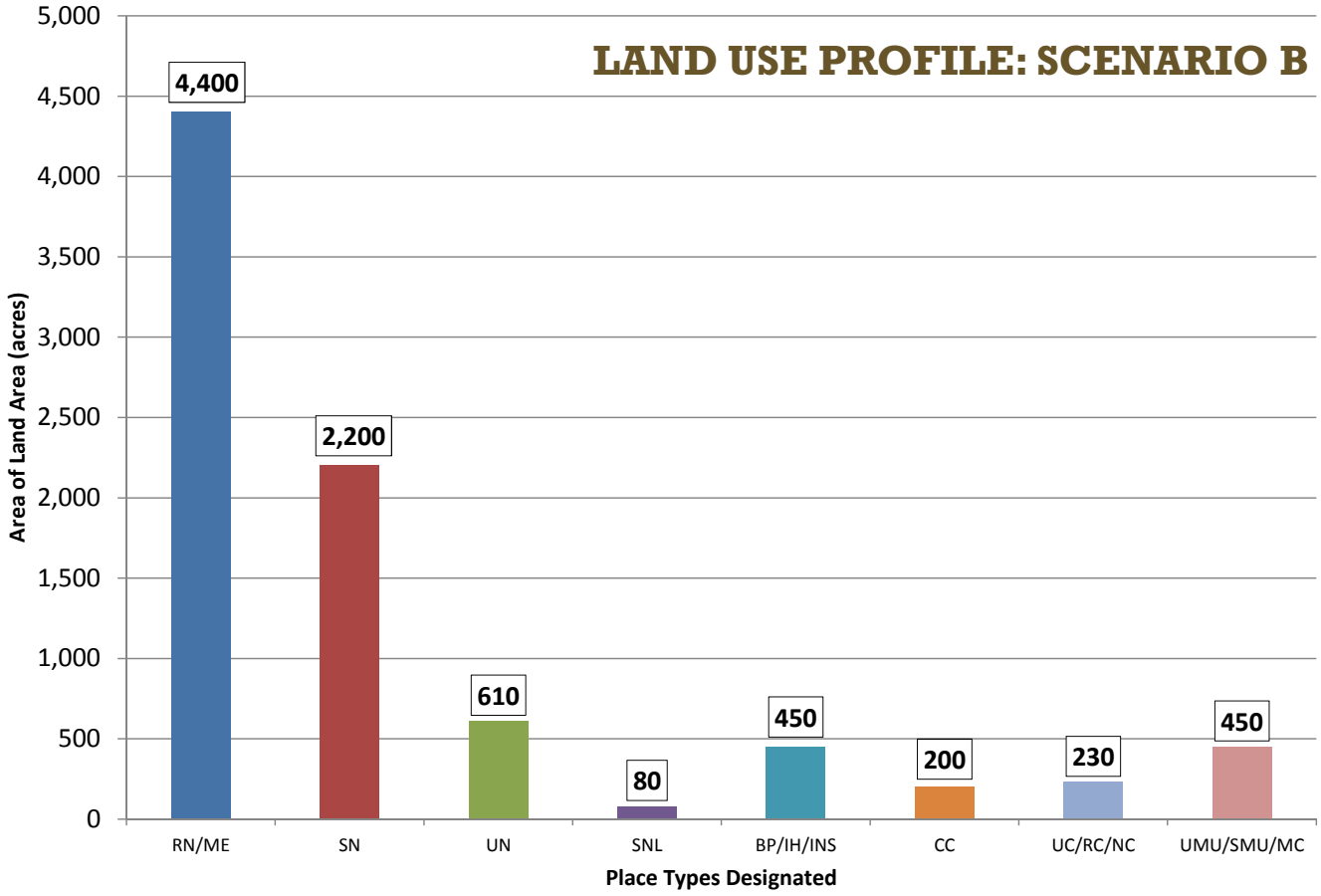
Legend

- Rural Growth Boundary
- Urban Growth Boundary
- Rural/Mountain Estates
- Suburban Neighborhood Light
- Suburban Neighborhood
- Urban Neighborhood
- Institutional
- Business Park
- Industrial - Heavy
- Commercial Corridor
- Regional Center
- Neighborhood Center
- Suburban Mixed-Use
- Protected Open Space
- Unprotected Open Space

Scenario B: Growing In and Out

Scenario B identifies how the region will look with increased emphasis on higher-density housing types than what is currently found in Flagstaff, allowing for changes to transportation patterns and access to jobs. The development pattern under this scenario is reflective of the goals of the new Regional Plan. New growth would still consist primarily of single-use, low-density development; however, an increased supply of mixed-use and higher-density housing and employment will allow for more walkable communities and alternative modes of travel.

SCENARIO B	
New Population	72,200
20%+ Avg. Residential Density (units per acre)	4.5
New Employment	41,100
20%+ Avg. Non-Residential Density (employees per acre)	0.35



RN - Rural Neighborhood – Residential

ME - Mountain Estates – Residential

SN - Suburban Neighborhood – Residential

UN - Urban Neighborhood – Residential and Non-Residential

SNL - Suburban Neighborhood Light – Residential

BP – Business Park – Non-Residential

IH – Industrial-Heavy – Non-Residential

INS – Institutional – Non-Residential

CC – Commercial Corridor – Non-Residential

UC – Urban Center – Non-Residential

RC – Regional Center – Non-Residential

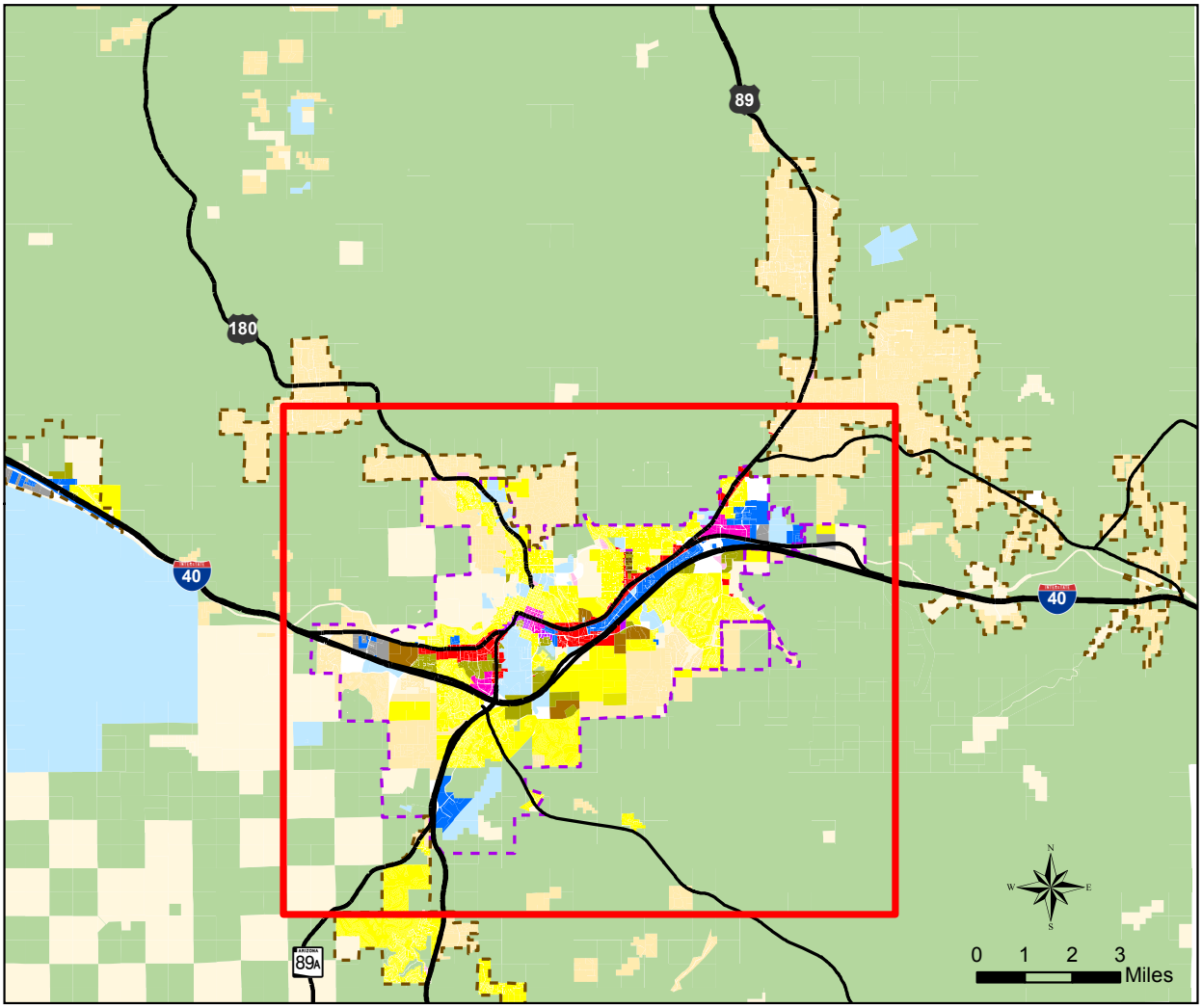
NC – Neighborhood Center – Non-Residential

UMU - Urban Mixed Use – Residential and Non-Residential

SMU - Suburban Mixed Use – Residential and Non-Residential

MC - Metro Core – Residential and Non-Residential

SCENARIO B: REGION + LAND USE MAP

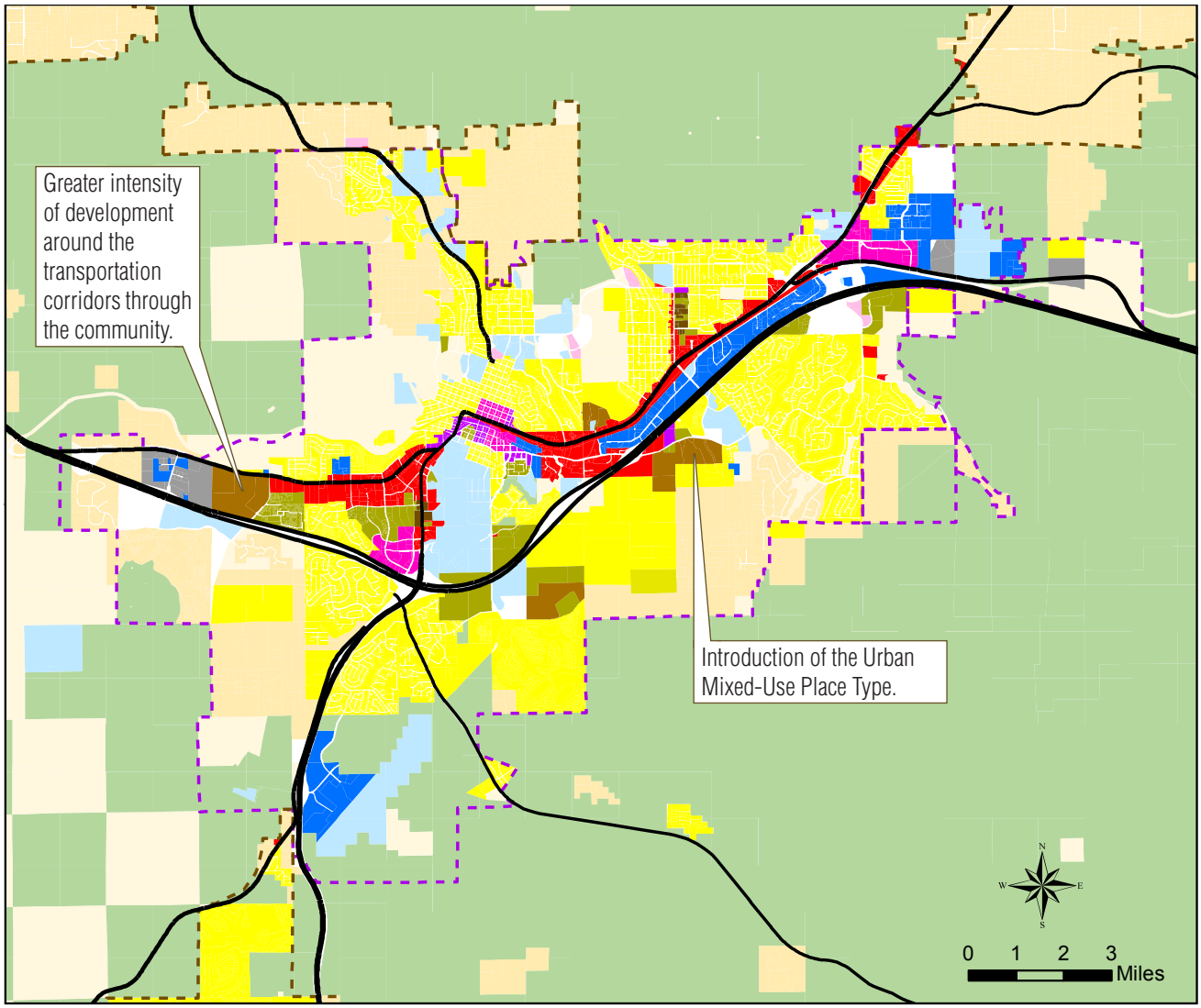


Legend

- Rural Growth Boundary
- Urban Growth Boundary
- Rural/Mountain Estates
- Suburban Neighborhood Light
- Suburban Neighborhood
- Urban Neighborhood
- Institutional
- Business Park
- Industrial - Heavy
- Commercial Corridor
- Urban Center
- Regional Center
- Neighborhood Center
- Suburban Mixed-Use
- Urban Mixed-Use
- Protected Open Space
- Unprotected Open Space

Scenario B has greater amounts of mixed use development (UMU/SMU/MC), located toward the heart of the City. Growth in general is directed more towards the center of the City. The resulting land use pattern under Scenario B is more likely to encourage the use of alternate modes of transportation.

SCENARIO B: CITY + LAND USE MAP



Legend

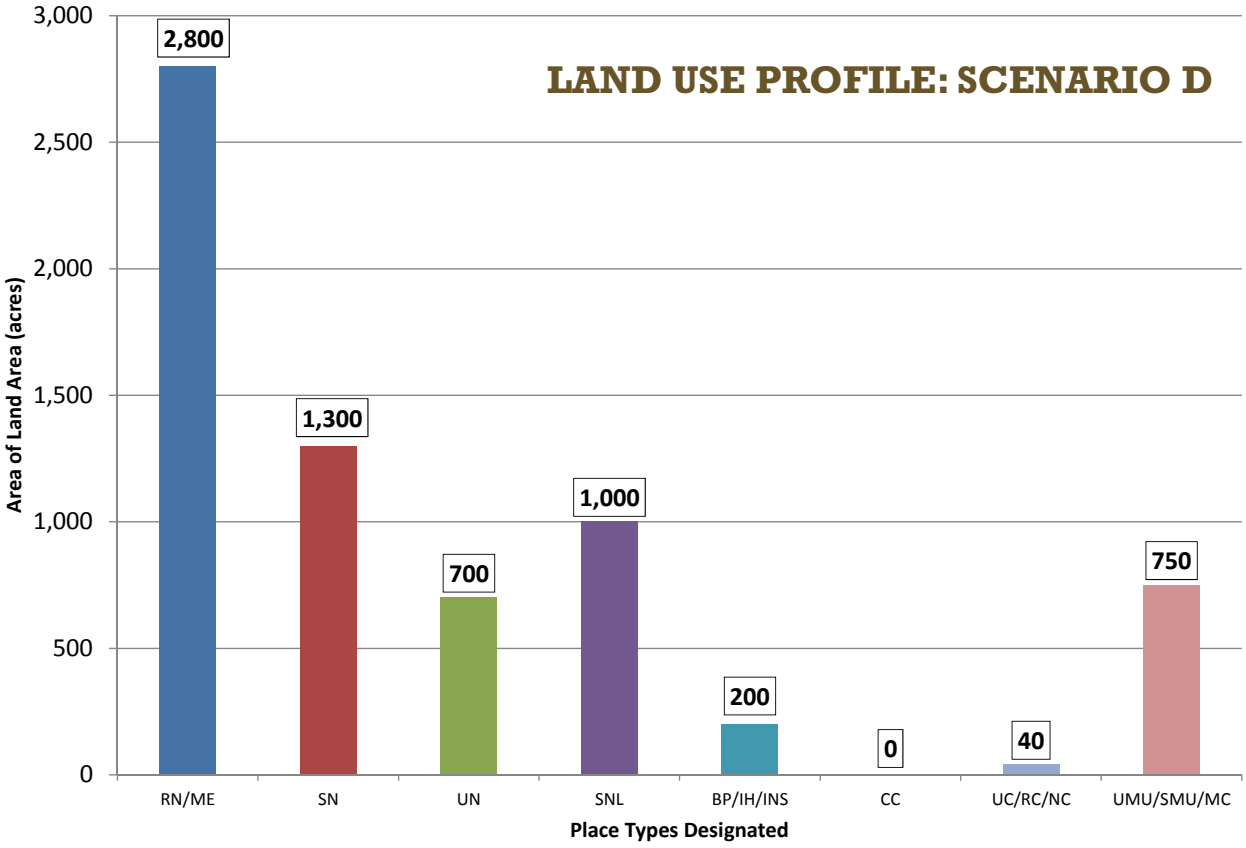
- Rural Growth Boundary
- Urban Growth Boundary
- Rural/Mountain Estates
- Suburban Neighborhood Light
- Suburban Neighborhood
- Urban Neighborhood
- Institutional
- Business Park
- Industrial - Heavy
- Commercial Corridor
- Urban Center
- Regional Center
- Neighborhood Center
- Suburban Mixed-Use
- Urban Mixed-Use
- Protected Open Space
- Unprotected Open Space

Scenario D: Growing In

Scenario D was developed to illustrate a higher density option to a greater degree than the previous Scenario C, which was developed during the Phase 1 analysis. Provision of high-density housing and employment creates an opportunity to preserve land on the fringe areas of the City.

Common features of Scenario D include: concentrated development areas, land preservation outside developed centers, a variety of development types and intensities, and more travel options (i.e. walking, bicycle, transit, and automobile).

SCENARIO D	
New Population	71,600
20%+ Avg. Residential Density (units per acre)	5.5
New Employment	39,600
20%+ Avg. Non-Residential Density (employees per acre)	0.54



RN - Rural Neighborhood – Residential

ME - Mountain Estates – Residential

SN - Suburban Neighborhood – Residential

UN - Urban Neighborhood – Residential and Non-Residential

SNL - Suburban Neighborhood Light – Residential

BP – Business Park – Non-Residential

IH – Industrial-Heavy – Non-Residential

INS – Institutional – Non-Residential

CC – Commercial Corridor – Non-Residential

UC – Urban Center – Non-Residential

RC – Regional Center – Non-Residential

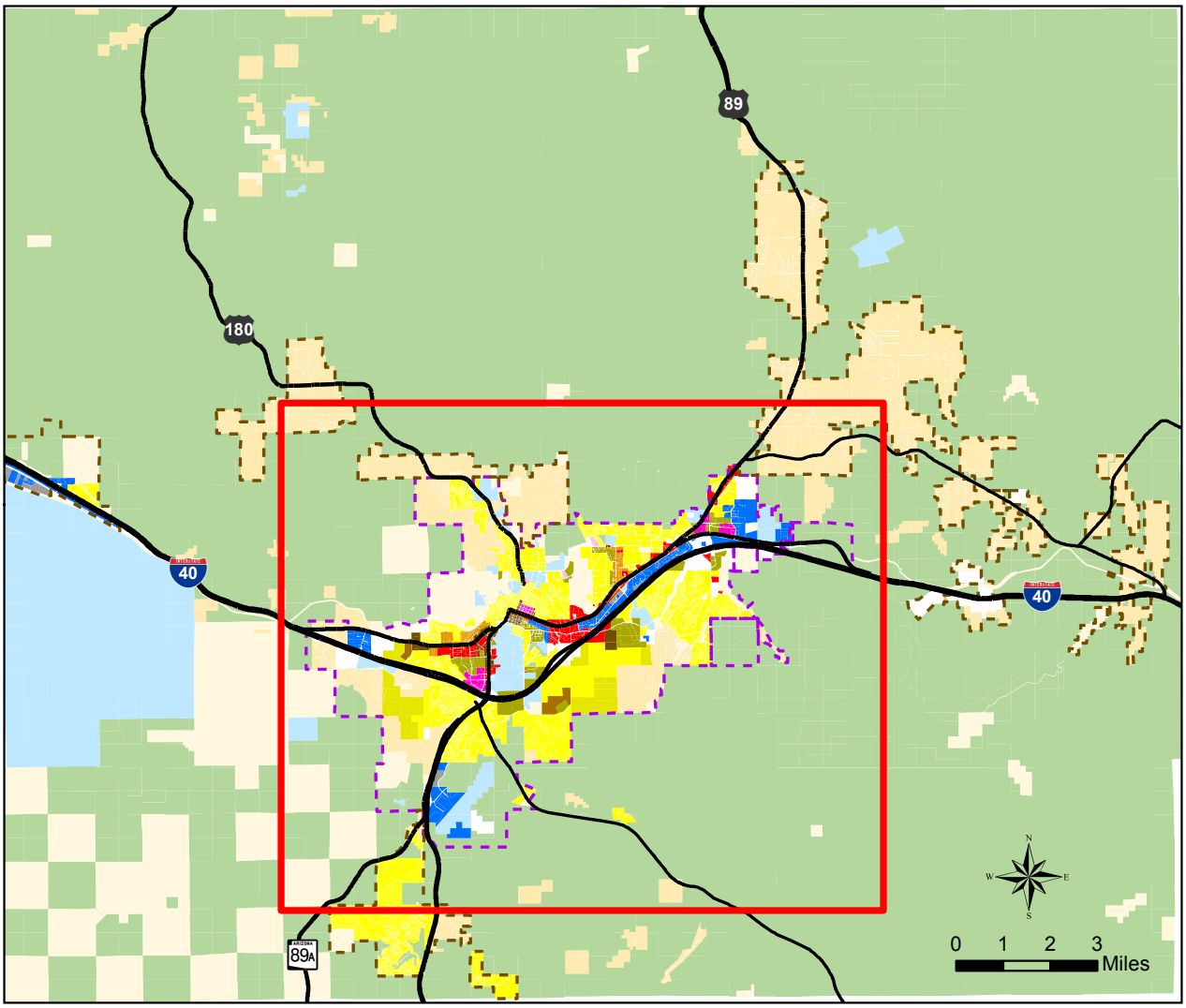
NC – Neighborhood Center – Non-Residential

UMU - Urban Mixed Use – Residential and Non-Residential

SMU - Suburban Mixed Use – Residential and Non-Residential

MC - Metro Core – Residential and Non-Residential

SCENARIO D: REGION + LAND USE MAP

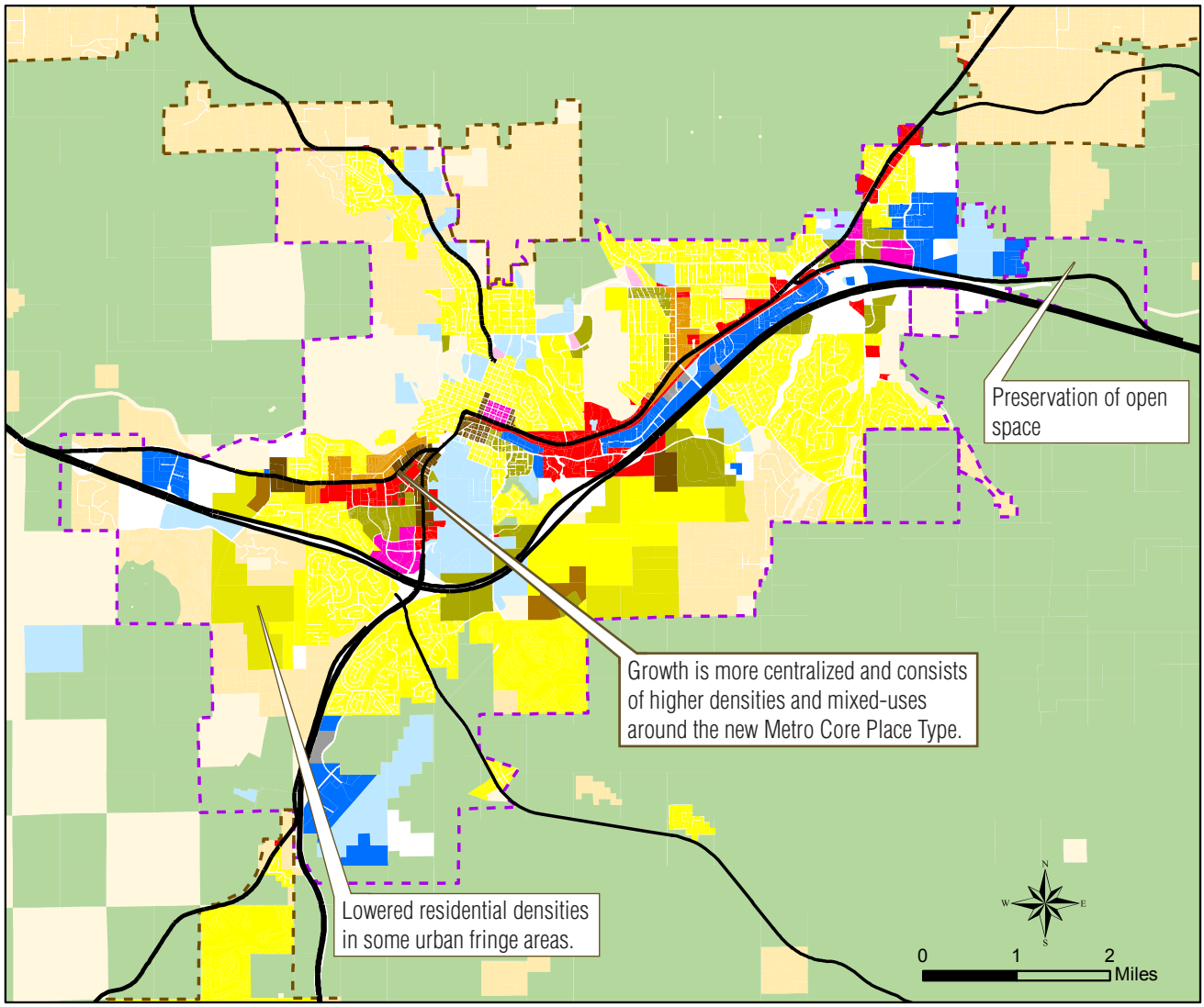


Legend

- Rural Growth Boundary
- Urban Growth Boundary
- Rural/Mountain Estates
- Suburban Neighborhood Light
- Suburban Neighborhood
- Urban Neighborhood
- Institutional
- Business Park
- Industrial - Heavy
- Commercial Corridor
- Metro Core
- Regional Center
- Neighborhood Center
- Suburban Mixed-Use
- Urban Mixed-Use
- Protected Open Space
- Unprotected Open Space

Scenario D is characterized by concentrating growth in the center of the City. The scenario introduces the Metro Core, which has the highest development intensity of all of the Place Types. The resulting land use pattern under Scenario D will support the use of alternate modes of transportation.

SCENARIO D: CITY + LAND USE MAP



Legend

- Rural Growth Boundary
- Urban Growth Boundary
- Rural/Mountain Estates
- Suburban Neighborhood Light
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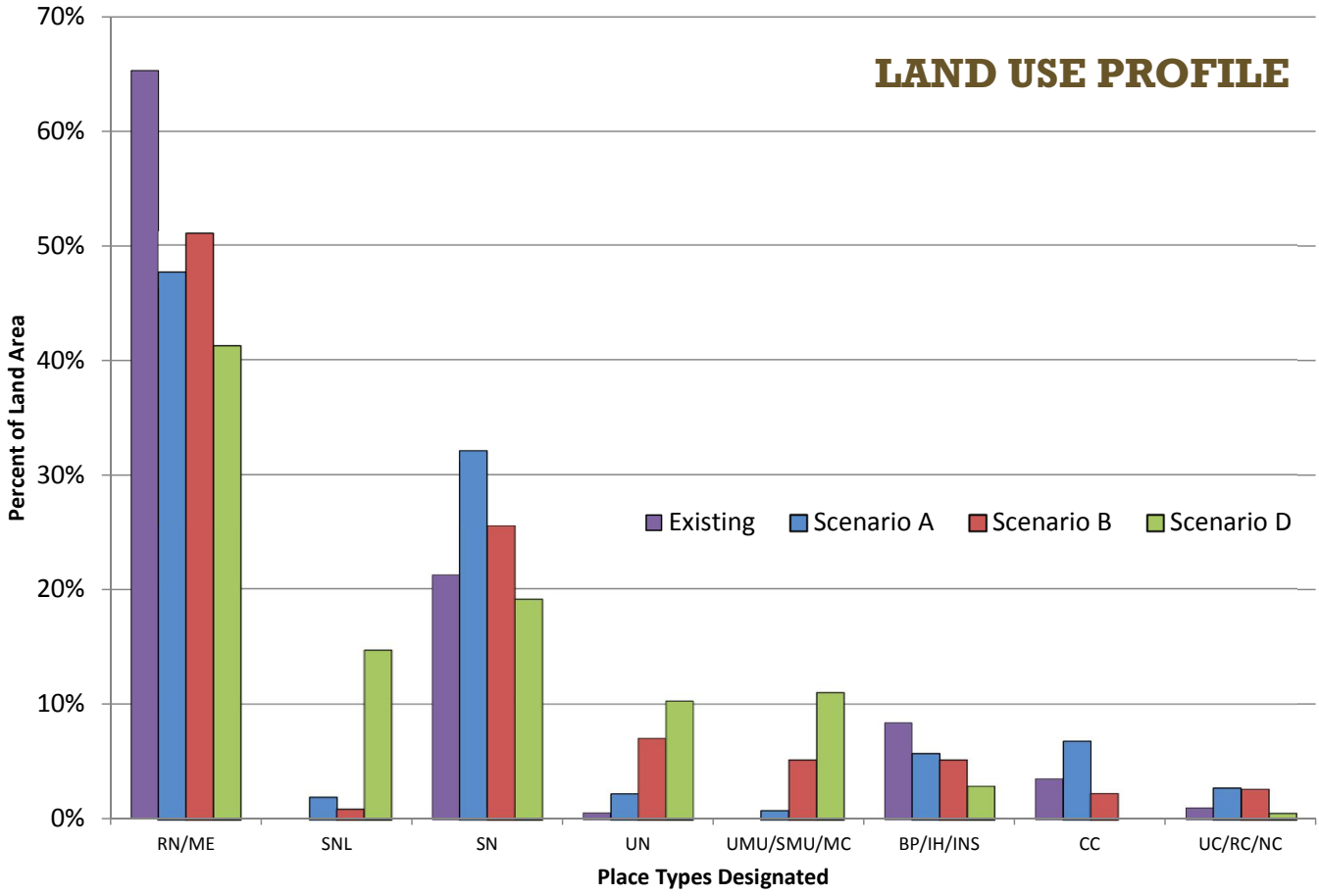
- Urban Mixed-Use
- Protected Open Space
- Unprotected Open Space

SCENARIO INDICATOR SUMMARIES

Phase 2 analysis reevaluated the indicators from Phase 1 as well as introduced new indicators to compare and contrast potential environmental impacts. The following charts, tables, and maps illustrate the output of each performance indicator, as determined using CommunityViz® software.

Land Use

The land use profile in Phase 2 differs from Phase 1 mostly with regards to the Rural Neighborhood, Mountain Estate, and Suburban Neighborhood Place Types (RN/ME and SN). Compared to Phase 1, Phase 2 has a higher percentage of Rural and Suburban Neighborhood Place Types in all three scenarios. However, similar to Phase 1, Rural Neighborhood and Mountain Estates, which are prevalent in Scenario A, are limited and are replaced by an increased number of urban and mixed-use development types in Scenarios B and D. It should also be noted that there is no Commercial Corridor (CC) Place Type in Scenario D. Instead, Scenario D features the Metro Core (MC). The addition of this new Place Type into the land use toolbox allows Flagstaff to adapt to some of the changes in national patterns of land use and transportation planning. The graph below compares the land use profiles of each of the scenarios, and the existing in one graph.



NOTE: The values for the scenarios represent new growth only and do not reflect existing population and land uses. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.

Mobility

Similar to Phase 1, performance measures used to evaluate mobility included daily trips by mode, vehicle miles traveled, annual fuel consumption, and trips generated in congested areas. The Regional Plan is focusing on encouraging multimodal transportation. In support of this move toward multimodal transportation, mode split assumptions were created for each Place Type and were incorporated into each scenario to determine trips for each mode. These assumptions represent the mode split goals for the Flagstaff region at build-out. The mode split assumptions are included in the Appendix, on page 94.

As shown in the tables, Phase 2 shows a similar pattern as was shown in Phase 1—as density increases people are more likely to use alternate modes of transportation. As shown, more people are expected to use transit, bike, or walk to complete their trips in Scenarios B and D when compared to Scenario A.

TRIPS INDICATOR METHODOLOGY

The Trips indicator focuses on the number of future trips created by the new growth. It does not take into consideration existing development and trips generated from those developments. It was assumed that 10 trips were made by each household, each day. This resulted in total trips for each scenario. The formula to calculate total trips is as follows:

New Households * Person Trip Generation assumption (which is 10)

To calculate the mode share of those trips, assumptions for mode share were made for each Place Type. The mode share for trips in this analysis included transit, bicycling, walking, and vehicles. The following formulas were used to determine trips for each transportation mode.

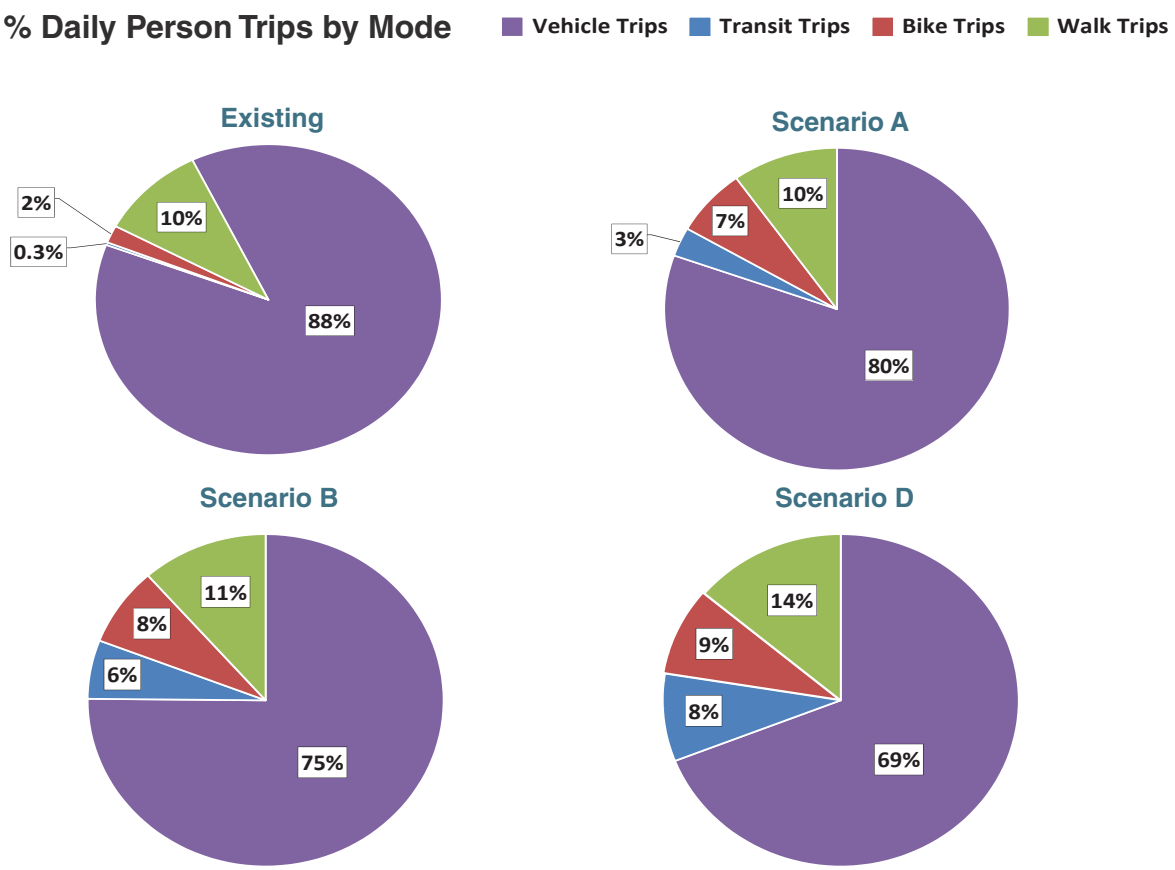
- Transit Trips: Total Trips * % Transit Trip Share assumption by Place Type
- Bicycle Trips: Total Trips * % Bicycle Trip Share assumption by Place Type
- Walking Trips: Total Trips * % Walk Trip Share assumption by Place Type
- Vehicle Trips: Total Trips * % Vehicle Trip Share assumption by Place Type

The results are shown in the table below.

INDICATOR	EXISTING^	POTENTIAL NEW FUTURE TRIPS*		
		SCENARIO A	SCENARIO B	SCENARIO D
AUTO TRIPS (DAILY)	526,000	224,000	209,000	190,000
20%+ TRANSIT TRIPS (DAILY)	1,700	8,100	15,800	23,400
BIKE TRIPS (DAILY)	10,900	18,900	21,200	23,500
20%+ WALK TRIPS (DAILY)	59,400	27,600	31,800	38,200
BP/IH/INS	1,900	590	450	200
TOTAL TRIPS GENERATED (DAILY)	**598,000**	**278,600**	**276,800**	**275,100**

*Values for the scenarios do not include existing. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.
^Existing values are based on values in the Flagstaff MPO 3d Model Daily Summary

The total number of trips made by personal vehicles decreases as density increases, which is expected. People living in higher densities tend to make fewer trips by vehicle since amenities are located closer to residential units.



VEHICLE MILES TRAVELED (VMT) INDICATOR METHODOLOGY

The VMT indicator focuses on the number of future miles traveled as a result of the new growth. It does not take into consideration existing development. The VMT is based on new households and assumptions made for each Place Type. The assumptions are as follows:

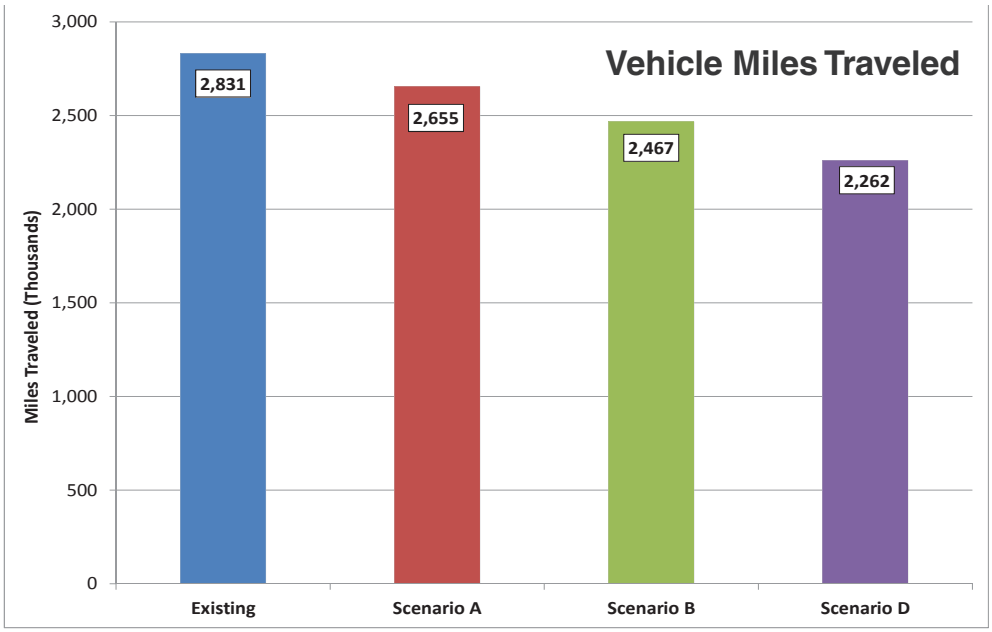
- Average Vehicle Trips per Household (varies for each Place Type)
- Average Vehicle Trip Length = 9.76 miles (US Bureau of Transportation Statistics, 2006)

The formula to calculate VMT is as follows:

New Households * Average Vehicle Trips per Household assumption * Average Vehicle Trip Length assumption

The results are shown in the following graph.

NOTE: The values for the scenarios represent new growth only and do not reflect existing population and land uses. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.

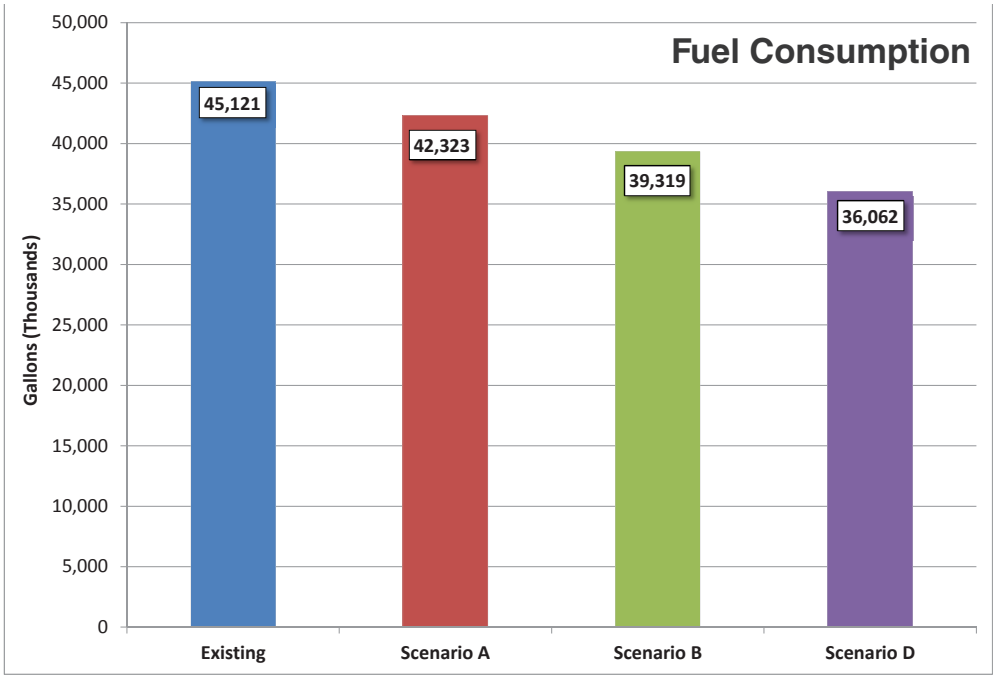


FUEL CONSUMPTION INDICATOR METHODOLOGY

The Fuel Consumption indicator presents the potential future amount of fuel consumed as a result of the new growth. It does not take into consideration existing development. The Fuel Consumption is based on the VMT, calculated above, and the assumption for Passenger Car Fuel Efficiency, which is 22.9 miles/gallon (US Bureau of Transportation Statistics, 2005). The formula to calculate Fuel Consumption is as follows:

VMT * Passenger Car Fuel Efficiency * 365

The results are shown in the following graph.



NOTE: The values for the scenarios represent new growth only and do not reflect existing population and land uses. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.

Housing Mix

As stated previously, housing mix is an important indicator to illustrate the diversity of an area. It should also be stated that encouraging certain housing types, such as apartments or townhomes, can support the region's goals for transportation. People living in apartments are more likely to take advantage of transit, bike, and walk than those living in single-family houses. The housing mix indicator for Phase 2 shows a similar pattern to that shown in Phase 1.

NEW HOUSEHOLDS AND HOUSING MIX INDICATOR METHODOLOGY

The New Households indicator calculates the number of potential new future households. The calculation does not take into consideration existing housing units. Assumptions for each Place Type were made to determine the number of housing units in each parcel, based on the parcel size. The assumptions include:

- Site Efficiency (varies for each Place Type)
- Percent Residential (varies by Place Type)
- Density (varies by Place Type)

The formula used to calculate new households is as follows:

((Parcel Area * Site Efficiency assumption by Place Type * % Residential assumption by Place Type) / 43,560) * Density assumption by Place Type

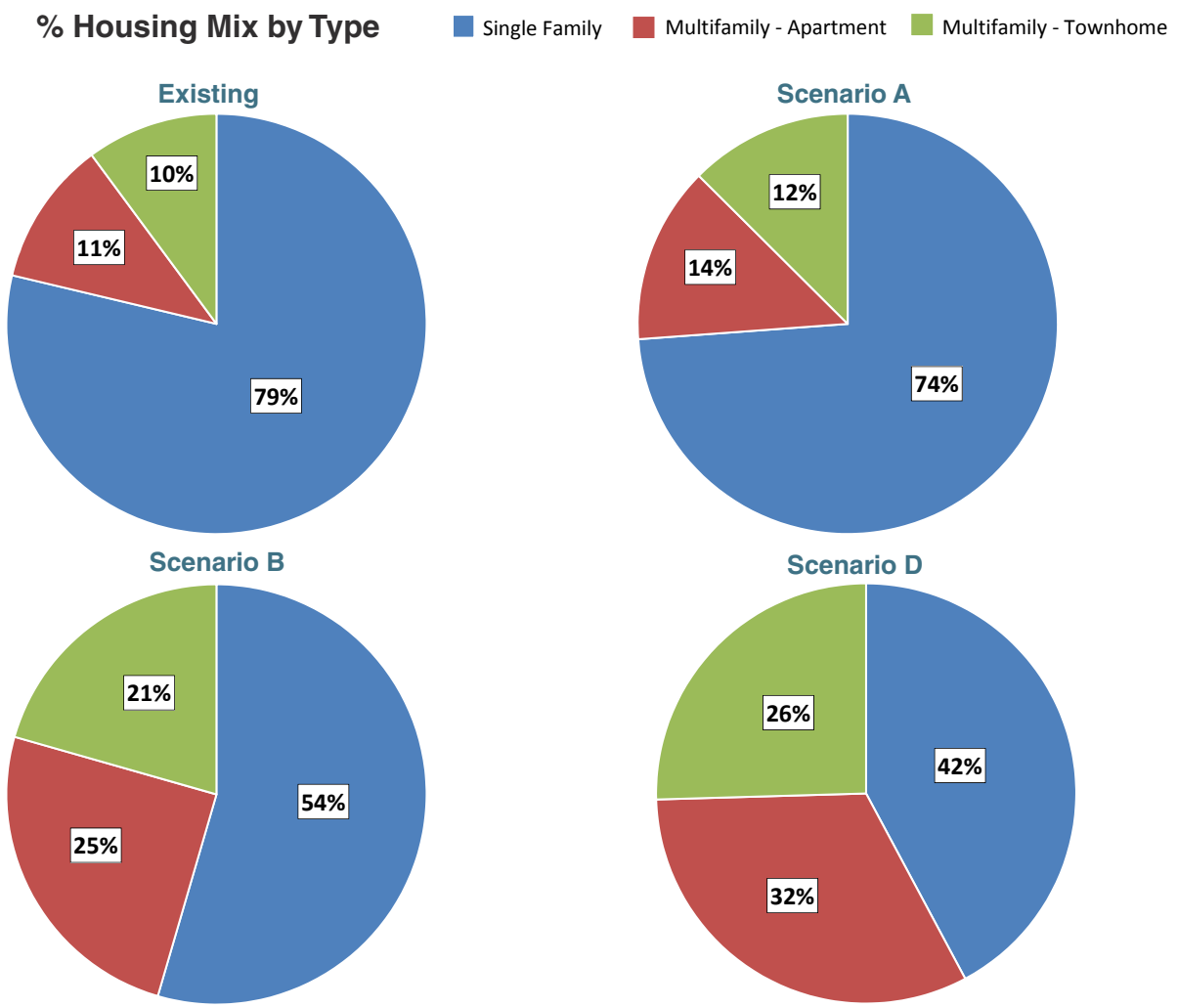
Along with new households, the housing mix was also calculated. For the purpose of this analysis, the housing mix consists of those homes that are single family, apartment, or townhomes. The formulas used to determine housing mix is as follows:

- New Households * % Single Family assumption by Place Type
- New Households * % Apartment Family assumption by Place Type
- New Households * % Townhome Family assumption by Place Type

The results of this calculation are presented in the table below.

INDICATOR	EXISTING	POTENTIAL NEW FUTURE HOUSEHOLDS AND HOUSING MIX*		
		SCENARIO A	SCENARIO B	SCENARIO D
SINGLE FAMILY HOUSEHOLDS	23,300	20,600	15,100	11,600
MULTIFAMILY - APARTMENT UNITS	3,300	3,800	6,900	8,900
MULTIFAMILY - TOWNHOME UNITS	3,000	3,500	5,700	7,000
TOTAL HOUSEHOLDS	**29,600**	**27,900**	**27,700**	**27,500**

*Values for the scenarios do not include existing. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.



Water Demand

As with the daily trips, water demand tends to decrease as density increases. In general, single family detached homes use more water than apartments or townhomes. This is due to the fact that single family homes have lawns and gardens that need watering. Scenario D has the least amount of single family homes and the least water demand.

WATER DEMAND INDICATOR METHODOLOGY

The Water Demand indicator calculates the number of potential new water demand based on the new development. The calculation does not take into consideration existing development. Assumptions for each Place Type were made to determine the demand based on Place Type. The assumptions are included in the table below:

The formula used to calculate new households is as follows:

> Sum (New Households * Daily Water Use by Place Type) + (Retail Square Feet * Retail Daily Water Use assumption by Place Type / 43,560) + (Industrial Square Feet * Industrial Daily Water Use assumption by Place Type / 43,560) + ((Service Square Feet + Office Square Feet + Institutional Square Feet) * Service Daily Water Use assumption by Place Type / 43,560)

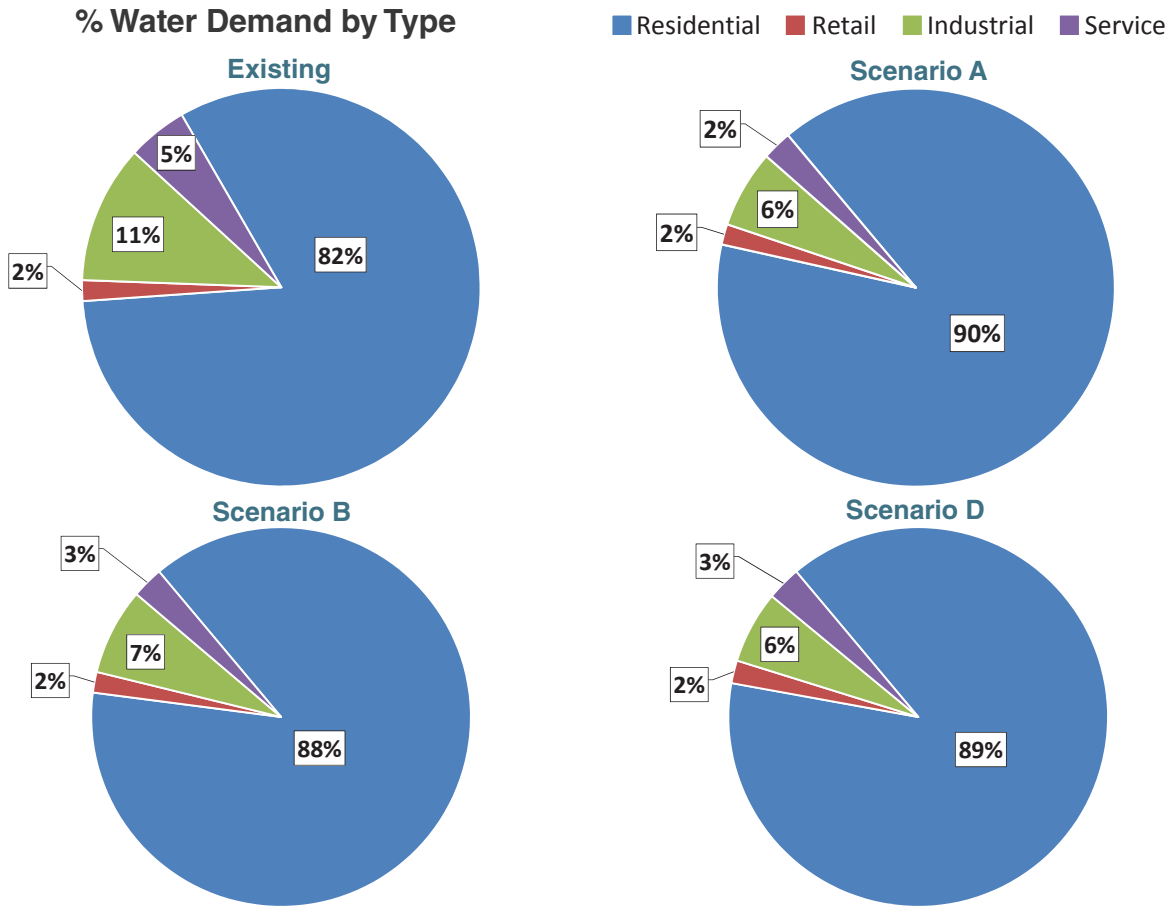
NOTE: The values for the scenarios represent new growth only and do not reflect existing population and land uses. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.

	WATER USE RATES	GALLONS PER DAY
RESIDENTIAL HOUSEHOLDS	Rural Neighborhood/Mountain Estates/Suburban Neighborhood/ Suburban Neighborhood Light	218/Household
	Urban Neighborhood/Regional Center/Neighborhood Center/Suburban Mixed-Use	174/Household
	Urban Center/Metro Core/ Urban Mixed-Use	161/Household
NON-RESIDENTIAL USES	Retail	874/Acre
	Industrial	5497/Acre
	Office	874/Acre

Source: City of Flagstaff 2009 Water Demand Analysis: Integrated Water Master Plan

INDICATOR	EXISTING	POTENTIAL NEW FUTURE WATER DEMAND*		
		SCENARIO A	SCENARIO B	SCENARIO D
DAILY RESIDENTIAL WATER DEMAND (GALLONS)	6,320,000	5,950,000	5,570,000	5,300,000
DAILY RETAIL WATER DEMAND (GALLONS)	128,000	111,000	111,000	116,000
DAILY INDUSTRIAL WATER DEMAND (GALLONS)	865,000	420,000	467,000	368,000
DAILY SERVICE WATER DEMAND (GALLONS)	373,000	160,000	169,000	173,000
DAILY TOTAL WATER DEMAND (GALLONS)	**7,686,000**	**6,641,000**	**6,317,000**	**5,957,000**

*Values for the scenarios do not include existing. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.



NOTE: The values for the scenarios represent new growth only and do not reflect existing population and land uses. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.

Environment

Environment is a broad category that includes the physical features of the region and the ability of policies and programs to protect certain environmentally-sensitive areas. In Phase 2, performance indicators were added to determine the impacts of development in each of the scenarios on the surrounding environment.

Environmental performance indicators include building footprint, air quality emissions, proximity to passive and active parks, consumption of unprotected open space, and developed area within environmentally sensitive areas including Wildlife Corridors and Arizona Game and Fish Department (AZGFD) Conservation Priority Areas.

BUILDING FOOTPRINT INDICATOR METHODOLOGY

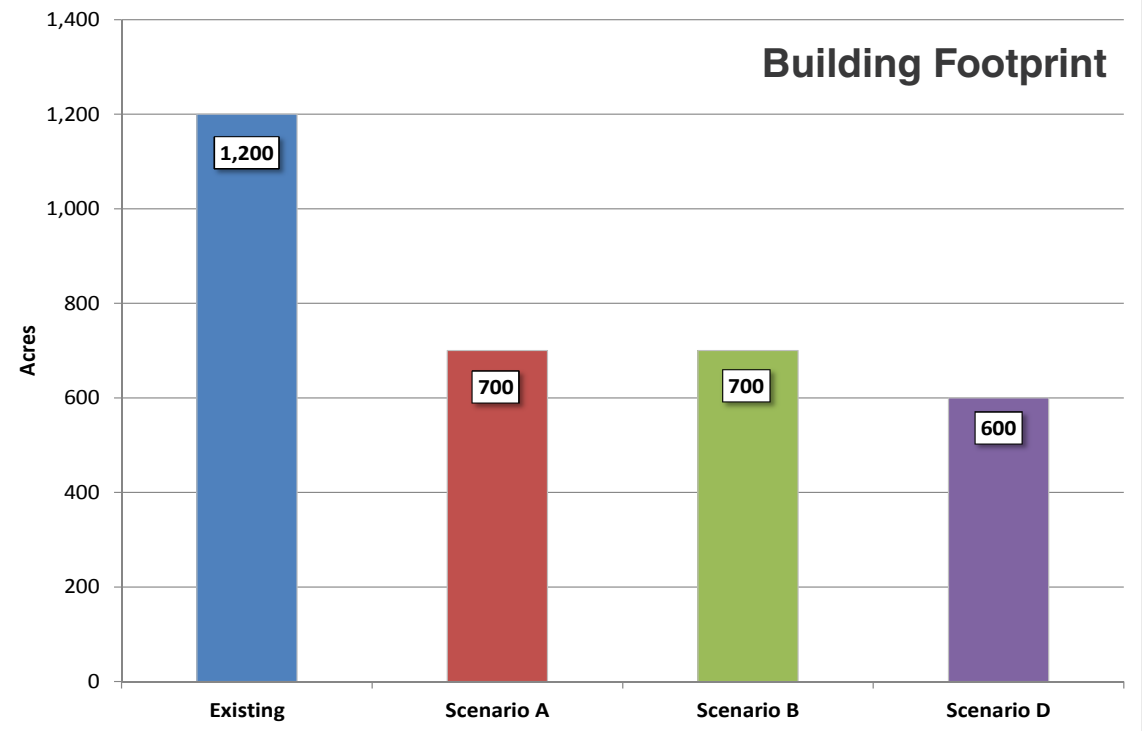
The Building Footprint indicator calculates the acres consumed by the potential new future buildings. Assumptions for each Place Type were made to determine the acres of buildings in each scenario, based on the parcel size. The assumptions include:

- Site Efficiency (varies for each Place Type)
- FAR (varies by Place Type)
- Number of Stories (varies by Place Type)

The formula used to calculate the building footprint is as follows:

((Parcel Area * Site Efficiency assumption by Place Type * FAR assumption by Place Type) / Number of Stories assumption by Place Type) / 43560

The results are displayed in the following chart. The decrease in building footprint from A to C is associated with the higher residential and non-residential densities found in the latter scenarios. The difference between the existing building footprint and the footprints in each of the scenarios is due to the distribution of Place Types (refer to the Acres of Potential New Future Growth table).

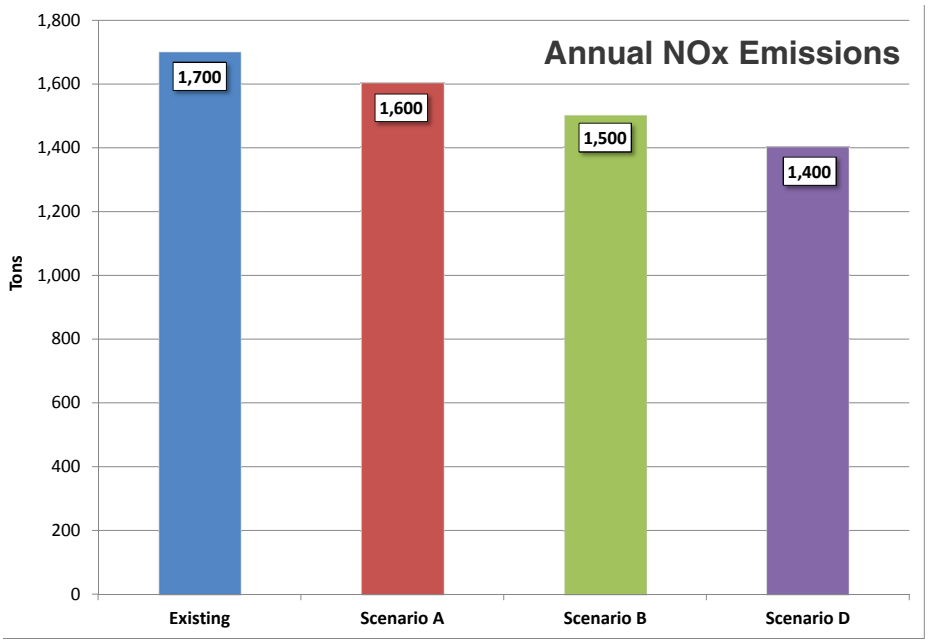


ANNUAL NOX EMISSIONS INDICATOR METHODOLOGY

This indicator calculates the potential NOx emissions as a result of new development. This indicator does not take into consideration existing development. The formula used to calculate the NOx Emissions is as follows:

VMT * 1.5 (avg NOx emission per mile traveled in grams) * 365 (days) * 0.0022046226 (grams to lbs) / 2000 (lbs/ton)

The results are displayed in the following chart.

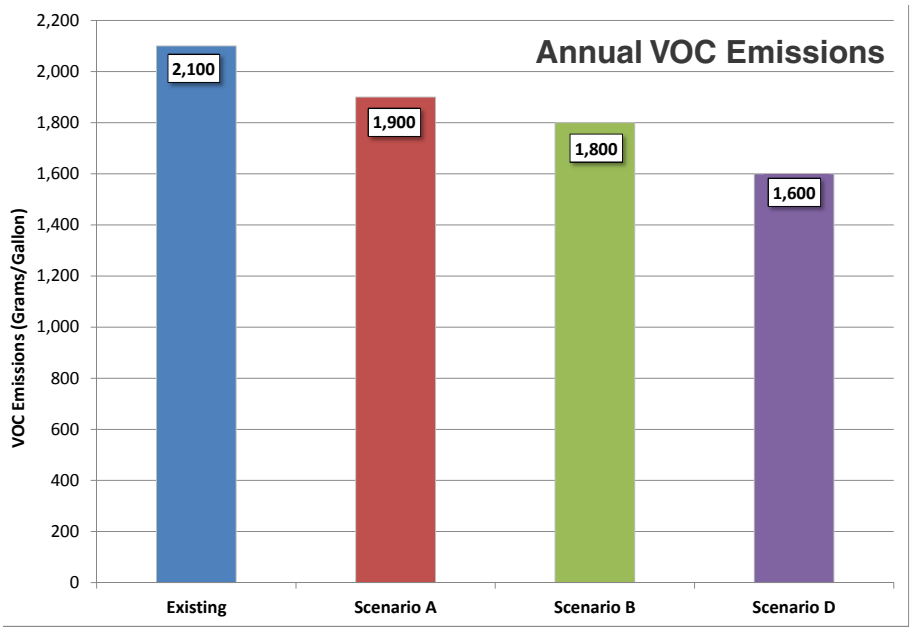


ANNUAL VOC EMISSIONS INDICATOR METHODOLOGY

This indicator calculates the potential VOC emissions as a result of new development. This indicator does not take into consideration existing development. The formula used to calculate the VOC Emissions is as follows:

VMT * 1.8 (avg VOC emission per mile traveled in grams) * 365 (days) * 0.0022046226 (grams to lbs) / 2000 (lbs/ton)

The results are displayed in the following chart.

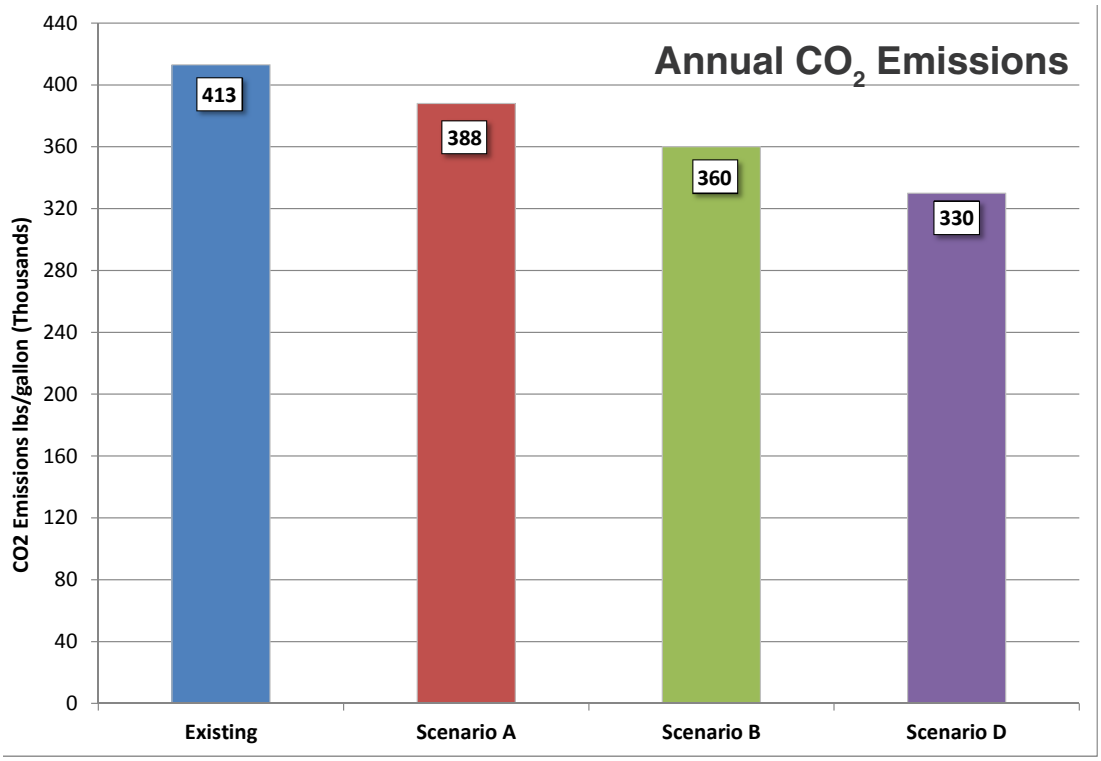


ANNUAL CO_2 EMISSIONS INDICATOR METHODOLOGY

This indicator calculates the potential CO_2 emissions as a result of new development. This indicator does not take into consideration existing development. The formula used to calculate the CO_2 Emissions is as follows:

VMT * 0.8 (avg CO2 emission per mile traveld in lbs) * 365 (days) / 2000 (lbs/ton)

The results are displayed in the following chart.



ARIZONA GAME AND FISH DEPARTMENT CONSERVATION PRIORITY AREAS

The data presented in this section is based on information found in the Arizona Game and Fish Department (AZGFD) Species and Habitat Conservation Guide. This Guide identifies key habitats referred to as Conservation Priority Areas. The Conservation Priority Areas are categorized into three types based on AZGFD's analysis of wildlife habitat needs: Low, Medium, and High. Lands in each category may have conservation value, but also the purpose of these categories is to help guide development so as to minimize impacts to wildlife and habitat. AZGFD's Species and Habitat Conservation Guide is intended as a tool to help landowners and planners assess conservation values of parcels and inform their decision-making. The values shown are relative values based on a summary of wildlife and habitat resources present. Lands classified as "Low" may have conservation value, but in general directing development to lands in the "Low" category would be preferable from an overall wildlife standpoint. It should be noted that these categories are current and are likely to change many times in the future as the area develops. The following maps and charts for each scenario indicate the amount of land consumed by development in each of these three categories.

NOTE: The values for the scenarios represent new growth only and do not reflect existing population and land uses. The existing condition is provided to allow for comparison between what is currently in the Flagstaff area and what could potentially be added at build out.

NEW ACRES OF DEVELOPMENT IN AZGFD AREAS INDICATOR METHODOLOGY

This indicator calculates the amount of acres developed by the potential new future growth within different categories of AZGFD areas. A query was performed in GIS to identify all of the parcels that were marked for future development that were within each AZGFD category. Then the parcel acres were summed for each category.

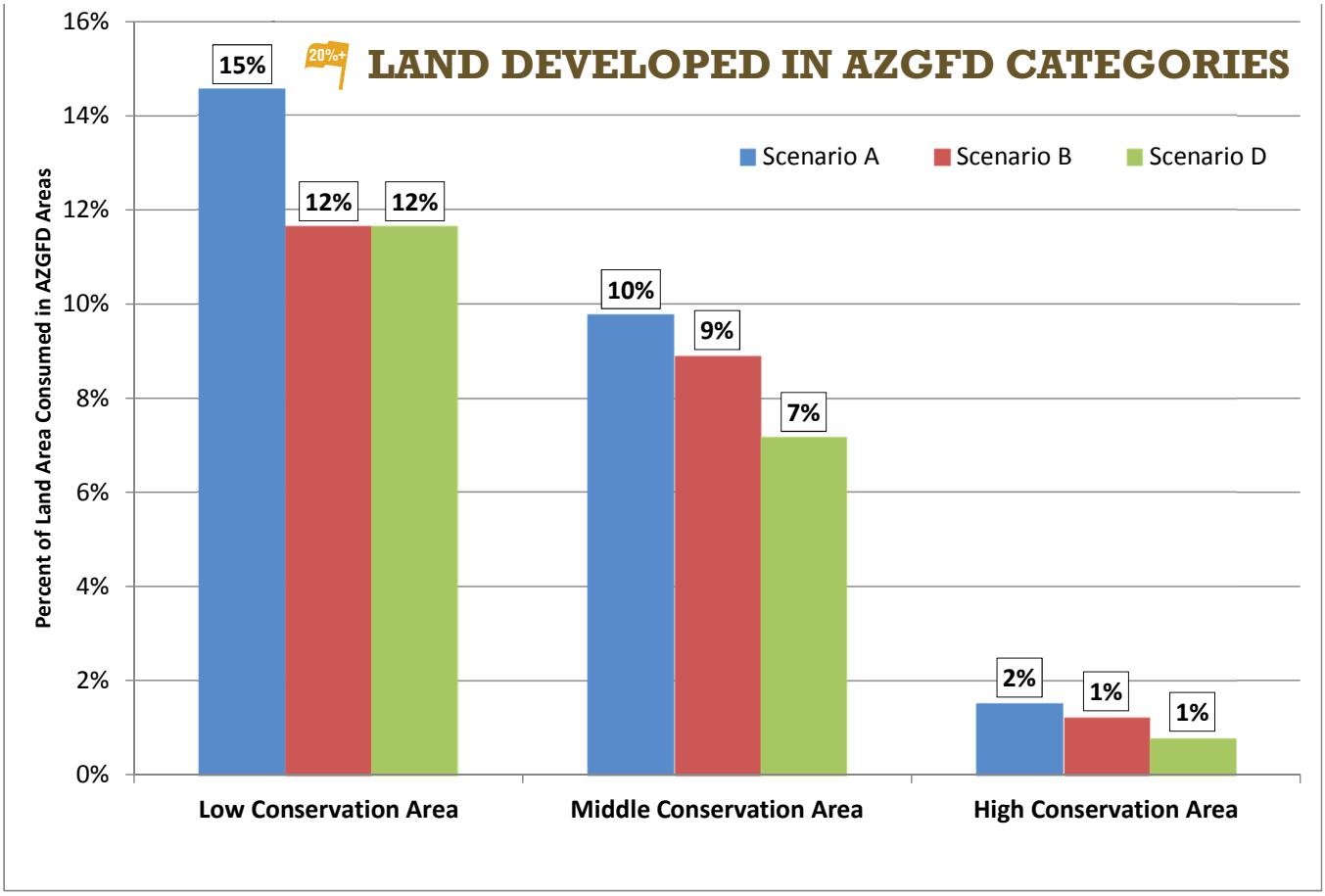
The formula used to calculate the Acres Developed in AZGFD Areas is as follows:

Summed Acres of AZGFD categories on parcels identified for growth in the public process.

The results are displayed in the following table, chart, and maps.

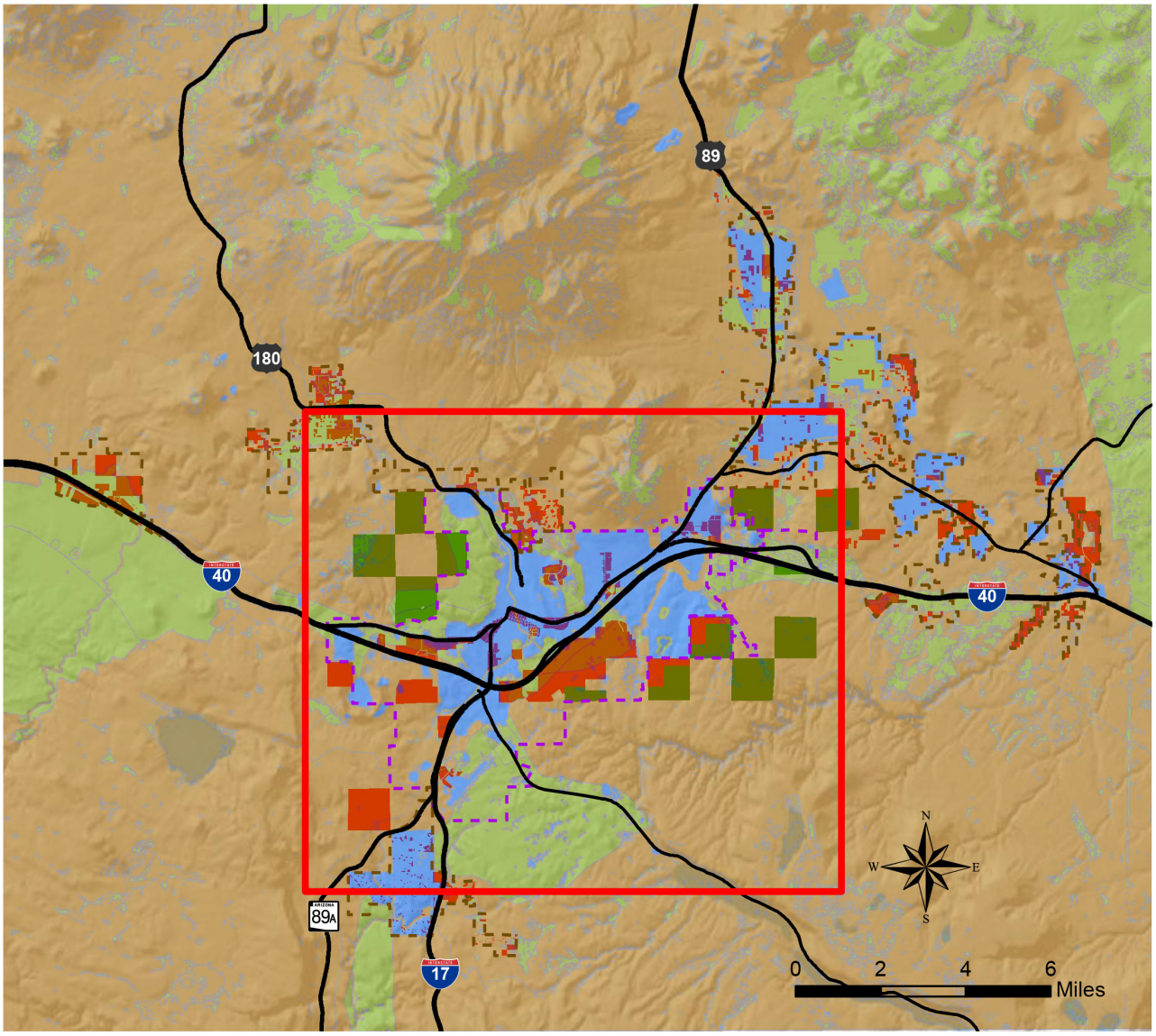
AZGFD RELATIVE CONSERVATION VALUE	TOTAL ACRES WITHIN AZGFD CONSERVATION AREAS	POTENTIAL ACRES DEVELOPED AS NEW GROWTH IN AZGFD AREAS*		
		SCENARIO A	SCENARIO B	SCENARIO D
LOW	10,300	1,500	1,200	1,200
MEDIUM	46,400	4,500	4,100	3,300
HIGH	275,200	4,200	3,400	2,200
TOTAL ACRES	**331,900**	**10,200**	**8,700**	**6,800**

*Existing conditions are not provided because this indicator shows how much land would potentially be developed as new growth. Values for the scenarios do not include existing.



NOTE: This indicator shows how much land would potentially be developed as new growth. Values for the scenarios do not include existing conditions.

SCENARIO A: REGION + CONSERVATION VALUES MAP



Legend

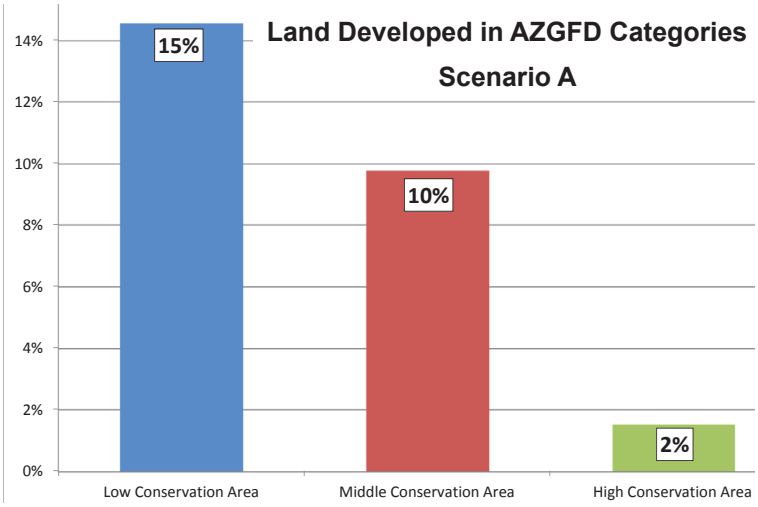
- Rural Growth Boundary
- Urban Growth Boundary

Parcels Identified for Growth in the Public Process

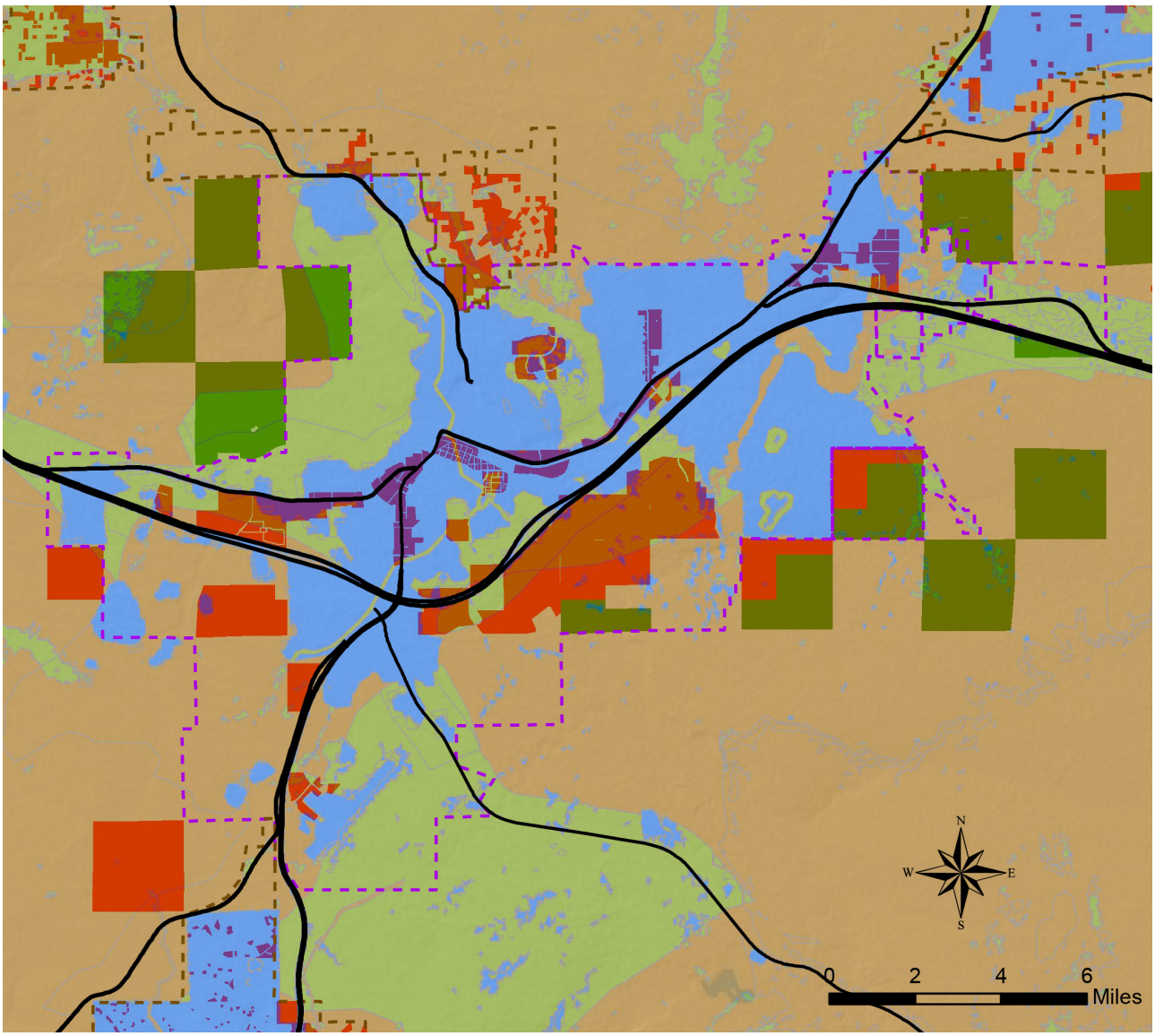
- Changed to Protected Open Space
- All Other Parcels

Land Developed in AZGFD Categories

- Low (Levels 1 and 2)
- Middle (Levels 3 and 4)
- High (Levels 5 and 6)



SCENARIO A: CITY + CONSERVATION VALUES MAP



Legend

Rural Growth Boundary

Urban Growth Boundary

Parcels Identified for Growth in the Public Process

Changed to Protected Open Space

All Other Parcels

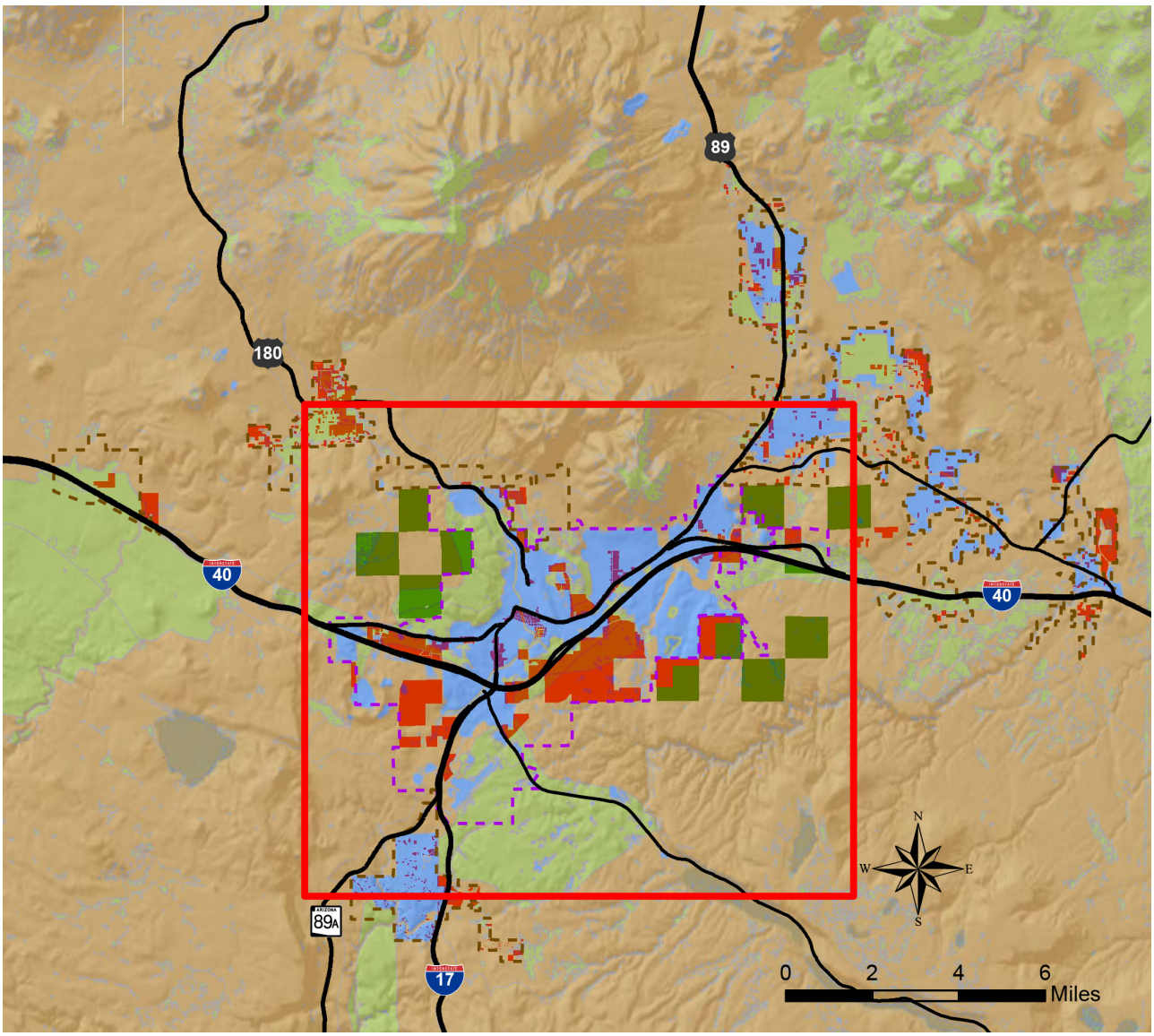
Land Developed in AZGFD Categories

Low (Levels 1 and 2)

Middle (Levels 3 and 4)

High (Levels 5 and 6)

SCENARIO B: REGION + CONSERVATION VALUES MAP



Legend

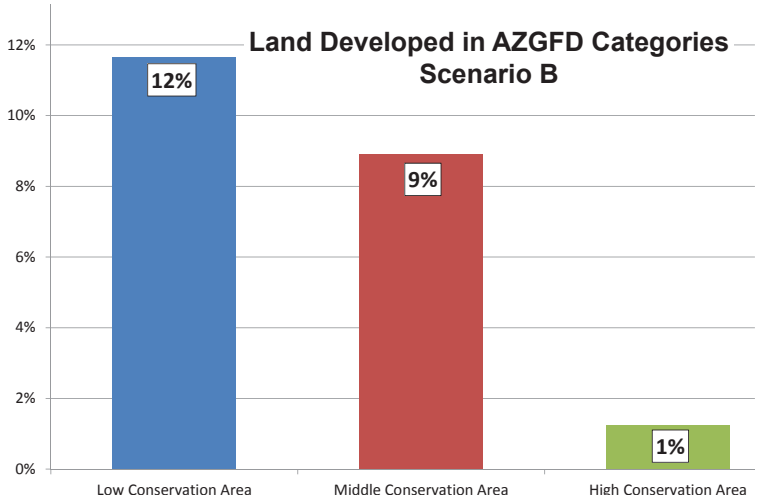
- Rural Growth Boundary
- Urban Growth Boundary

Parcels Identified for Growth in the Public Process

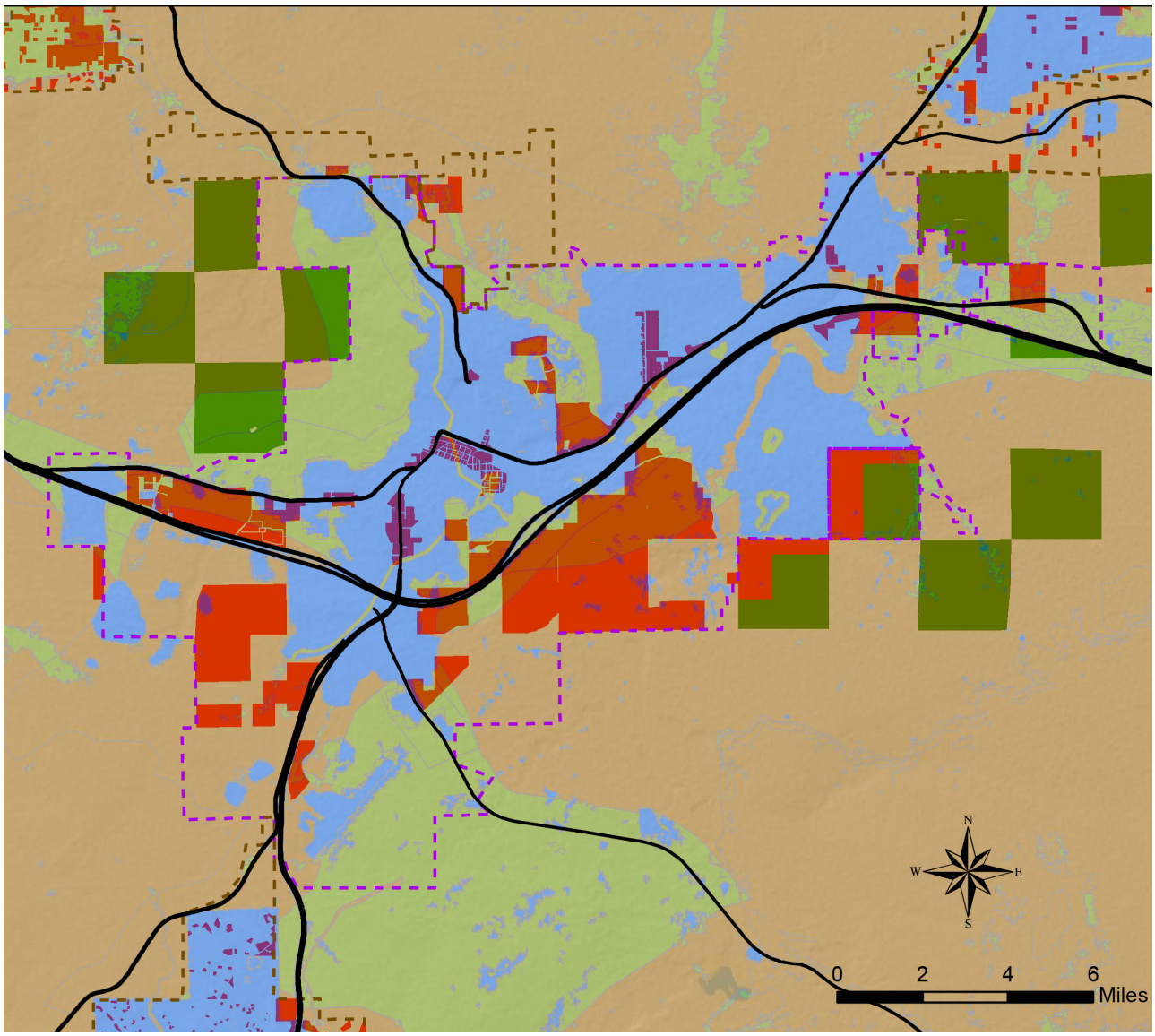
- Changed to Protected Open Space
- All Other Parcels

Land Developed in AZGFD Categories

- Low (Levels 1 and 2)
- Middle (Levels 3 and 4)
- High (Levels 5 and 6)



SCENARIO B: CITY + CONSERVATION VALUES MAP



Legend

- Rural Growth Boundary
- Urban Growth Boundary

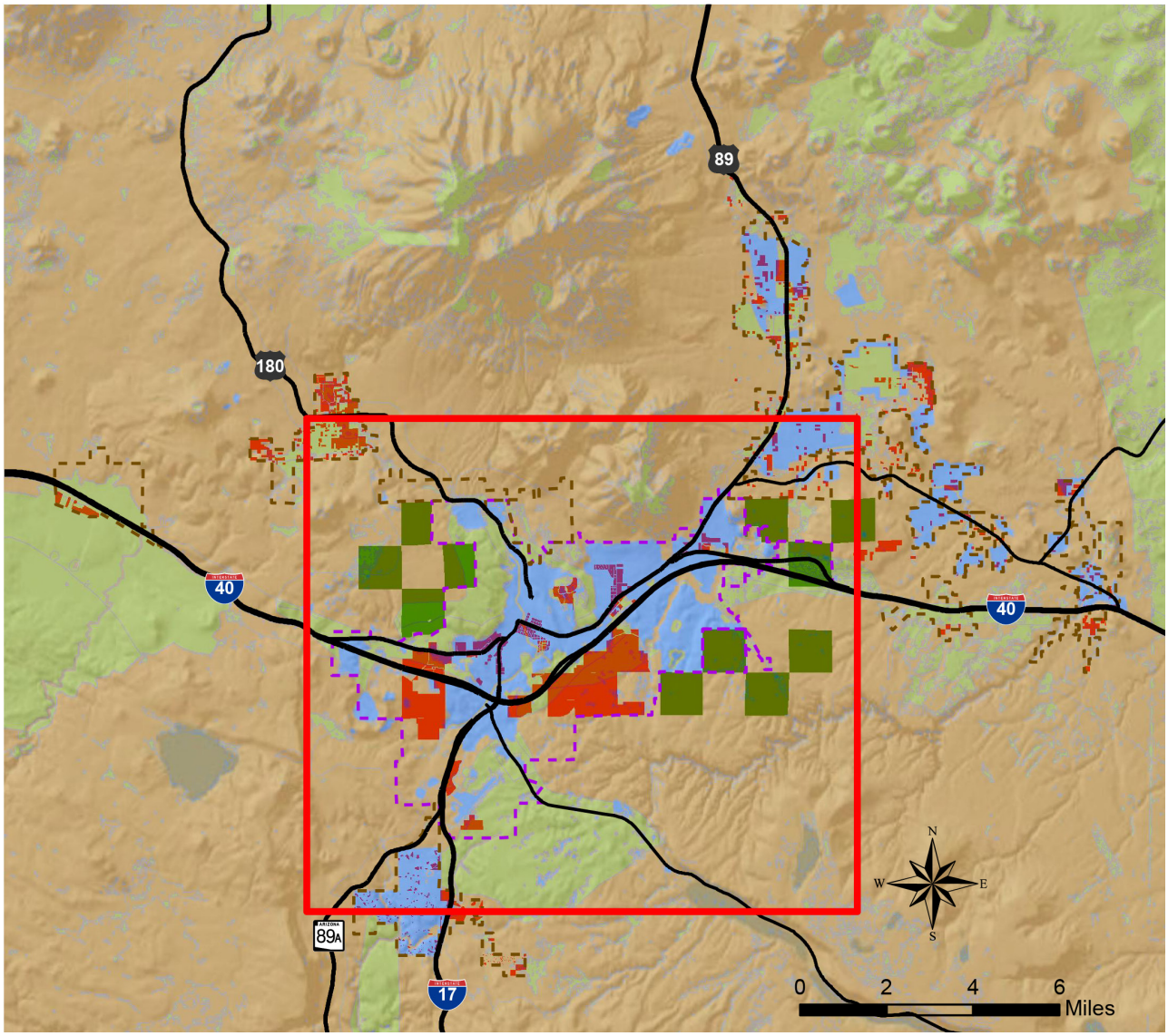
Parcels Identified for Growth in the Public Process

- Changed to Protected Open Space
- All Other Parcels

Land Developed in AZGFD Categories

- Low (Levels 1 and 2)
- Middle (Levels 3 and 4)
- High (Levels 5 and 6)

SCENARIO D: REGION + CONSERVATION VALUES MAP



Legend

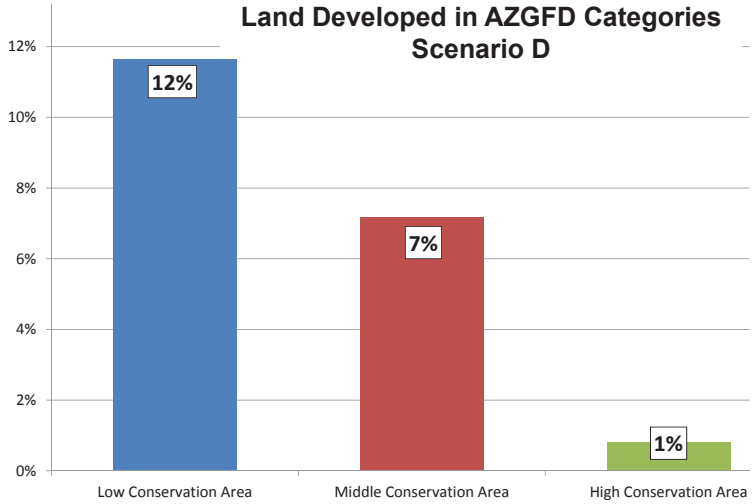
- Rural Growth Boundary
- Urban Growth Boundary

Parcels Identified for Growth in the Public Process

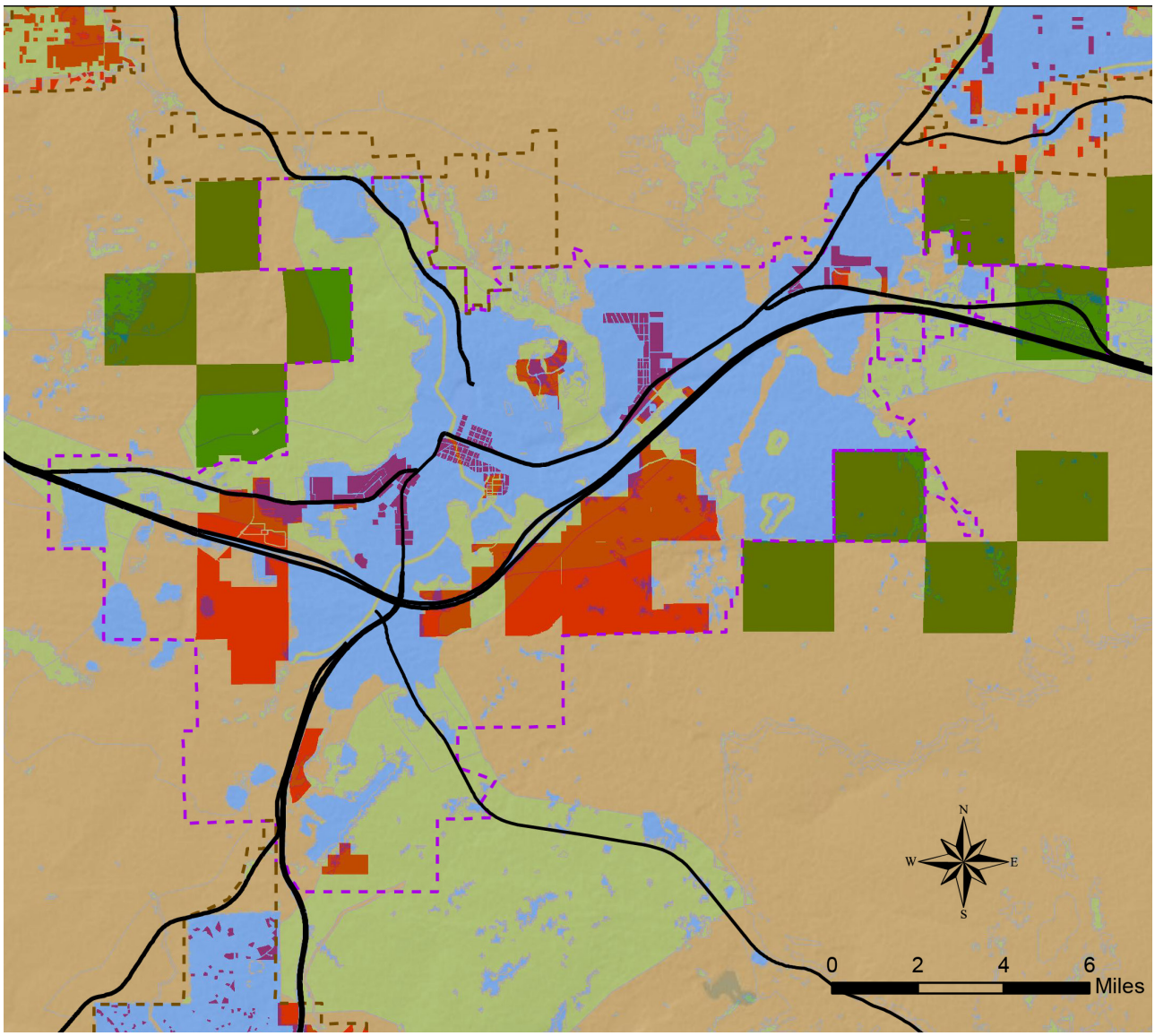
- Changed to Protected Open Space
- All Other Parcels

Land Developed in AZGFD Categories

- Low (Levels 1 and 2)
- Middle (Levels 3 and 4)
- High (Levels 5 and 6)



SCENARIO D: CITY + CONSERVATION VALUES MAP



Legend

Rural Growth Boundary

Urban Growth Boundary

Parcels Identified for Growth in the Public Process

Changed to Protected Open Space

All Other Parcels

Land Developed in AZGFD Categories

Low (Levels 1 and 2)

Middle (Levels 3 and 4)

High (Levels 5 and 6)

WILDLIFE CORRIDORS

Wildlife corridors are interconnected areas that enable species to migrate between larger habitat areas, preventing species isolation and fragmentation. From the perspective of conserving wildlife and wildlife habitat, keeping future development inside the current urban footprint and promoting infill development is considered preferable, even if that results in some habitat losses within that footprint. Generally, preserving interconnected habitats is more beneficial to wildlife than isolated and disconnected habitat.

Wildlife populations and vital ecosystem processes are more likely to remain intact into the future if habitats are conserved in larger areas, connected by corridors that enable animal movement, seed dispersal, etc. For instance, the large area of habitat surrounding the San Francisco Peaks and the important wildlife corridor that includes the west side of Observatory Mesa and Woody Ridge further south, provides large areas of breeding habitat for many species. Additionally it allows animals to move seasonally down to habitat near the Mogollon Rim to secure needed resources.

As the Flagstaff area develops, it will be important to consider these corridors and to evaluate their biological significance as it relates to wildlife and habitat preservation. Some corridors, or even portions of one corridor, may prove to be more critical than others in terms of maintaining wildlife and habitat health.

NEW ACRES OF DEVELOPMENT IN WILDLIFE CORRIDORS INDICATOR METHODOLOGY

This indicator calculates the amount of acres developed by the potential new future growth within wildlife corridors. A query was performed in GIS to identify all of the parcels that were marked for future development that were within wildlife corridors. Then the parcel acres were summed for each category.

The formula used to calculate the Acres Developed in Wildlife Corridors is as follows:

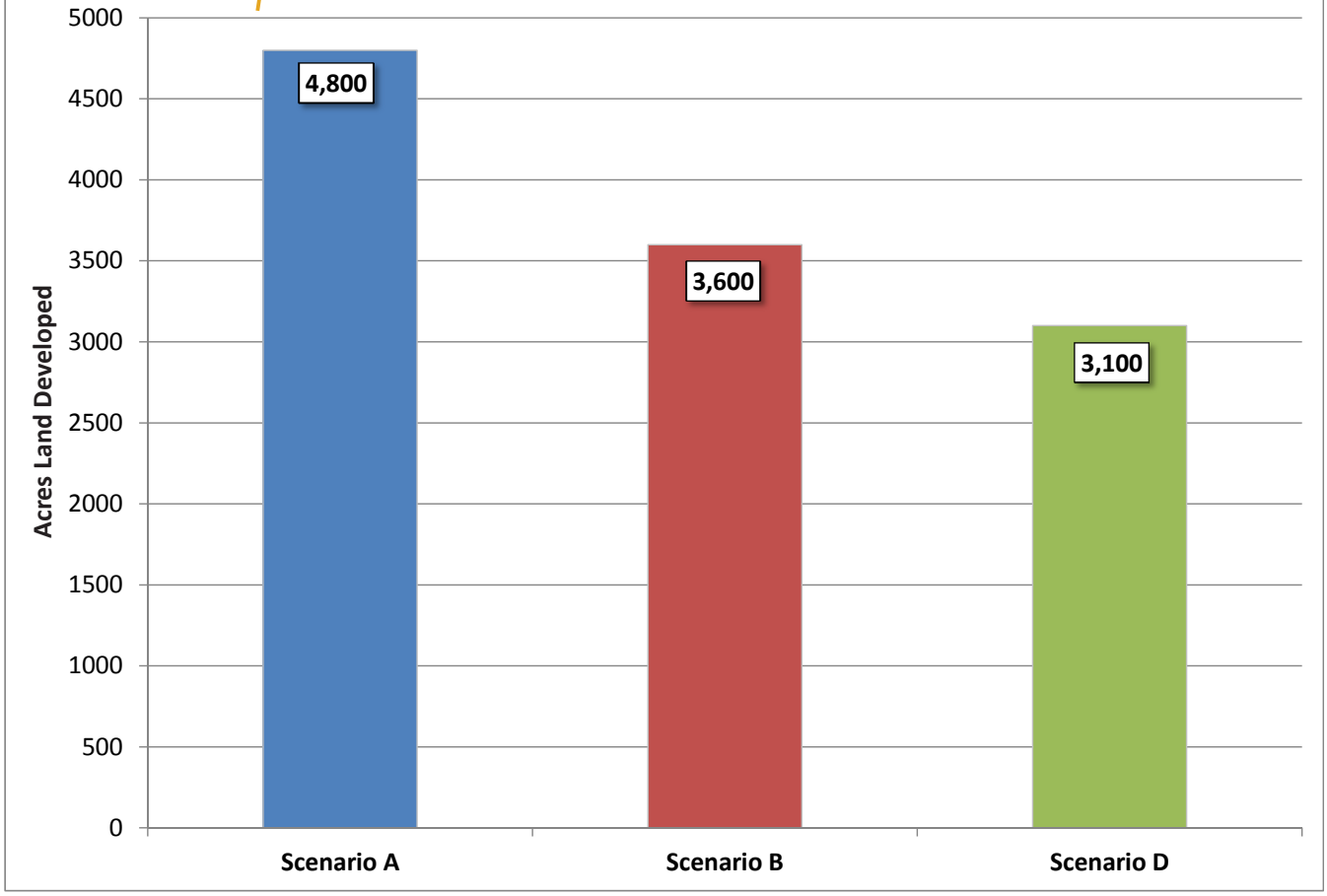
Summed Acres of Wildlife Corridor that were marked for development

The results are displayed in the following table, chart, and maps.

INDICATOR	TOTAL ACRES	POTENTIAL ACRES DEVELOPED AS NEW GROWTH IN WILDLIFE CORRIDORS*		
		SCENARIO A	SCENARIO B	SCENARIO D
Wildlife Corridors	219,200	4,800	3,600	3,100

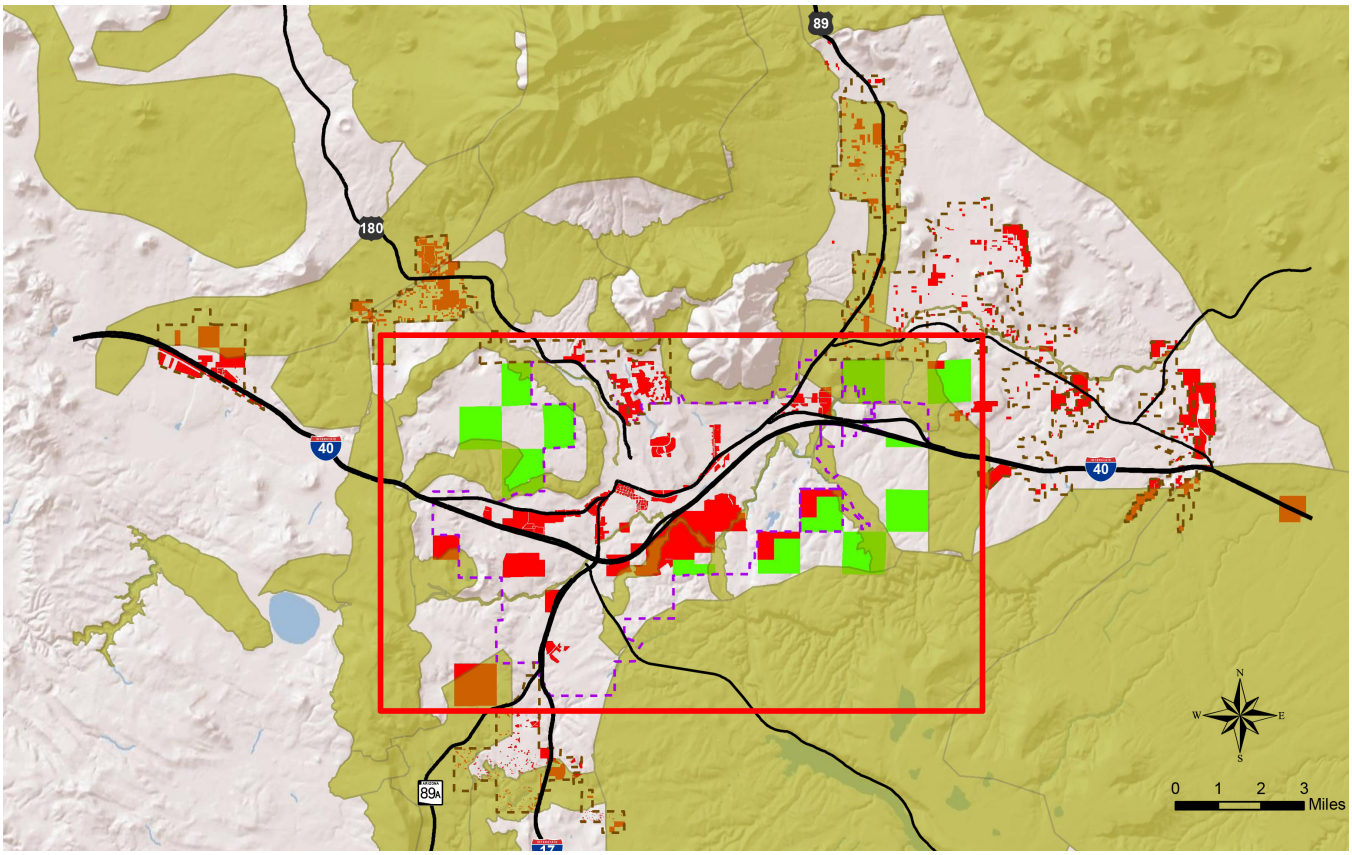
*Existing conditions are not provided because this indicator shows how much land would potentially be developed as new growth. Values for the scenarios do not include existing acres.

LAND DEVELOPED WITHIN WILDLIFE CORRIDORS



NOTE: This indicator shows how much land would potentially be developed as new growth. Values for the scenarios do not include existing conditions.

SCENARIO A: REGION + WILDLIFE CORRIDOR MAP



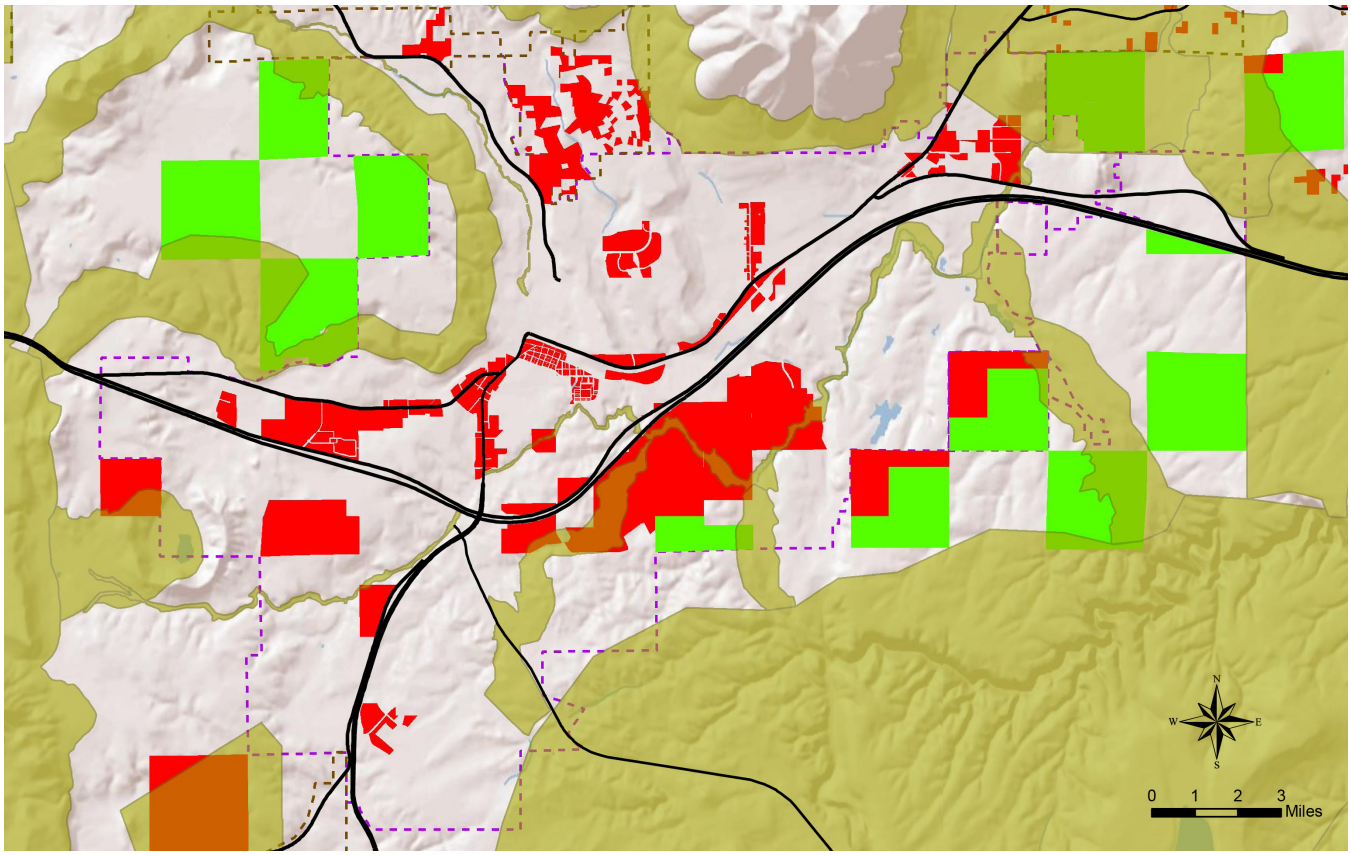
Legend

- Rural Growth Boundary
- Urban Growth Boundary
- Wildlife Corridors

Parcels Identified for Growth in the Public Process

- Changed to Protected Open Space
- All Other Parcels

SCENARIO A: CITY + WILDLIFE CORRIDOR MAP



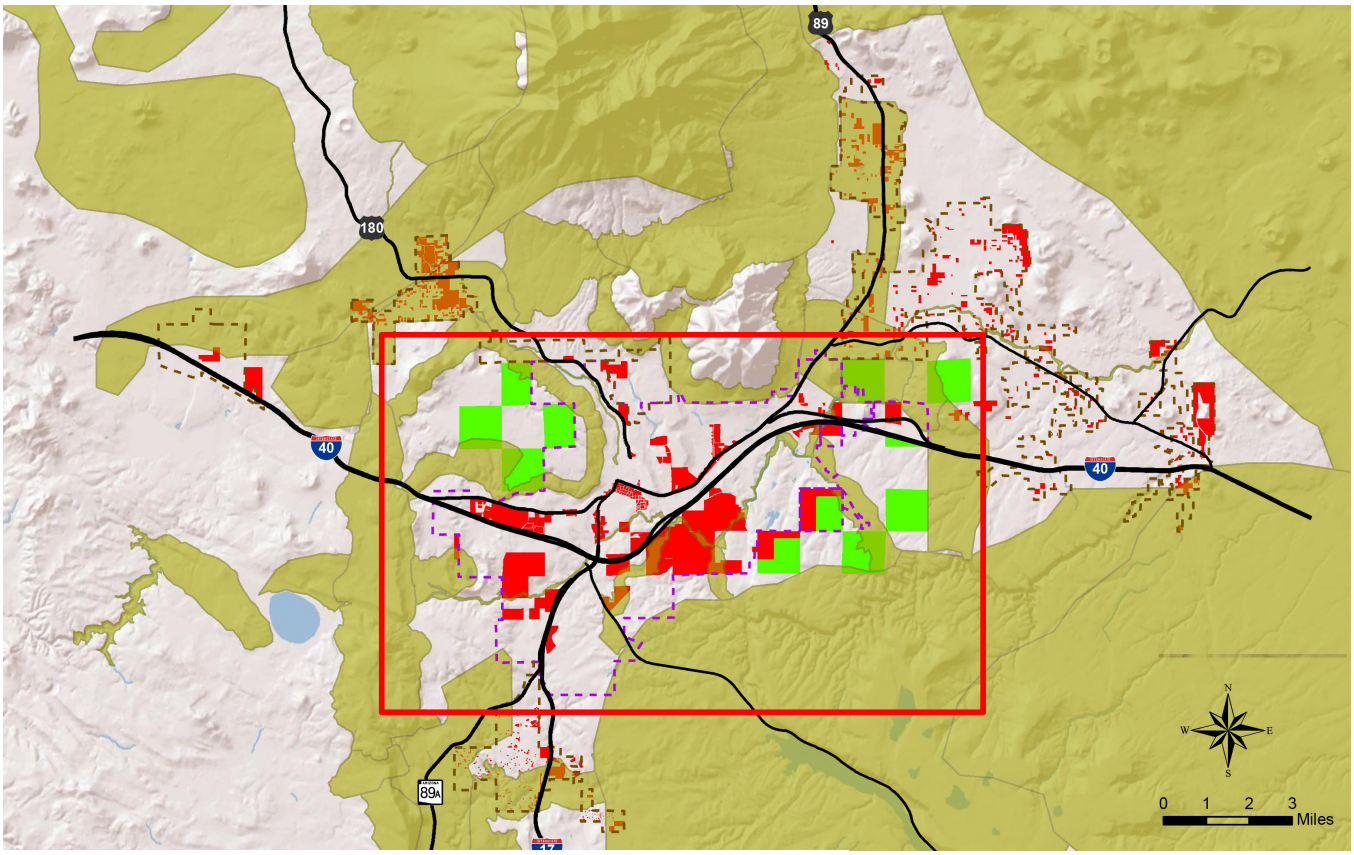
Legend

- Rural Growth Boundary
- Urban Growth Boundary
- Wildlife Corridors

Parcels Identified for Growth in the Public Process

- Changed to Protected Open Space
- All Other Parcels

SCENARIO B: REGION + WILDLIFE CORRIDOR MAP



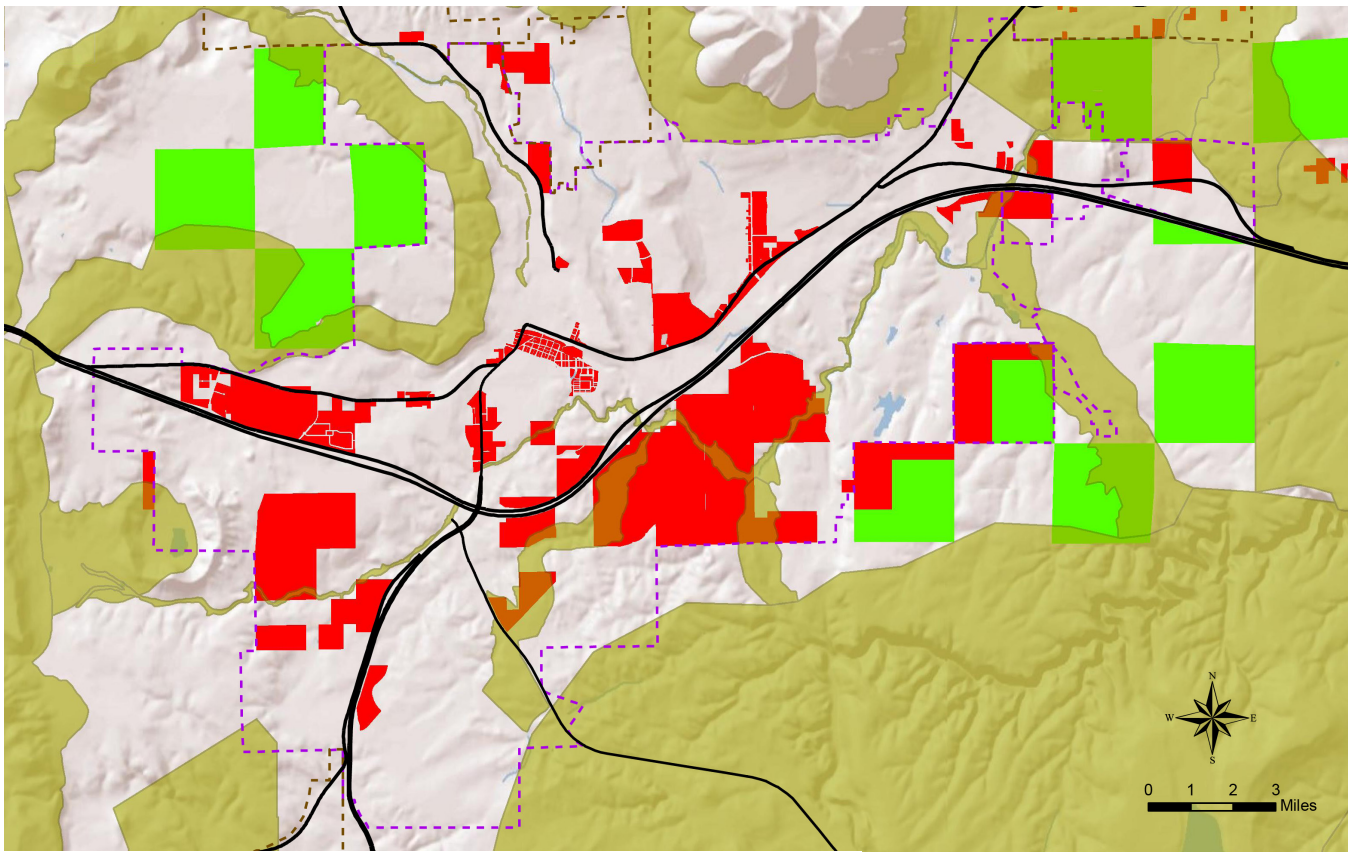
Legend

- Rural Growth Boundary
- Urban Growth Boundary
- Wildlife Corridors

Parcels Identified for Growth in the Public Process

- Changed to Protected Open Space
- All Other Parcels

SCENARIO B: CITY + WILDLIFE CORRIDOR MAP



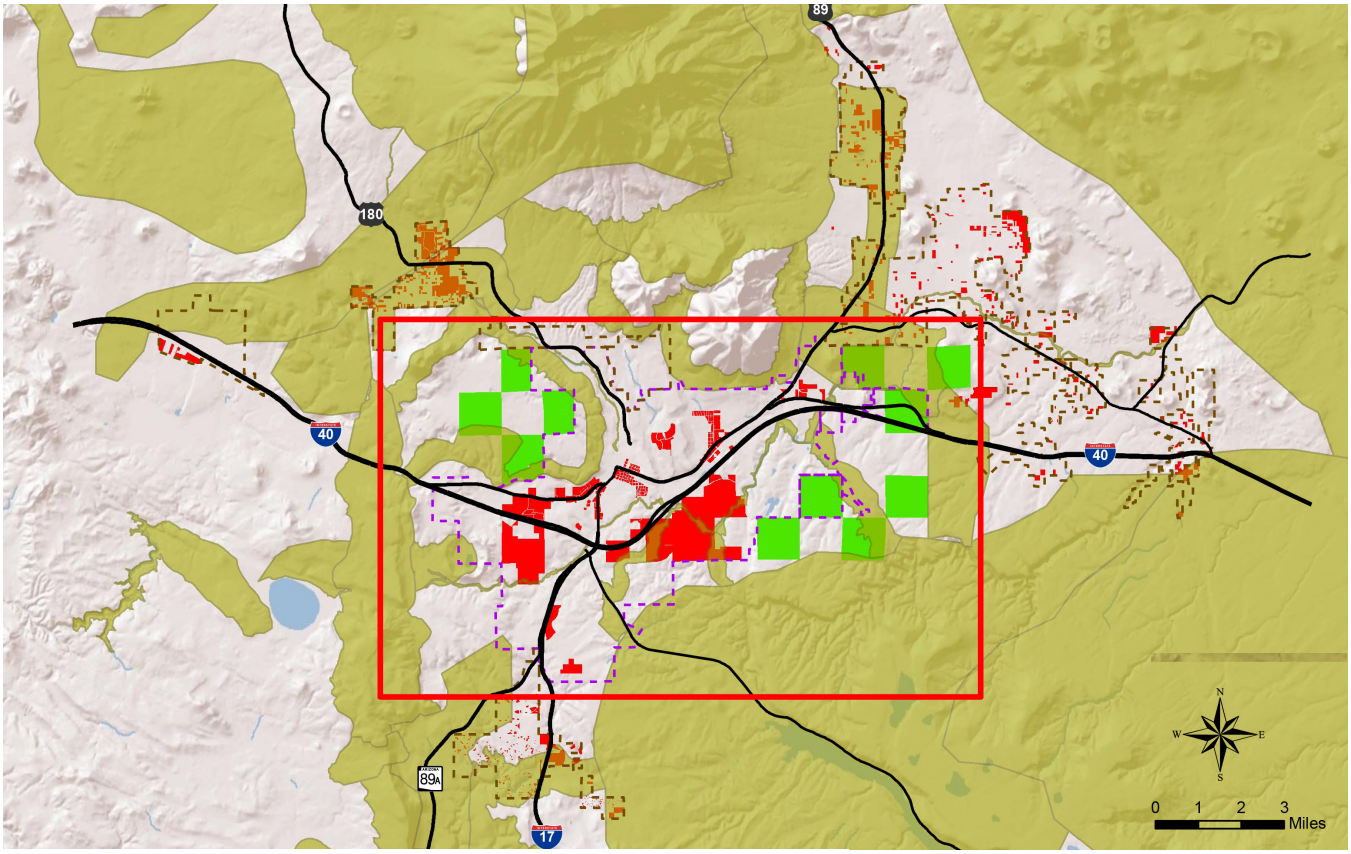
Legend

- Rural Growth Boundary
- Urban Growth Boundary
- Wildlife Corridors

Parcels Identified for Growth in the Public Process

- Changed to Protected Open Space
- All Other Parcels

SCENARIO D: REGION + WILDLIFE CORRIDOR MAP



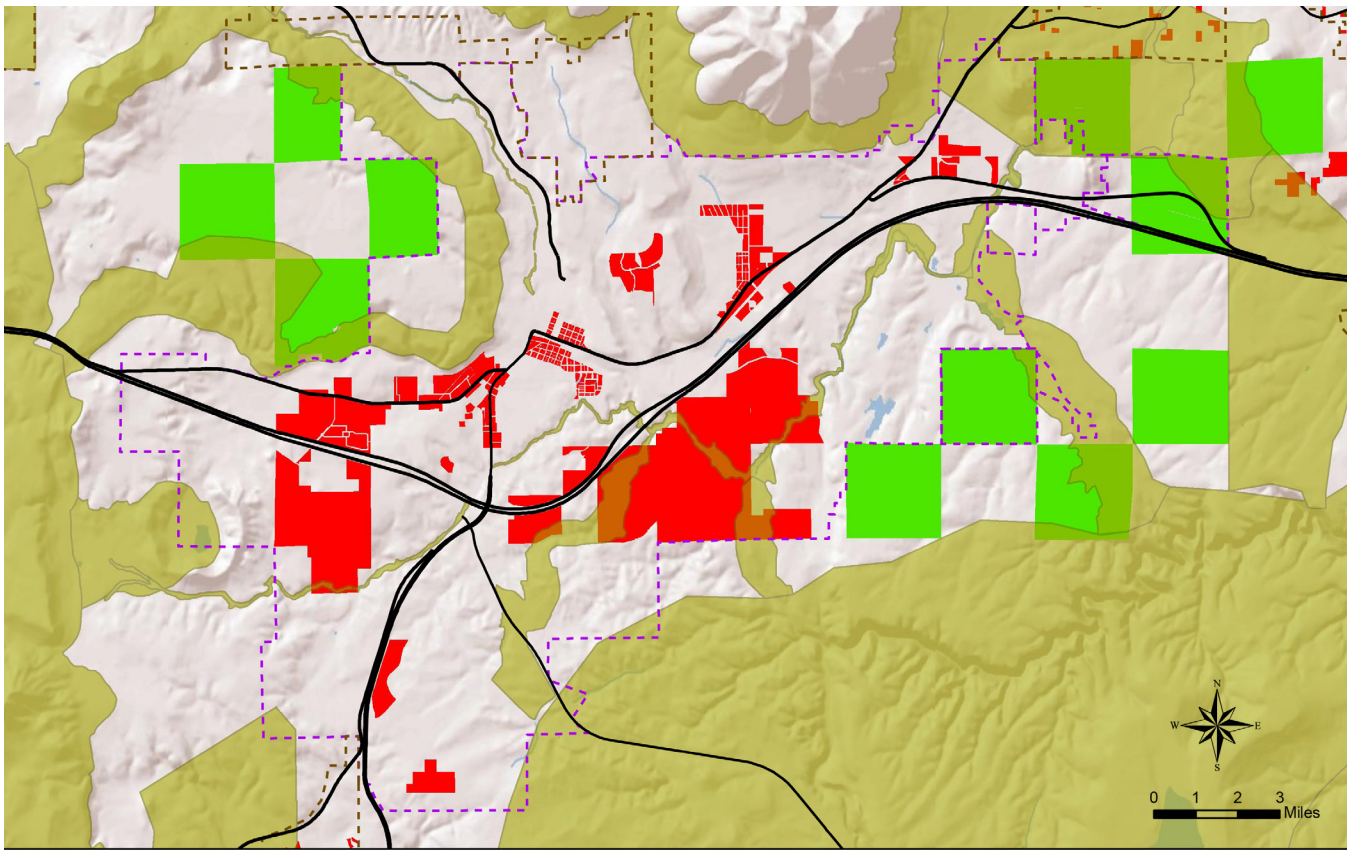
Legend

- Rural Growth Boundary
- Urban Growth Boundary
- Wildlife Corridors

Parcels Identified for Growth in the Public Process

- Changed to Protected Open Space
- All Other Parcels

SCENARIO D: CITY + WILDLIFE CORRIDOR MAP



Legend

- Rural Growth Boundary
- Urban Growth Boundary
- Wildlife Corridors

Parcels Identified for Growth in the Public Process

- Changed to Protected Open Space
- All Other Parcels

PROXIMITY TO PASSIVE AND ACTIVE PARKS

This indicator calculates the number of people within a specified distance to either passive or active parks. Passive parks are areas of protected open space, such as national forest lands, and the FUTS trail. The specified distance for passive parks was a quarter mile. Active parks are areas where a higher intensity of recreational activity takes place and includes playgrounds, sports fields and courts, swimming pools, skating rinks, tennis facilities, and other support facilities. Providing increased access to these areas encourages healthy lifestyles and promotes a sense of community. In areas with higher densities, as in Scenarios B and D, smaller parks tend to be more frequent to compensate for the reduction in yards associated with single-family style development.

POPULATION IN PROXIMITY TO PARKS INDICATOR METHODOLOGY

This indicator calculates the number of people within walking distance to passive parks (1/4 mile) and biking or walking distance to active parks (1/2 mile). A query was performed in GIS to identify all of the parcels that were marked for future development that were within a ¼ mile and a ½ mile of current parks. Since future parks are not known at this time, they were not considered as part of the evaluation.

NOTE: This indicator shows how much land would potentially be developed as new growth. Values for the scenarios do not include existing conditions.

The formula used to calculate the Population in Proximity to Park is as follows:

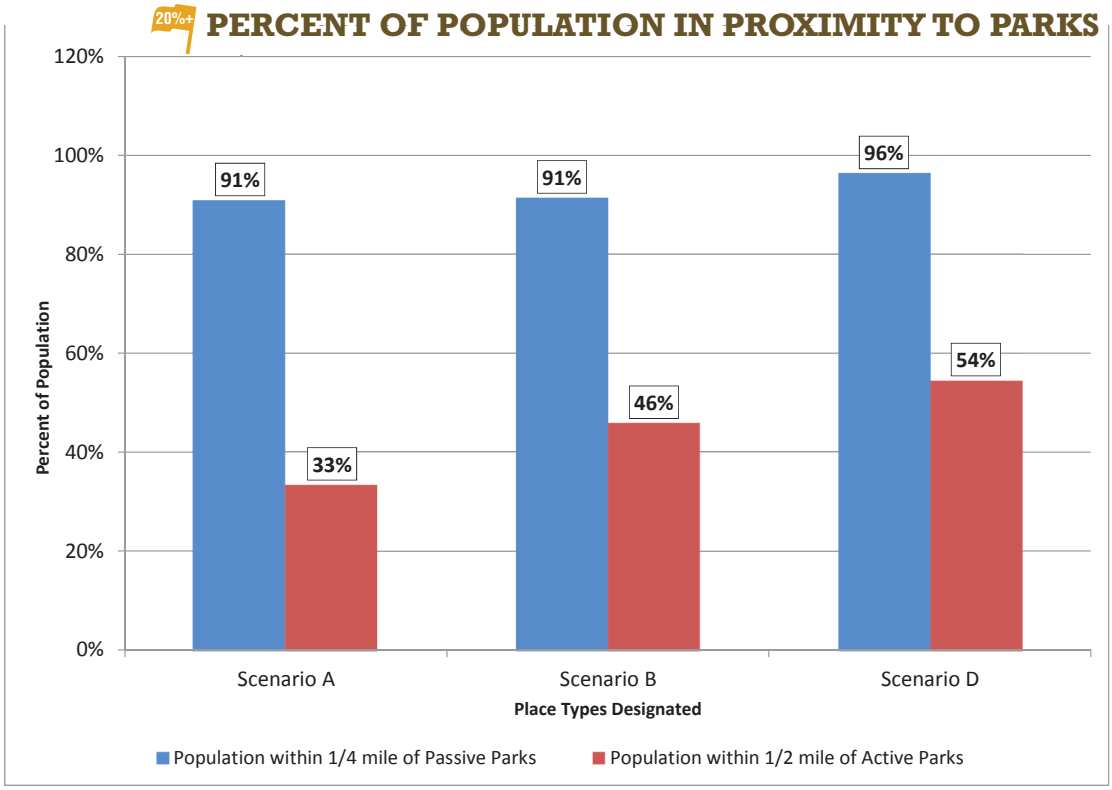
Summed Population within a ¼ mile of passive parks or the FUTS

Summed Population within a ½ mile of active parks

The results are displayed in the following table and chart.

INDICATOR	POTENTIAL NEW POPULATION IN PROXIMITY TO PARKS*		
	SCENARIO A	SCENARIO B	SCENARIO D
TOTAL POTENTIAL NEW POPULATION (DOES NOT INCLUDE EXISTING POPULATION)	72,500	72,200	71,600
POPULATION WITHIN ¼ MILE TO PASSIVE PARKS	65,900	65,900	69,000
POPULATION WITHIN ½ MILE TO ACTIVE PARKS	24,200	33,100	39,000

*Existing conditions are not provided because this indicator shows how much of the new population will be in proximity to parks.



DEVELOPED UNPROTECTED OPEN SPACE

There are two types of open spaces used in this analysis—protected and unprotected. For the purpose of this analysis, protected open space is land that is assumed as not being developed such as national, monument lands, national parks, or state forests. State lands are not considered Protected Open Space because they to be sold or leased at some point in the future and whether that land gets developed or preserved for open space is dependant on the developer. Unprotected open space is land that is currently undeveloped but does not have regulations or restrictions inhibiting development, this includes Arizona State Land Department properties. The analysis performed for this indicator involved determining how much existing unprotected open space would be developed in the future scenarios. The result of this analysis is presented on the following pages.

DEVELOPED UNPROTECTED OPEN SPACE INDICATOR METHODOLOGY

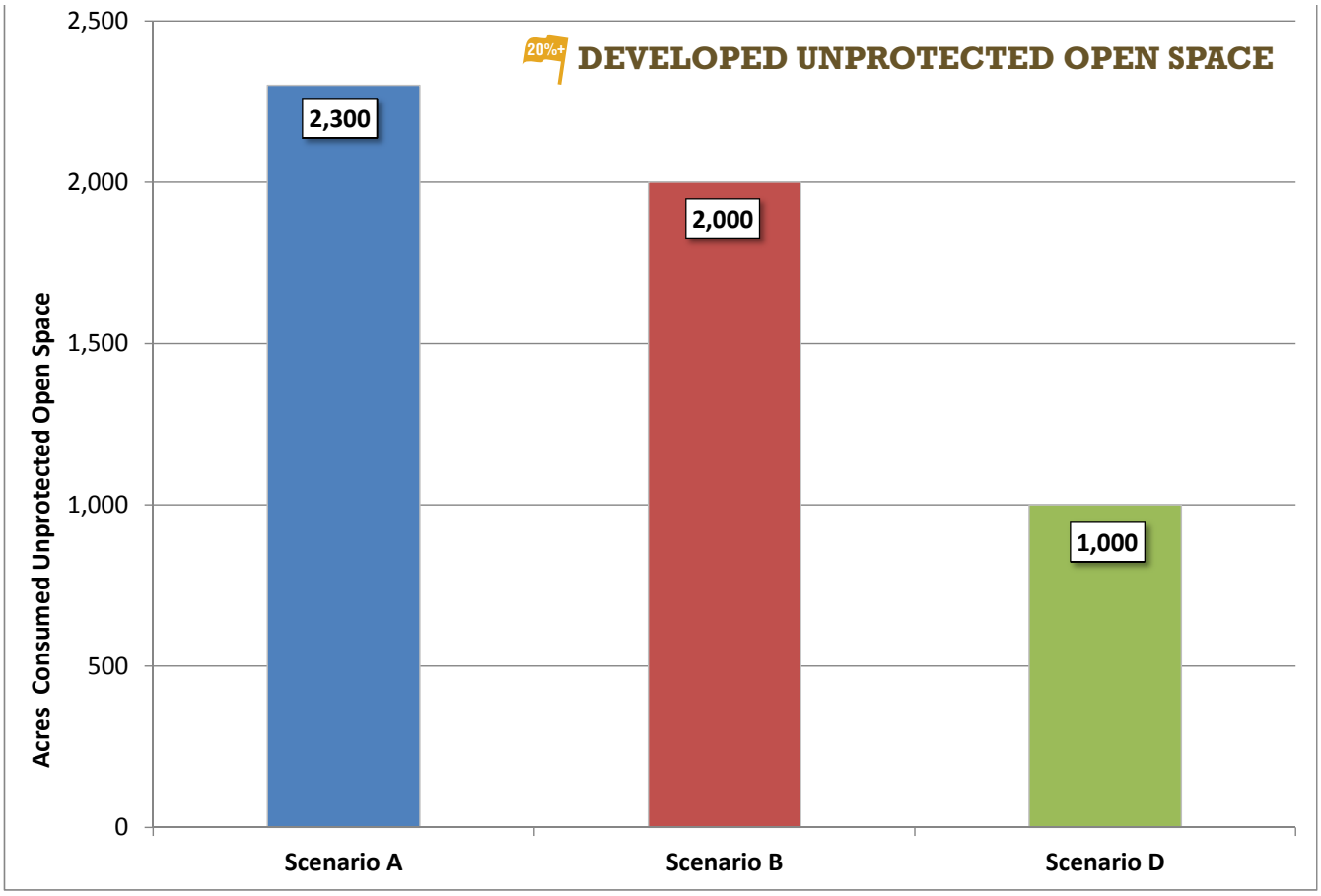
This indicator calculates the acres of open space developed by the potential new future growth. A query was performed in GIS to identify all of the existing unprotected open space and of those parcels, which ones were marked for development of future growth.

The formula used to calculate the Developed Unprotected Open Space is as follows:

Summed Acres where Unprotected Open Space that were marked for development

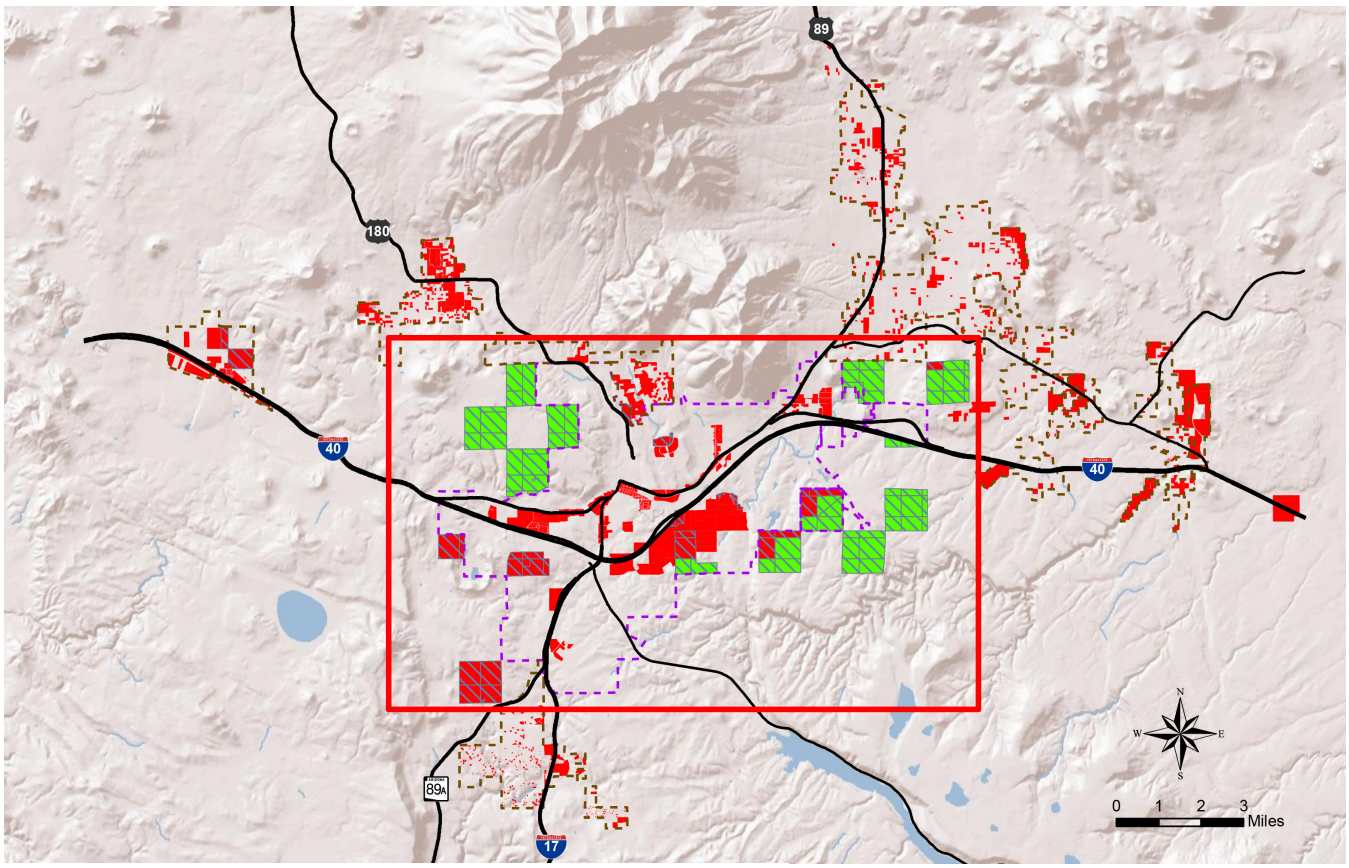
The results are displayed in the following table, chart, and maps.

INDICATOR	TOTAL ACRES OF EXISTING UNPROTECTED OPEN SPACE	POTENTIAL NEW FUTURE ACRES OF UNPROTECTED OPEN SPACE DEVELOPED AS NEW GROWTH		
		SCENARIO A	SCENARIO B	SCENARIO D
CONSUMED UNPROTECTED OPEN SPACE (ACRES)	26,600	2,300	2,000	1,000
*Existing conditions are not provided because this indicator shows how much land would potentially be developed as new growth.				



NOTE: This indicator shows how much unprotected open space land would potentially be developed as new growth. Values for the scenarios do not include existing development.

SCENARIO A: REGION + CONSUMED OPEN SPACE MAP



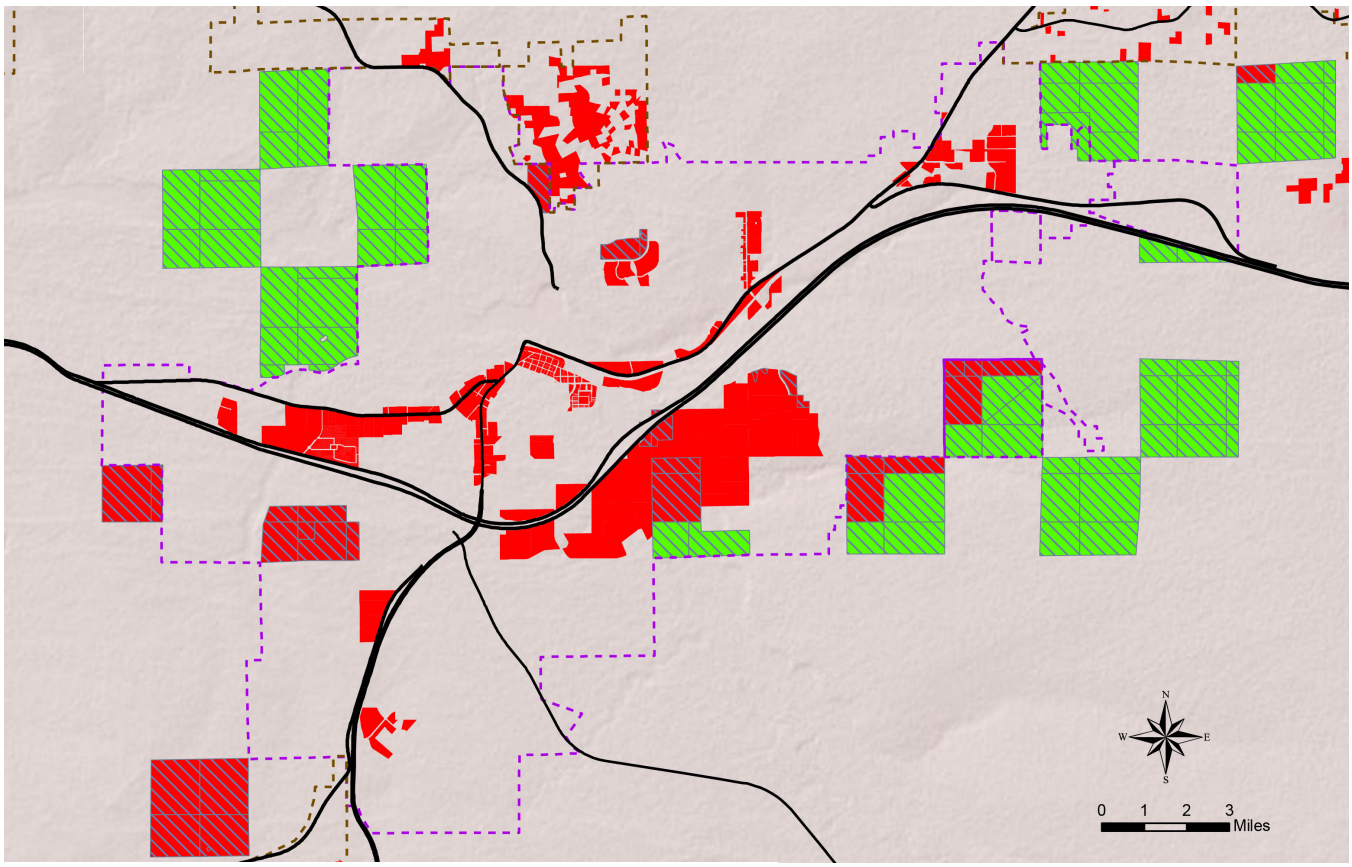
Legend

- Rural Growth Boundary
- Urban Growth Boundary
- Previously Unprotected Open Space

Parcels Identified for Growth in the Public Process

- Changed to Protected Open Space
- All Other Parcels

SCENARIO A: CITY + CONSUMED OPEN SPACE MAP



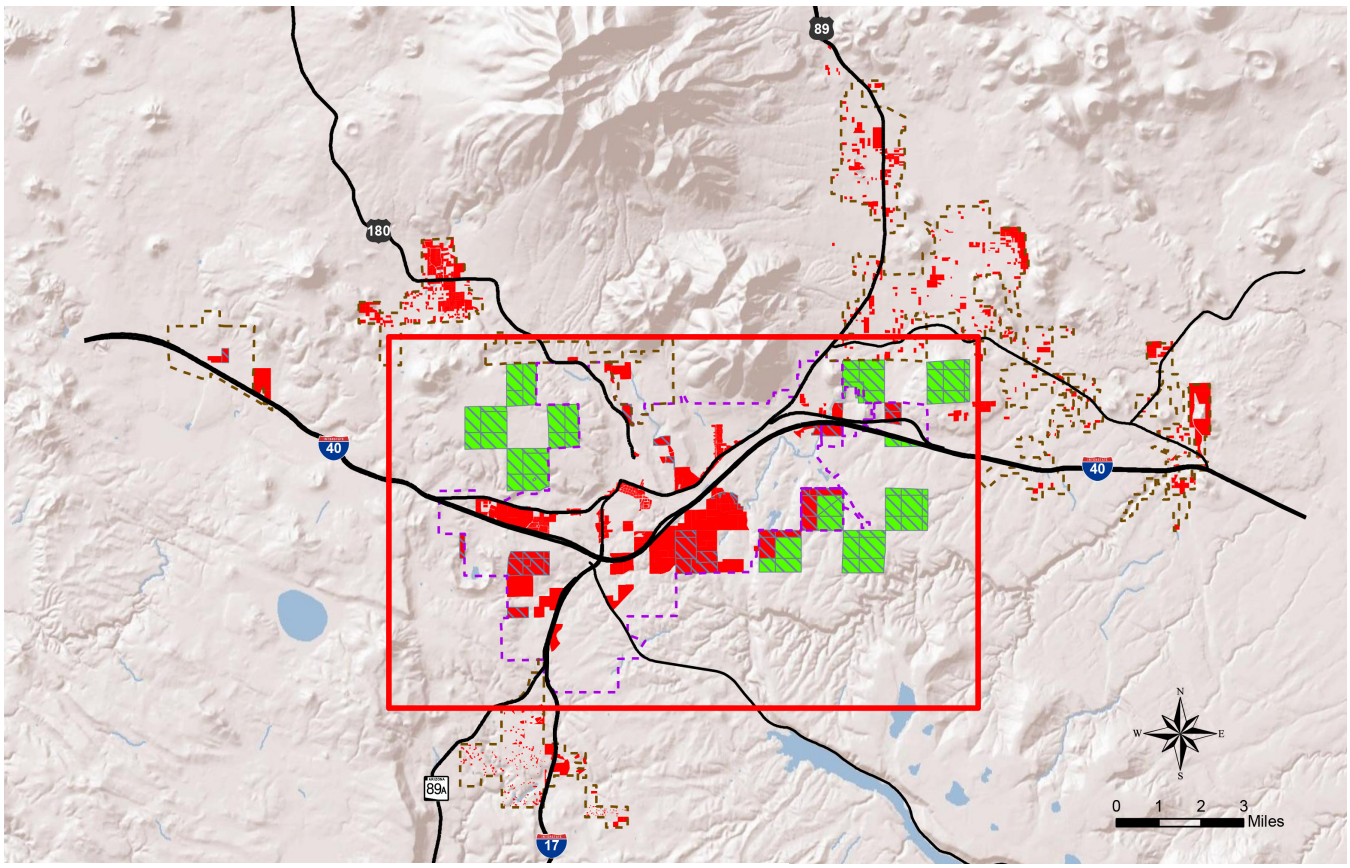
Legend

- Rural Growth Boundary
- Urban Growth Boundary
- Previously Unprotected Open Space

Parcels Identified for Growth in the Public Process

- Changed to Protected Open Space
- All Other Parcels

SCENARIO B: REGION + CONSUMED OPEN SPACE MAP



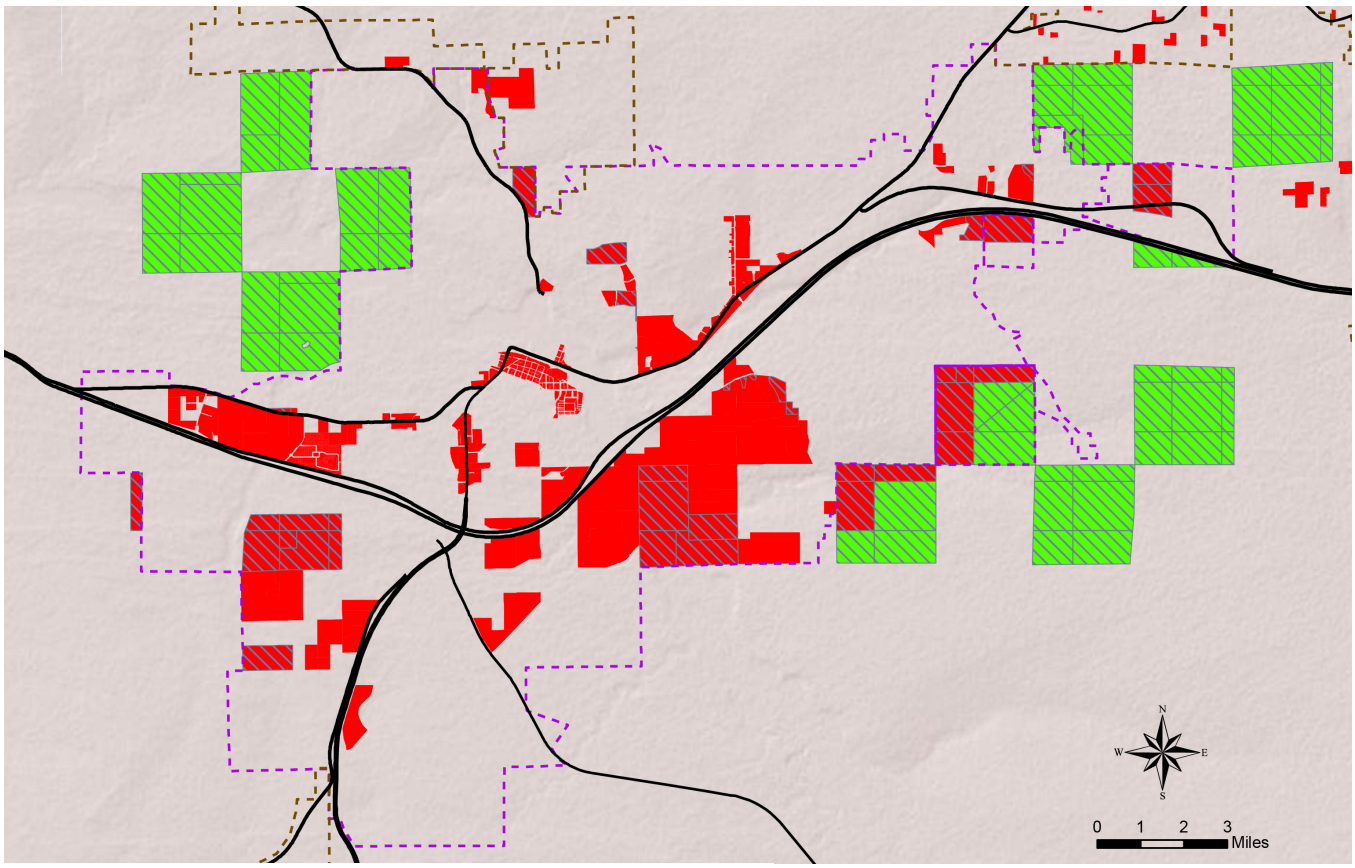
Legend

- Rural Growth Boundary
- Urban Growth Boundary
- Previously Unprotected Open Space

Parcels Identified for Growth in the Public Process

- Changed to Protected Open Space
- All Other Parcels

SCENARIO B: CITY + CONSUMED OPEN SPACE MAP



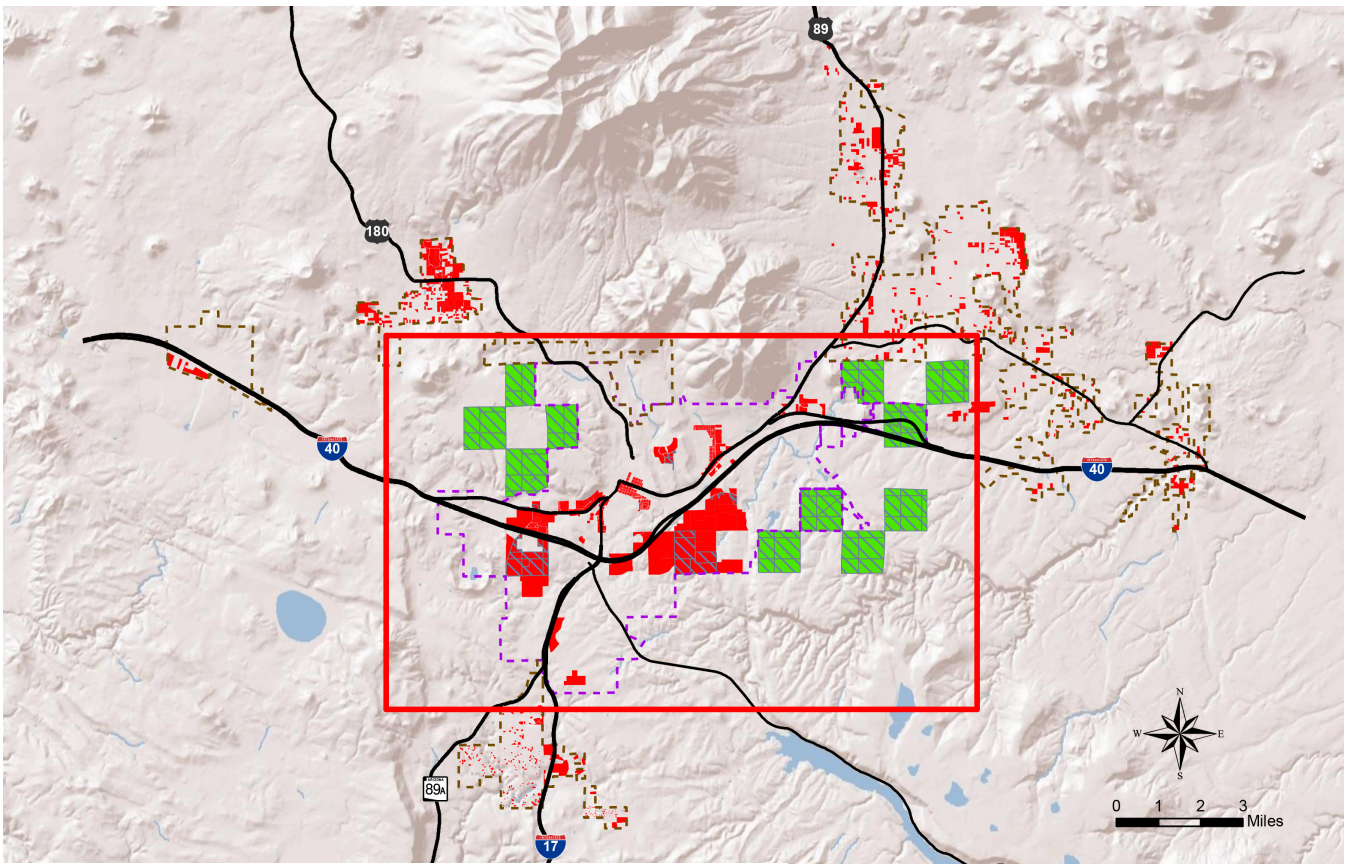
Legend

- Rural Growth Boundary
- Urban Growth Boundary
- Previously Unprotected Open Space

Parcels Identified for Growth in the Public Process

- Changed to Protected Open Space
- All Other Parcels

SCENARIO D: REGION + CONSUMED OPEN SPACE MAP



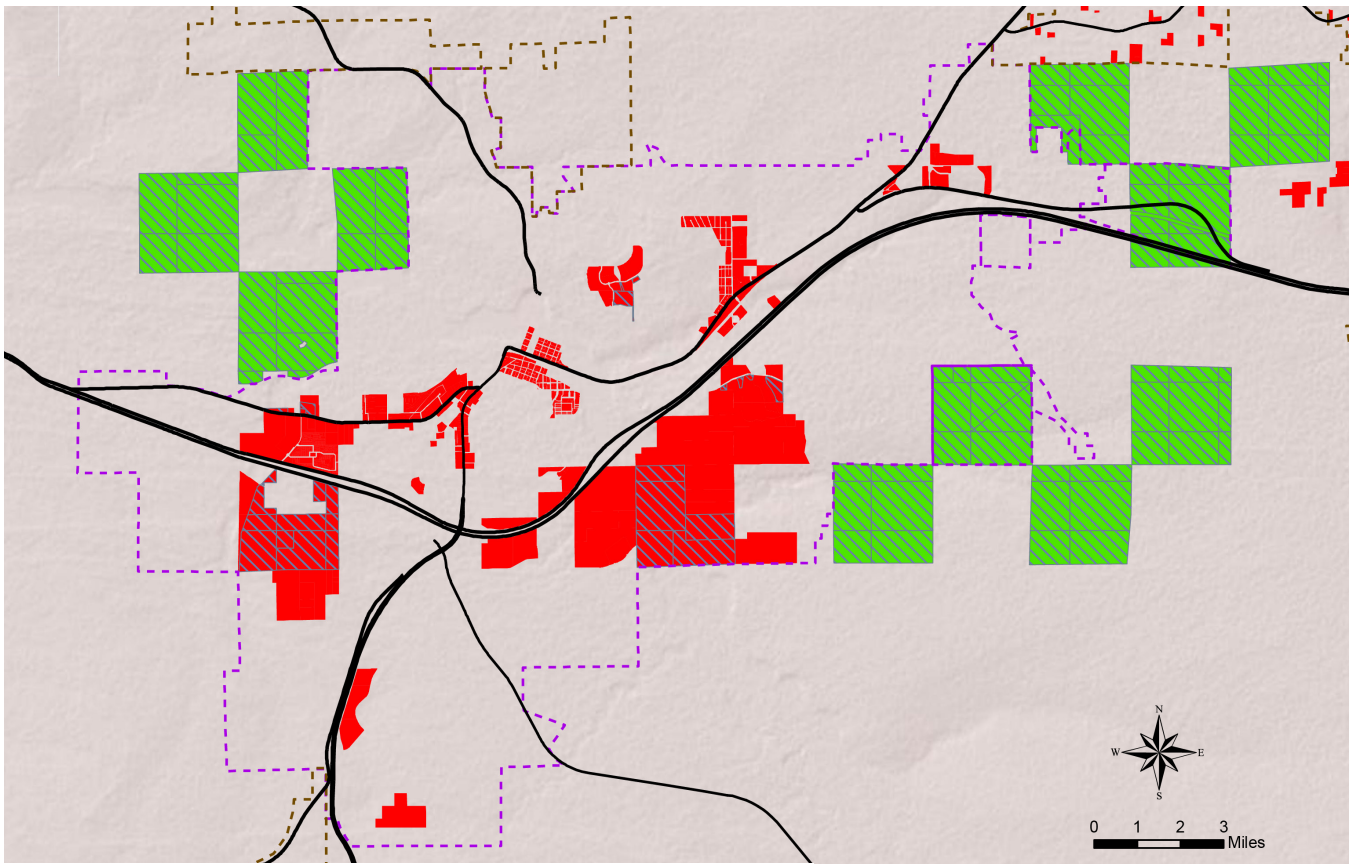
Legend

- Rural Growth Boundary
- Urban Growth Boundary
- Previously Unprotected Open Space

Parcels Identified for Growth in the Public Process

- Changed to Protected Open Space
- All Other Parcels

SCENARIO D: CITY + CONSUMED OPEN SPACE MAP



Legend

- Rural Growth Boundary
- Urban Growth Boundary
- Previously Unprotected Open Space

Parcels Identified for Growth in the Public Process

- Changed to Protected Open Space
- All Other Parcels

PHASE 2 CONCLUSION

Growth is inevitable in the City and the County. The purpose of this analysis is to evaluate, compare, and contrast different ways growth can occur in order to make sound policy and planning decisions that will manage the future growth. As shown in both the Phase 1 and Phase 2 analysis, as growth develops at a higher-density, the use of alternate modes of transportation becomes more prevalent; water demand, fuel consumption, and vehicle miles traveled all decrease; and the impact to the surrounding environment also decreases. It should be noted, however, that high density development is not always a plausible solution. There are some benefits, but it has to make sense for the community in terms of development goals and the character of the region.

NOTE: This indicator shows how much unprotected open space land would potentially be developed as new growth. Values for the scenarios do not include existing conditions.

Phase 3 Analysis

Phase 3 analysis included evaluation of fiscal performance indicators, which allows comparison and contrast of potential costs and revenues based on the development patterns of each scenario. It should be noted that this report analyzes outputs based on possible future development patterns for the ultimate build-out of the Flagstaff region. The time horizon for ultimate build-out is not determined, but is estimated to be around 80 to 100 years in the future. As a result, projection of monetary values that far into the future is highly speculative and dependent on many variables that may change in the future. Therefore, this section is meant to present a general understanding, comparison, and contrast of the costs and revenues associated with each scenario for comparative purposes.

SCENARIO INDICATOR SUMMARIES

Phase 3 analysis also reevaluated indicators from Phases 1 and 2. In addition, new indicators were introduced to analyze fiscal impacts. The following charts, tables, and maps illustrate the output of performance measures for each indicator. Indicators introduced in Phase 3 in this analysis were performed in Microsoft Excel.

Capital Costs

Capital Costs were obtained from the 2007 Development Fee Study prepared by Tischler-Bise conducted in 2007. The 2007 Tischler-Bise study analyzed the cost of development for a number of community features typically associated with continued growth and development in the region. For the purpose of this analysis, Leisure Expenditures include libraries, parks, and open space/trails. Public Safety includes police and fire services. General Government includes government services and public works, with the exception of streets. Utility costs include water, wastewater, reclaimed water, and stormwater costs. The following charts summarize the capital costs for the scenarios.

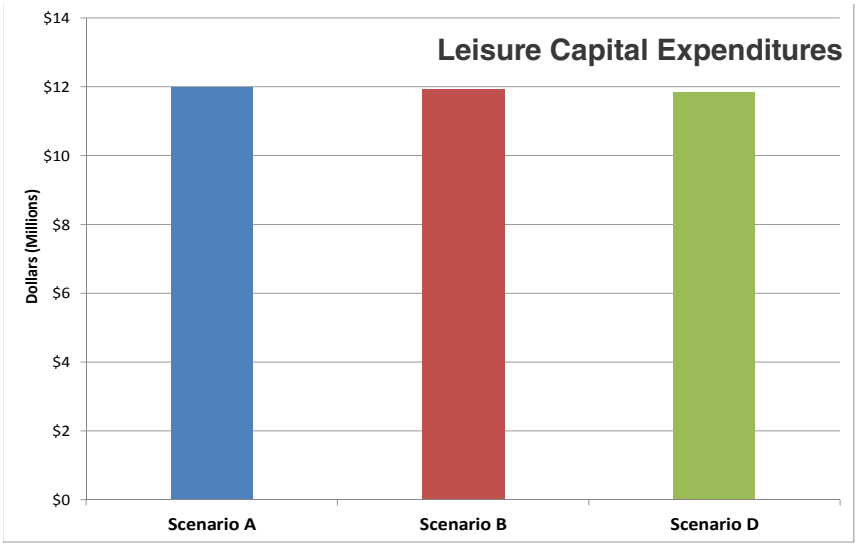
CAPITAL COSTS METHODOLOGY

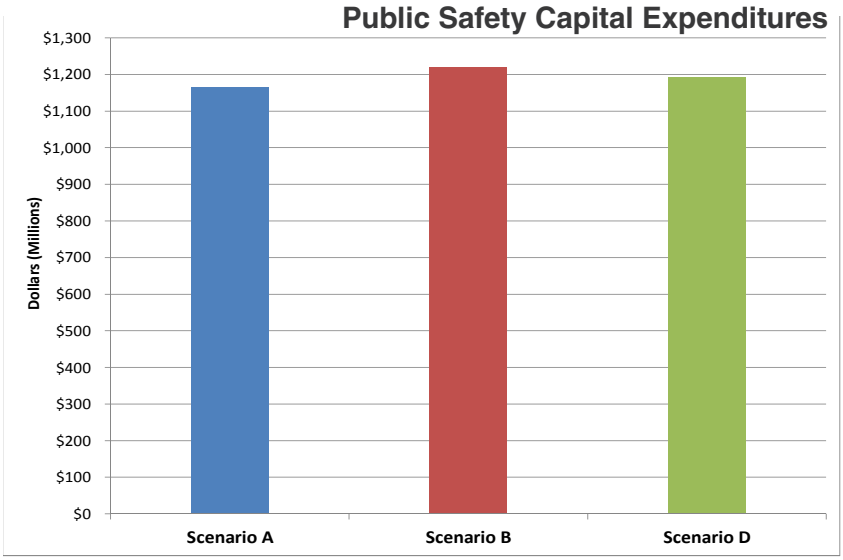
Leisure, Public Safety, and General Government capital costs were developed based on information in the Tischler-Bise study and the future population indicator for residential areas and non-residential square feet for non-residential areas. This indicator does not take into consideration existing population.

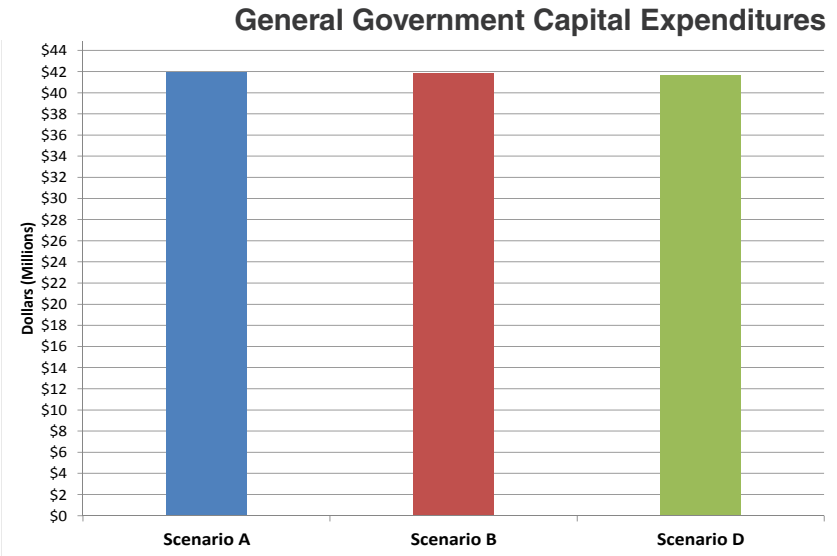
The formula used to calculate the Capital Costs for Leisure, Public Safety, and General Government is as follows:

> (New Population per Scenario * Cost per capita for facilities (provided by Tischler-Bise)) + (Non-residential square feet * Cost per square feet for facilities (provided by Tischler-Bise))

The results are displayed in the following charts.







Source: Tischler-Bise, Development Fee Study, January 2007.
Note: Costs are in 2007 dollars

For the most part, capital costs do not differ much between the scenarios, with the exception of public safety. The cost for public safety is higher in Scenarios B and D due to larger amounts of non-residential square footage. The Leisure capital costs don't differ much between scenarios because they are based on the population, which also doesn't differ much between scenarios. Similarly, General Government capital costs are based on population and employment, both of which are relatively similar between scenarios. Leisure Expenditures include libraries, parks, and open space/trails. Public Safety includes police and fire services. General Government includes government services and public works. Utility costs include water, wastewater, reclaimed water, and stormwater costs.

Water and Sewer capital costs were developed from the total acres identified for growth, the water demand indicator, the water production report, and information provided by the City of Flagstaff Utilities Department on the existing linear feet of water and wastewater facilities and the cost per linear foot for those facilities. The costs were then grown based on the number of developed acres in each scenario..

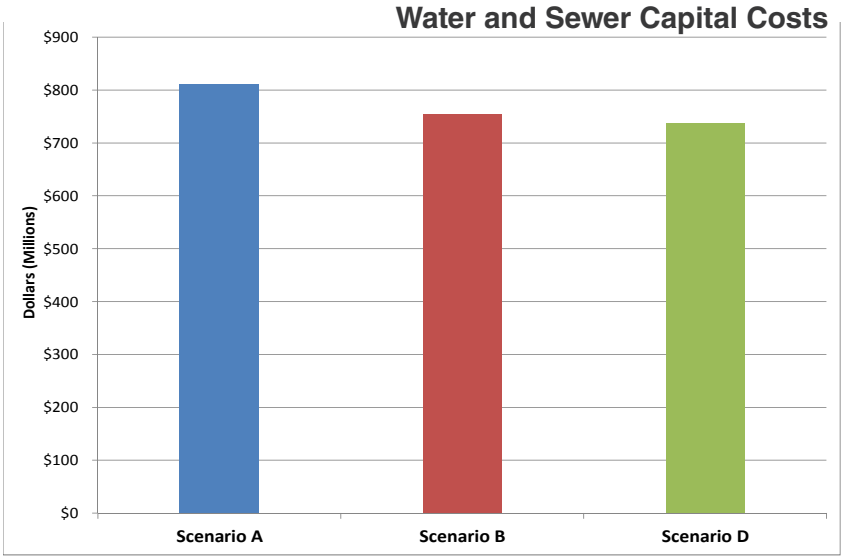
The formula used to calculate the Capital Costs for Water and Sewer is as follows:

Facility Costs: (Cost per linear foot feeder * Linear feet of pipe* 18%) + (Cost per linear foot feeder * 75% * Linear feet of pipe* 68%)

Note: Linear feet of pipe is based on the total acres identified for growth and existing linear feet of pipe per acre.

Treatment Costs: (Water Demand indicator * Cost per gallon Water production) + (Water Demand indictor * 0.75 * Cost per gallon wastewater treatment)

The results are displayed in the following chart.

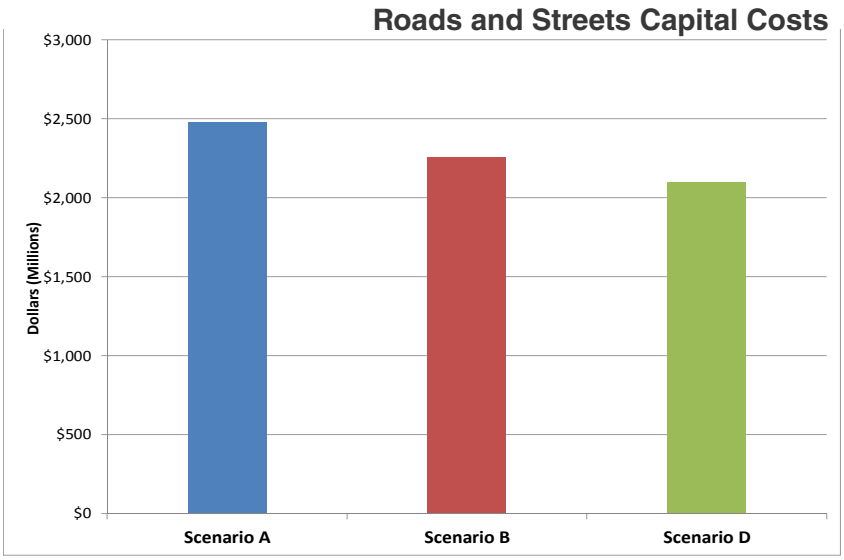


Roadway and Streets capital costs were derived from the existing lane miles, total acres identified for growth, and cost per lane mile. Inputs to derive the costs include:

- Arterials: $1,600,000 per lane mile
- Collectors: $1,300,000 per lane mile
- Locals: $800,000 per lane mile
- VMT indicator results for each scenario
- Total acres identified for growth in each scenario
- Assumes five lanes per arterial, three lanes per collector, and two lanes per local streets

From the above information, the capital costs for roadways could be determined. The results are displayed in the following chart.

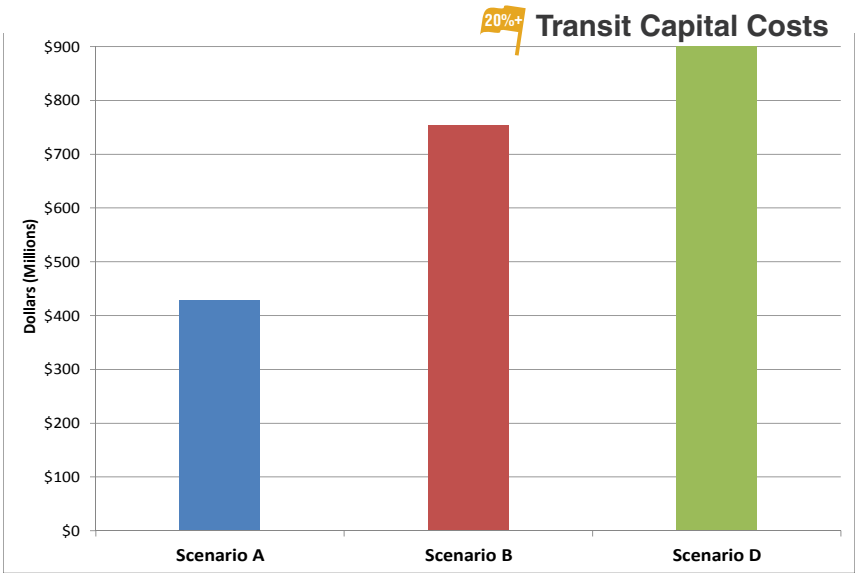
Note: Costs are in 2012 dollars



The transit capital costs were based on transit trips (from the Trips indicator) and the following assumptions:

- Cost per transit trip: $3.47 (based on NAIPTA ridership data)
- Efficiency factor
- Capital Costs estimated at 37% of operating costs * 80 years to approximate build-out

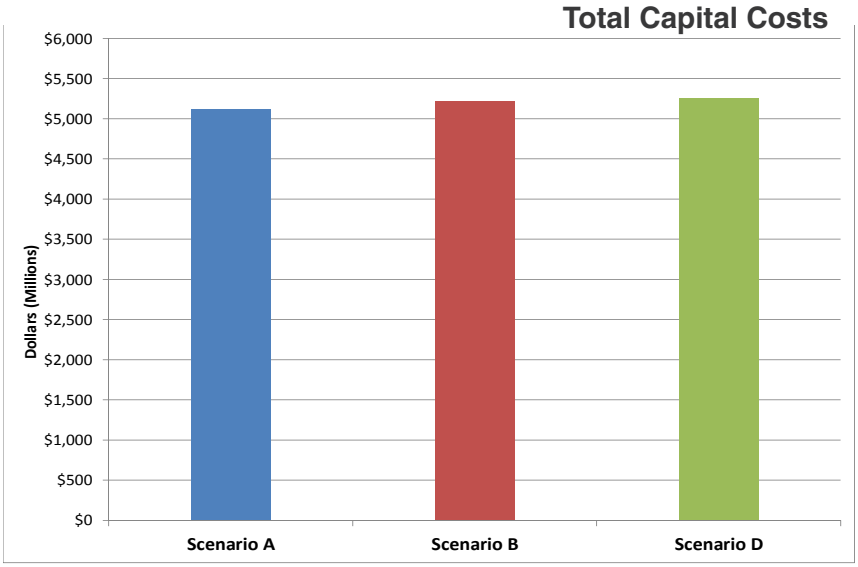
The results of this analysis are presented in the following chart.



Transit costs, which are one of the measurements that increase significantly in Scenario D, is a result of an expanded transit system to accommodate more passengers. Factors such as housing and jobs in proximity to transit, density of development, mixture of land uses, the pedestrian environment, cost and availability of parking, and traveler demographics all play a part in determining ridership.

Total Costs were summed and are displayed in the following chart.

Note: Costs are in 2012 dollars



Capital costs are relatively consistent between the scenarios (with the exception of public safety) because costs are driven on a per capita basis. The cost for public safety is higher in Scenarios B and D due to larger amounts of non-residential square footage.

Operation & Maintenance Costs

Capital costs are only part of the cost of development. Operation and Maintenance (O&M) costs are needed to represent the costs associated with the general upkeep of facilities and services associated with development. These costs are annual and accounted for in the budget. The O&M costs for this analysis were obtained from the 2012-2013 Annual Financial Plan - Division Budgets, and reflect fiscal year 2010-2011 expenses.

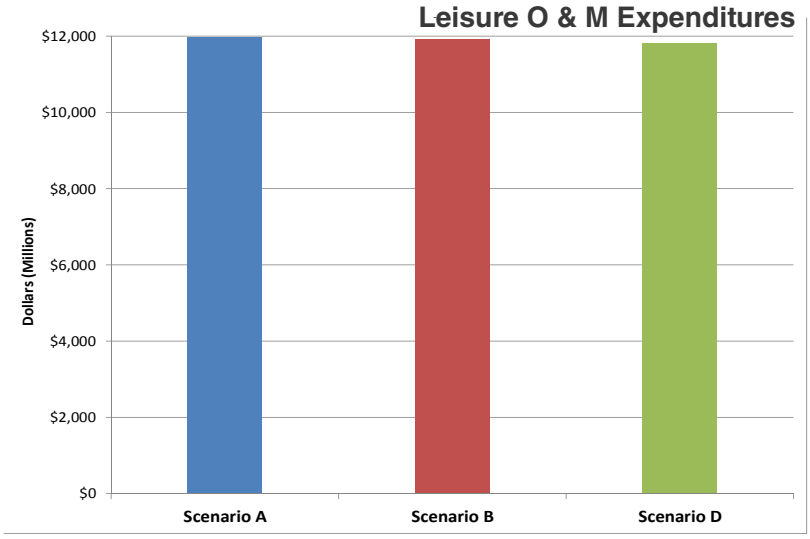
OPERATION AND MAINTENANCE COSTS METHODOLOGY

Leisure, Public Safety, and General Government O&M costs were developed based on information in the Tischler-Bise study and the future population indicator to determine costs per capita. This indicator does not take into consideration existing population.

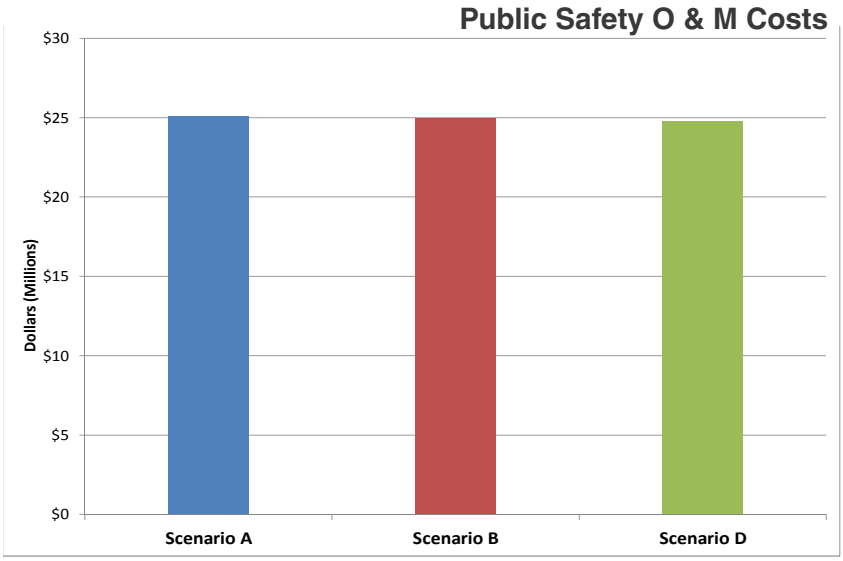
The formula used to calculate the O&M Costs for Leisure, Public Safety, and General Government is as follows:

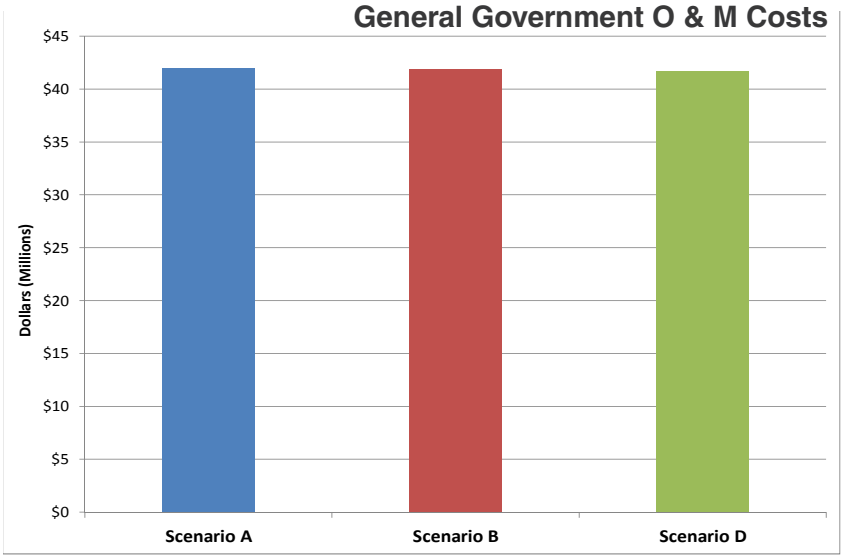
New Population per Scenario * Cost per capita for facilities (provided by Tischler-Bise)

The results are displayed in the following charts.



Source: Tischler-Bise, Development Fee Study, January 2007.
Note: Costs are in 2007 dollars





Water and Sewer O&M costs were based on the future Water Demand indicator results for each scenario. These costs are based on values from the Tischler-Bise study and input from the City of Flagstaff Utilities Department. These costs do not take into consideration existing water demand. The following assumptions were made to determine O&M costs:

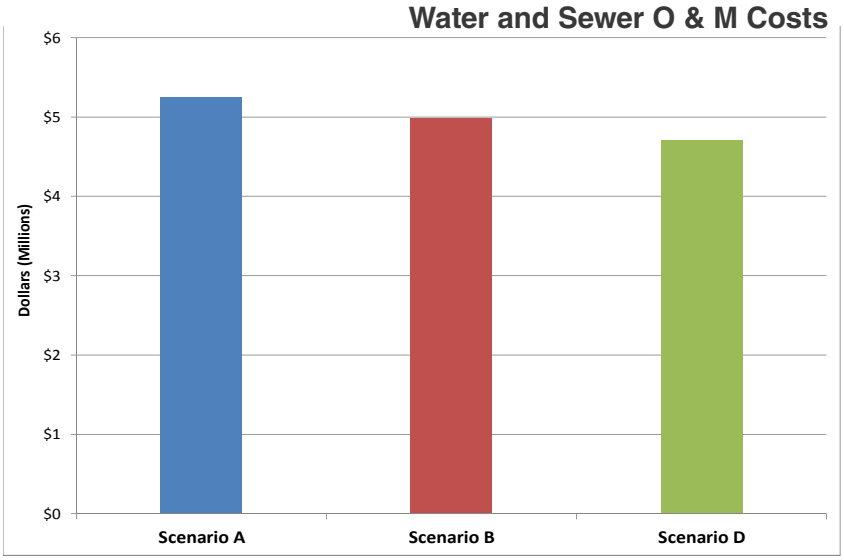
- Cost per gallon water: $0.46 (City of Flagstaff Utilities Department)
- Cost per gallon waste water: $0.44 (City of Flagstaff Utilities Department)

The formula used to calculate the O&M Costs for Water and Sewer is as follows:

(Water Demand indicator results for each scenario * 0.46) + (Water Demand indicator results for each scenario * 0.44)

The results are displayed in the following chart.

Source: Tischler-Bise, Development Fee Study, January 2007.
Note: Costs are in 2007 dollars



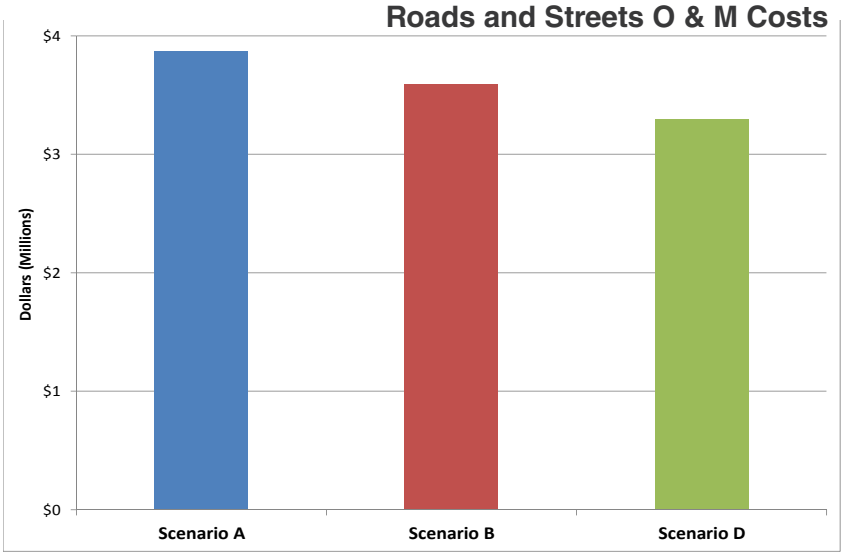
Roadway and Streets O&M costs were derived from the VMT indicator results and cost per VMT. The assumptions for this indicator include:

- VMT indicator results for each scenario
- Cost per VMT: $1.46 (City of Flagstaff Route Transfer Study)

The formula used to calculate the O&M Costs for Water and Sewer is as follows:

Cost per VMT * VMT indicator results

The results are displayed in the following chart.

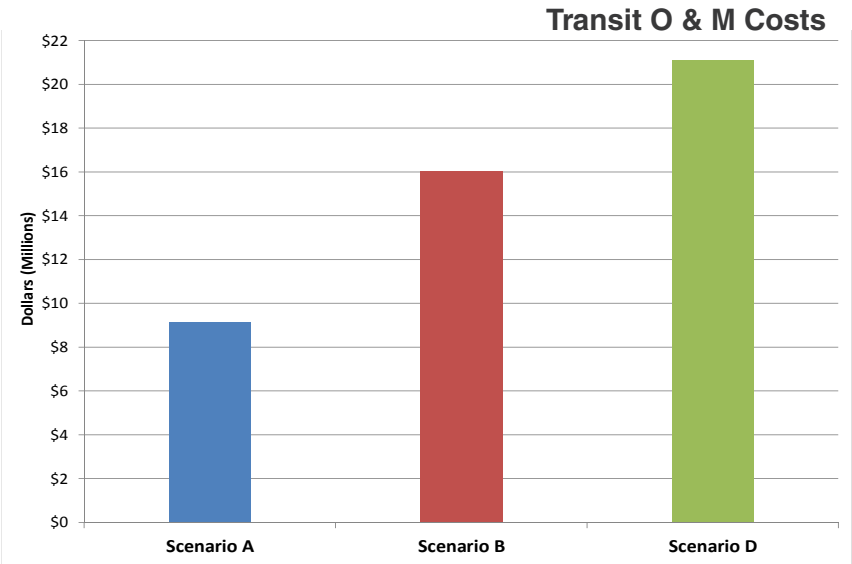


The transit O&M costs were based on transit trips (from the Trips indicator) and the following assumptions:

- Cost per transit trip: $3.47 Northern Arizona Intergovernmental Public Transportation Authority - NAIPTA)
- Efficiency factor

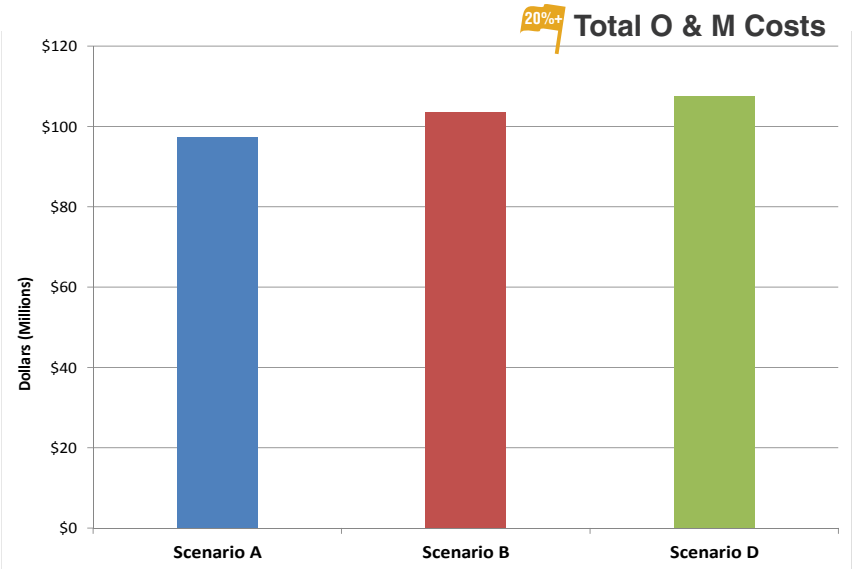
The results of this analysis are presented in the following chart.

Note: Costs are in 2012 dollars



Transit O&M costs are dependent on the number of transit trips. Scenario D is showing a higher cost because there are significantly more transit trips in Scenario D compared to Scenarios A and B.

Total Costs were summed and are displayed in the following chart.



Other Costs

ACQUISITION COSTS OF OPEN SPACE FOR CONSERVATION PURPOSES

In each scenario, Protected Open Space is assumed to be acquired (bought) and paid for. The associated cost assumptions are $2,000 per acre for lands on the periphery of the urban areas, and $10,000 per acre for lands closer to the urban area (FMPO). These assumptions were based upon recent appraisals of State Land. Unprotected open space in rural areas are assumed unlikely candidates for development, such as State Lands associated with the NAU Centennial Forest, and thus no costs were associated with them.

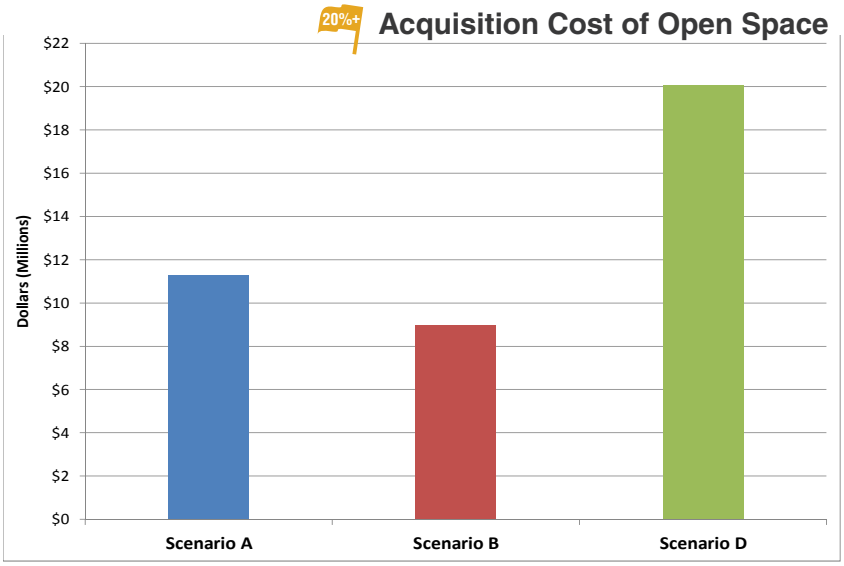
ACQUISITION COSTS OF OPEN SPACE FOR CONSERVATION METHODOLOGY

The following formula was used to determine the Acquisition Costs of Open Space for Conservation:

Total acres where unprotected open space changed to protected open space in the future scenarios (varies by scenario) * the respective cost per acre (either $10,000 or $2,000 depending on the location)

Note: Costs are in 2012 dollars

The following chart illustrates the costs for developing open space for each assumption.



"The respective costs per acre were based on the cost per acre based on State Trust Land sales and appraisals.

HOUSING + TRANSPORTATION COSTS

Costs for housing affordability typically just take into consideration the cost of rent or mortgage payments. However, there is an often overlooked cost for transportation associated with housing options. The location of housing plays a significant role in the cost of home ownership or renting. Housing units closer to downtowns or activity centers will likely have less transportation costs associated with them.

HOUSING AND TRANSPORTATION COST METHODOLOGY

The following assumptions were used for the Housing + Transportation (H+T) costs indicator:

- US Census: Average Owner monthly cost ($1,326 for the Flagstaff region) and Average Renter monthly cost ($949 for the Flagstaff region) (ACS 5 Year (2006-2009), Table S2503)
- Cost per VMT: Varies per placetype Center for Neighborhood Technology's (CNT) Abogo tool
- Center for Neighborhood Technology's (CNT) H+T Affordability Index: Existing number of households (35,182 households)
- Size Factor (varies by Place Type, but Place Types with single family units had larger sizes)
- Distance Factor (varies by Place Type, but Place Types on the periphery had further distances)

The H+T costs were developed for each Place Type with residential uses based on the census data and assumptions made for distances to the Flagstaff core and housing size.

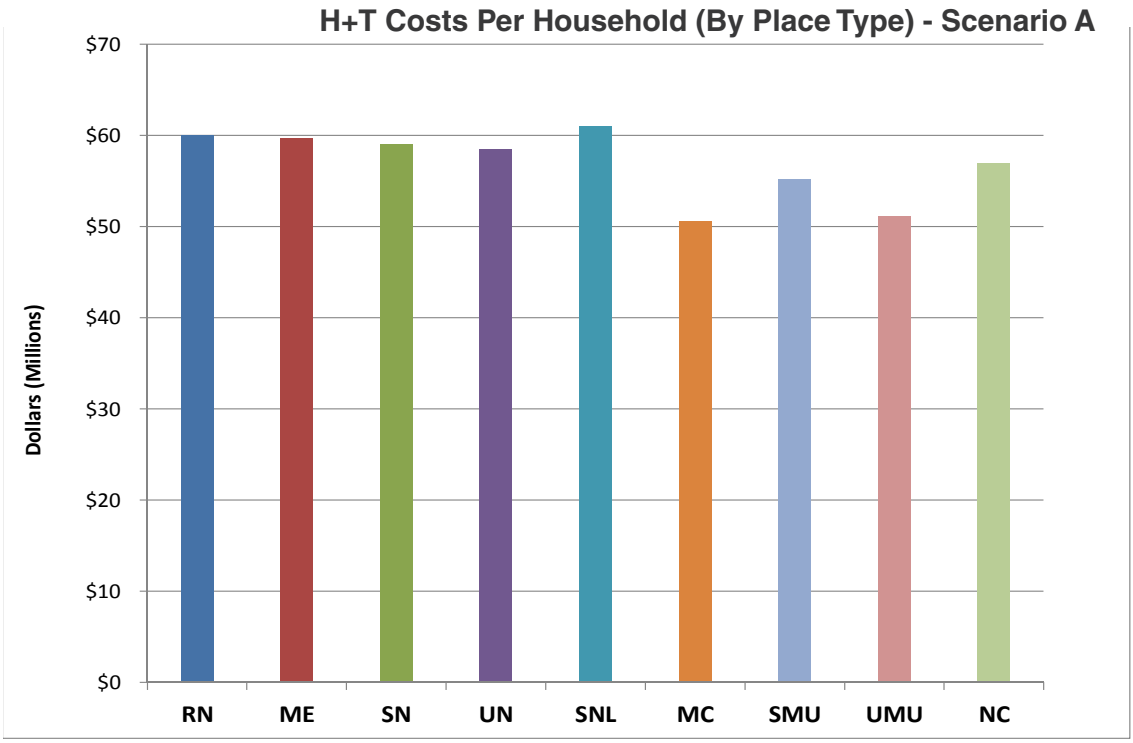
Housing Costs:

((Average monthly cost for home ownership * Number of Single Family Homes * percent single family assumption) + (Average monthly rent * Number of apartments and townhomes * percent townhome and apartment)) * Size Factor

Transportation Costs:

((Number of Single Family Homes * percent single family assumption) + (Number of apartments and townhomes * percent townhome and apartment)) * Cost per VMT * Distance Factor

The following chart shows the H+T costs for each scenario by Place Type.



RN - Rural Neighborhood

ME - Mountain Estates

SN - Suburban Neighborhood

UN - Urban Neighborhood

SNL - Suburban Neighborhood Light

MC - Metro Core

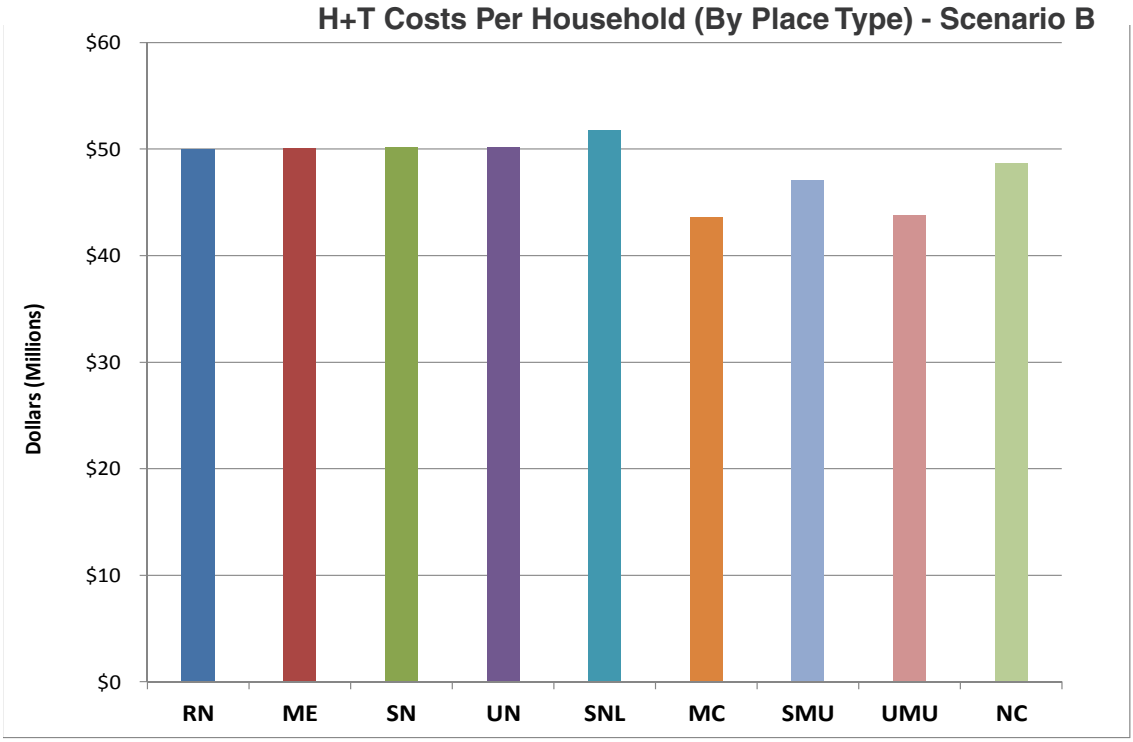
SMU - Suburban Mixed Use

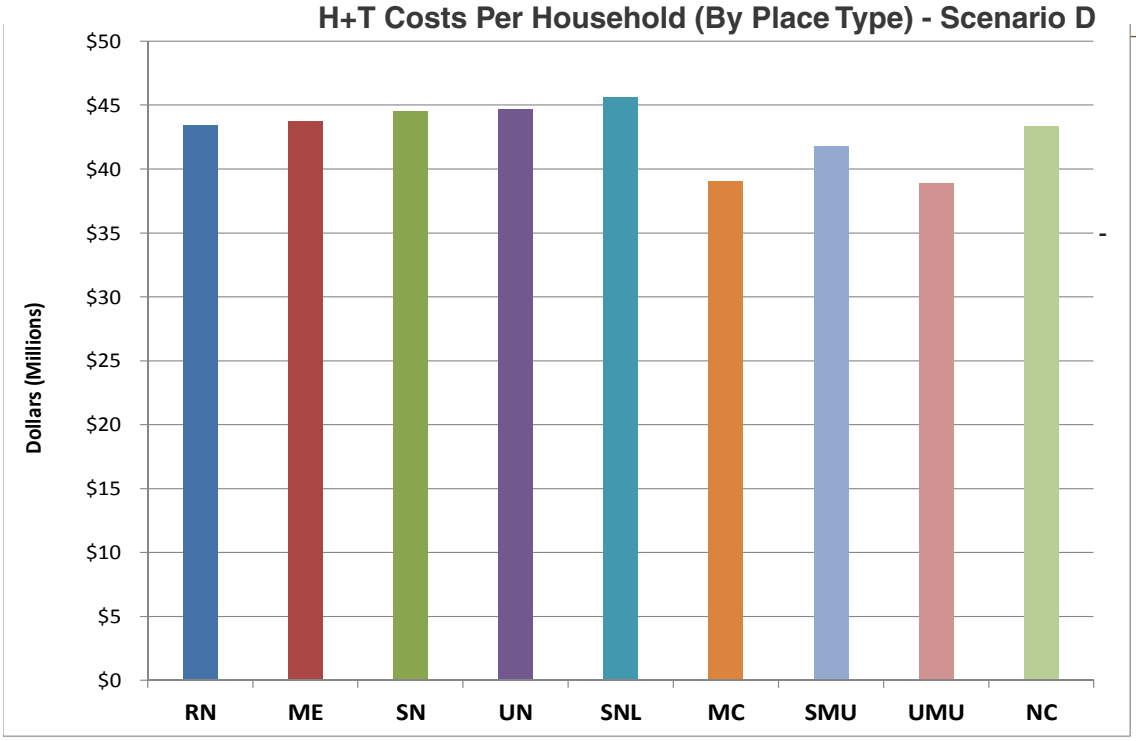
UMU - Urban Mixed Use

NC - Neighborhood Center

Note: Other Place Types were not included because they do not include residential uses

Notice that the Place Types that have mixed-uses and less single family homes are more affordable.





RN - Rural Neighborhood

ME - Mountain Estates

SN - Suburban Neighborhood

UN - Urban Neighborhood

SNL - Suburban Neighborhood Light

MC - Metro Core

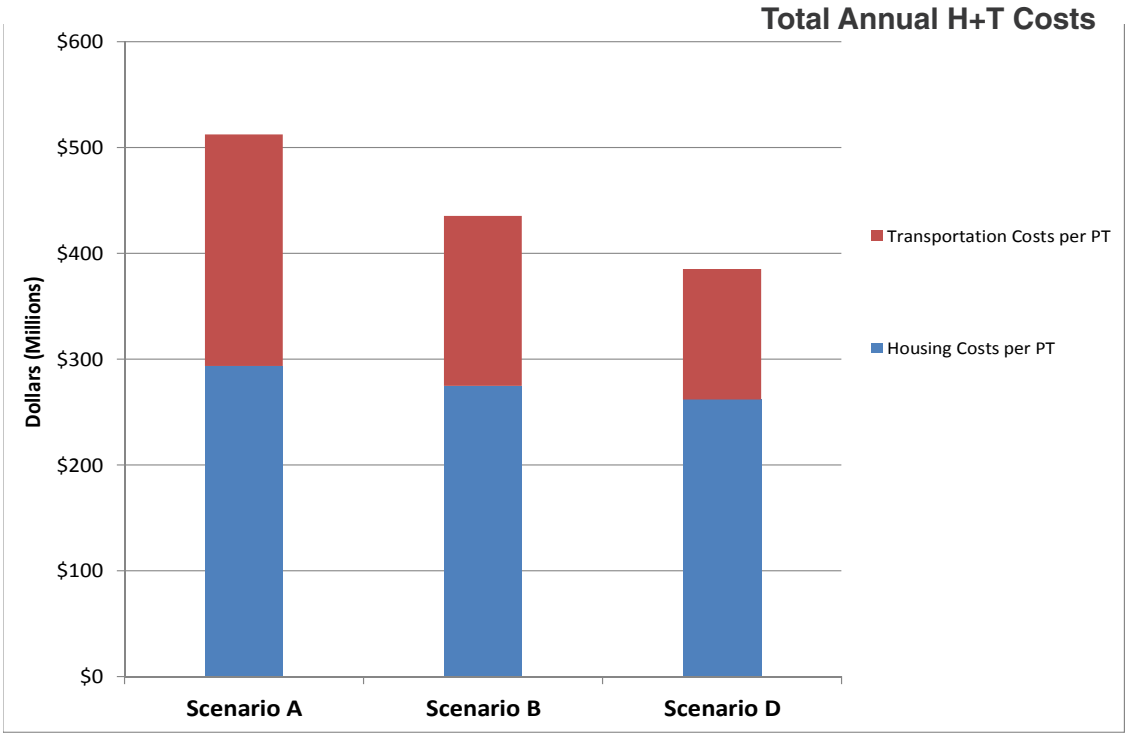
SMU - Suburban Mixed Use

UMU - Urban Mixed Use

NC - Neighborhood Center

Note: Other Place Types were not included because they do not include residential uses

Notice that the Place Types that have mixed-uses and less single family homes are more affordable.



Revenues

The Arizona Rural Policy Institute (RPI) and Northern Arizona University (NAU) were commissioned to conduct a fiscal impact analysis. The revenues within this study included property tax for each Place Type. Sales tax revenues for each Place Type were obtained from the City.

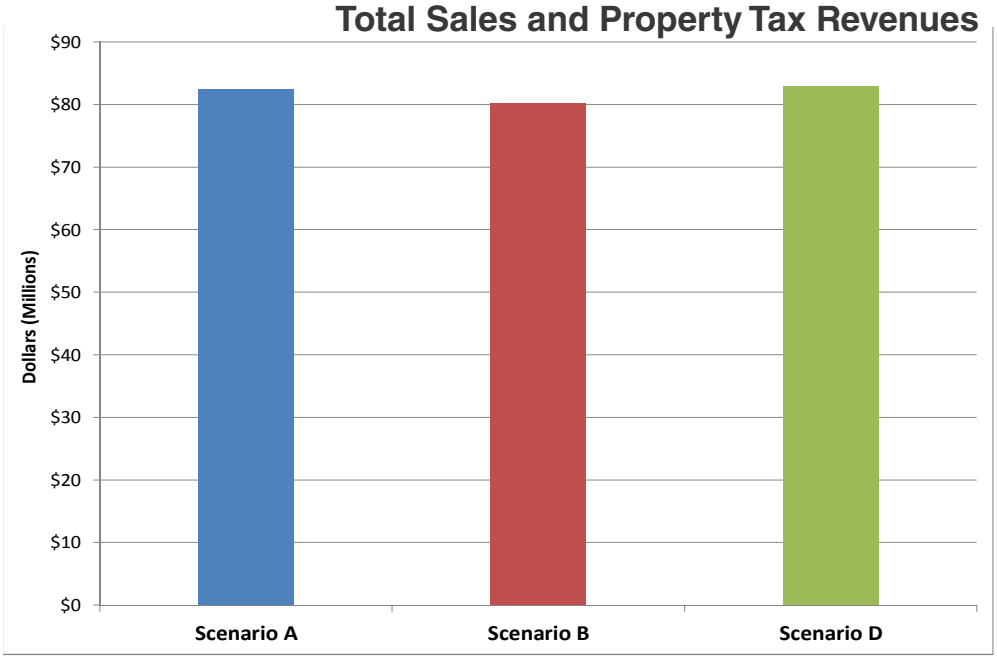
REVENUE METHODOLOGY

Property tax information for each Place Type was obtained from the RPI/NAU study and the future acreage for each Place Type. However, some Place Types were not included in the Tischler-Bise study. These Place Types include Metro Core, Suburban Mixed-Use, and Urban Mixed-Use. Therefore property tax revenues for each of these Place Types were derived based on similar Place Types with known property tax revenues. Sales tax revenues were created by the City based on existing sales tax data representative of each Place Type. Future acres per Place Type were applied to the sales and property taxes to derive future revenues. This indicator does not take into consideration existing development.

The formula used to calculate future Sales Tax and Property Tax Revenues is as follows:

Future Acres by Place Type * (Property Tax Revenues by Place Type + Sales Tax Revenues by Place Type)

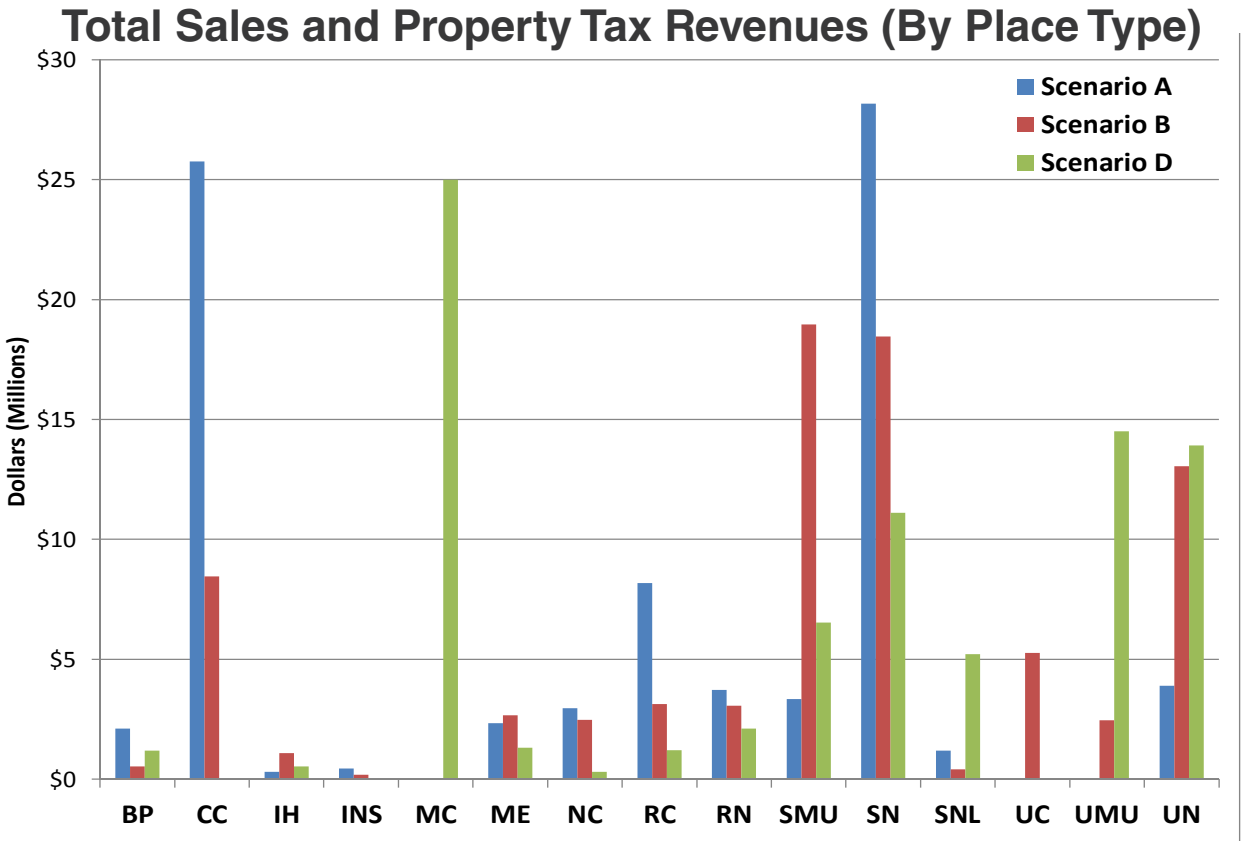
The results are displayed in the following charts.



Sales tax is associated with areas with non-residential uses, whereas property taxes are associated with all properties. For instance, revenues for the Commercial Corridor Place Type decreases because there is significantly less square footage of Commercial Corridor in Scenario B than in Scenario A. Similarly, in Scenario A, most of the housing units are single family, mostly in the Suburban Neighborhood Place Type. In Scenarios B and D, the housing stock shifts to apartments and townhomes, which are present in other Place Types. This results in a redistribution of the property taxes and decreases the taxes in the Suburban Neighborhood Place Type and increases them in others such as Urban Mixed Use and Urban Neighborhood. Also noticeable in the graph are the Metro Core Place Type and the Urban Center Place Type. The Metro Core Place Type is only present in Scenario D and the Urban Center Place Type is only present in Scenario B.

Source: Arizona Rural Policy Institute and Northern Arizona University, Demographic Estimates and Projections, Task Order 5 – Fiscal Impact, September 2011.
Note: Costs are in 2011 dollars

TOTAL SALES AND PROPERTY TAX REVENUES BY PLACE TYPE			
PLACE TYPE	SCENARIO A	SCENARIO B	SCENARIO D
BUSINESS PARK	$2,111,000	$527,000	$1,182,000
COMMERCIAL CORRIDOR	$25,760,000	$8,452,000	$0
INDUSTRIAL - HEAVY	$304,000	$1,093,000	$533,000
INSTITUTIONAL	$444,000	$188,000	$0
METRO CORE	$0	$0	$24,990,000
MOUNTAIN ESTATE	$2,340,000	$2,664,000	$1,314,000
NEIGHBORHOOD CENTER	$2,950,000	$2,478,000	$307,000
RURAL CENTER	$8,178,000	$3,134,000	$1,202,000
RURAL NEIGHBORHOOD	$3,728,000	$3,071,000	$2,113,000
SUBURBAN MIXED USE	$3,345,000	$18,960,000	$6,531,000
SUBURBAN NEIGHBORHOOD	$28,169,000	$18,460,000	$11,100,000
SUBURBAN NEIGHBORHOOD LIGHT	$1,187,000	$413,000	$5,214,000
URBAN CENTER	$0	$5,264,000	$0
URBAN MIXED USE	$0	$2,450,000	$14,500,000
URBAN NEIGHBORHOOD	$3,892,000	$13,050,000	$13,910,000
TOTAL REVENUES	**$82,408,000**	**$80,204,000**	**$82,896,000**



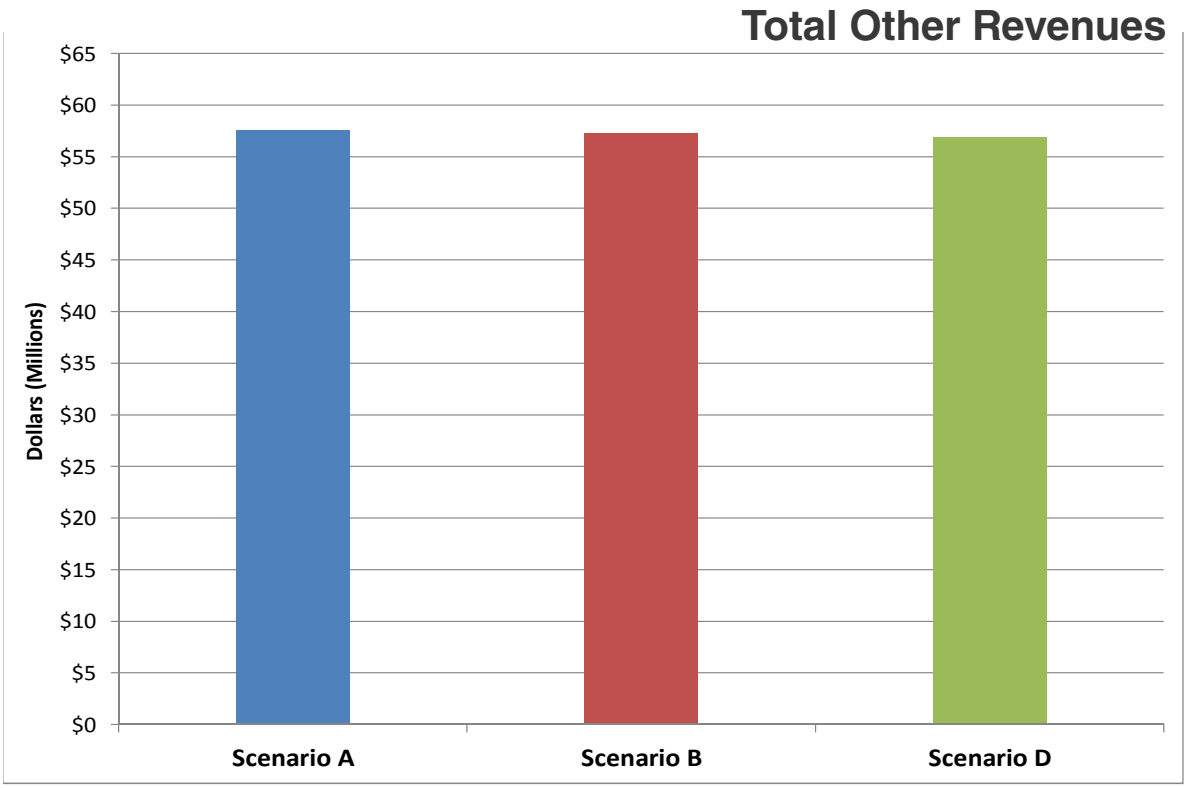
Other revenues were also evaluated for determining future revenues. These revenues include the following and were obtained from the RPI/NAU study and the City 2012-2013 Budget:

- Highway User Revenue Fund (HURF)
- Water and Wastewater Fund
- Environmental Services
- Airport
- Stormwater
- States sales tax & income tax sharing
- Franchise tax
- Fines and forfeitures
- Auto-in-lieu

The formula used to calculate the Other Revenues is as follows:

New Households * the cost for each of the above revenues as provided by the RPI/NAU study or the City 2012-2012 Budget

The results are displayed in the following chart.



Energy Use

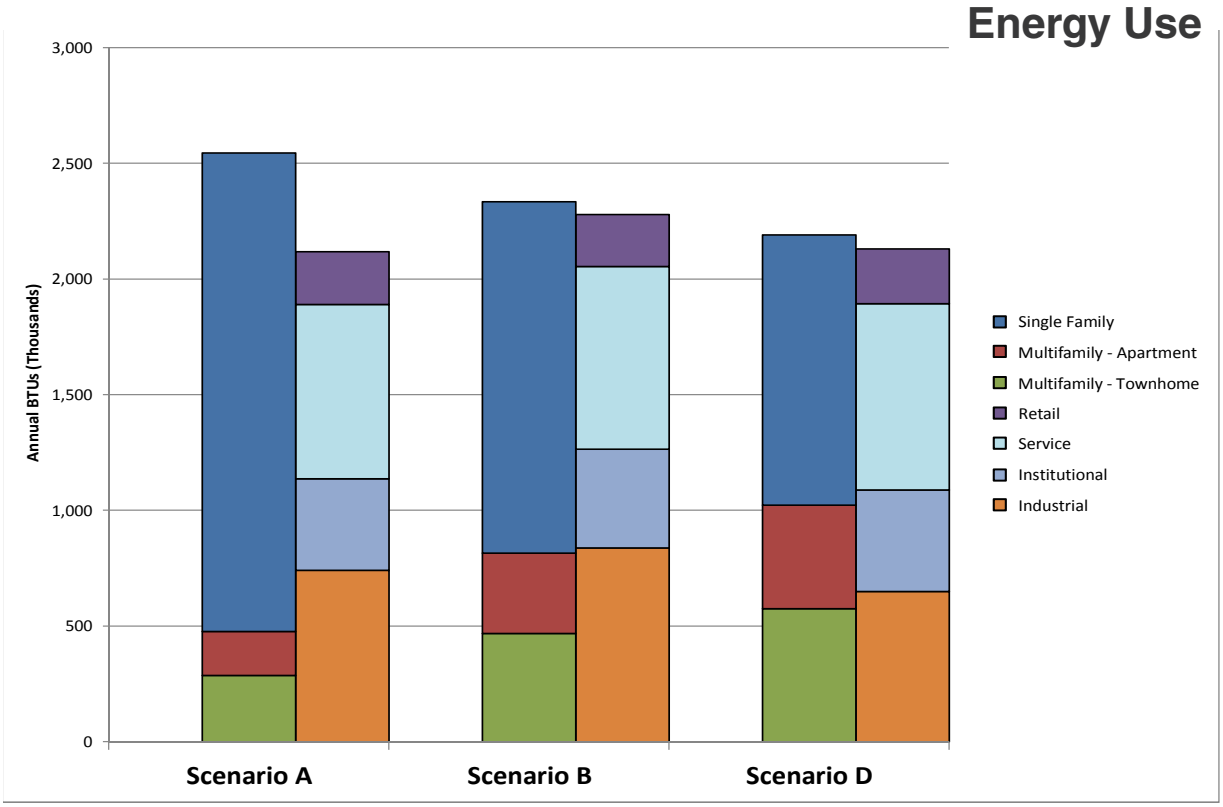
Energy use was determined for the different housing types and non-residential uses. This indicator is based on the number of future housing units and the housing mix (this does not include existing housing), and the number of jobs for each non-residential use (retail, service/office, industrial, and institutional). The following table summarizes the assumptions for Beta Thermal Units (BTUs).

	WATER USE RATES	MILLION BTU PER YEAR
RESIDENTIAL HOUSEHOLDS	Single Family	100
	Multifamily-Apartment	50
	Multifamily-Townhome	83
NON-RESIDENTIAL USES	Retail	255,985
	Service	849,170
	Institutional	444,972
	Industrial	834,683
Source: City of Flagstaff Community Greenhouse Gas Emissions Report 2010		

The following formulas were used to determine residential and non-residential Energy Use for each scenario:

Assumption for housing BTUs based on housing type (varies for each type of housing) * the number of homes in each housing type category (single family, apartment, townhome)

The following chart illustrates the results of the above calculation for energy use.



As the charts show, lifestyle choices have an impact on overall energy consumption. Multifamily housing uses less energy than single-family housing. Additionally, retail uses less energy than any of the other non-residential uses.

Conclusion

Overall the differences between the scenarios are fairly minimal except for a few notable indicators. Those indicators where differences were seen were the housing mix, mode share, some environmental impacts, and the related fiscal indicators. The driving factor behind the housing mix and mode share is the differences between the scenarios themselves, the type of development. The difference in what type of place type was used in each scenario directly impacted the differences seen between scenarios for housing mix and daily trips. Since the costs are based on the amount of trips or housing type, the costs reflect similar differences between scenarios. This is especially evident for transit costs. In regards to housing costs, it is evident that the further away from the core, the less affordable it becomes. This is due to the combined housing and transportation costs of living further from the urban core. A longer distance to the core means more people in a household are likely to drive, adding to a household's gas, vehicle maintenance costs. These are costs that are determined by where we live and therefore were considered as part of the costs in these scenarios.

It is also worth noting that the percent differences between environmental indicators, such as emissions and open space consumption are large, the difference in their actual values is quite minimal. In addition, parks will continue to be added in the Flagstaff region, whether as large regional parks, neighborhood parks, or small pocket parks and trails. The number of people within proximity to these parks will increase over time regardless of scenario.

On a more global scale there are other considerations that the community should consider as part of the decision-making process. Water availability is always a concern, especially in the southwest where it is a precious resource. As the indicators show, higher densities support the use of less water demand. Along a similar vein is energy consumption. Energy costs will likely increase over the years and the scenarios show that higher density development uses less energy and might cause some people to gravitate towards other forms of housing besides single family detached units. There are also social trends to consider. People are starting to consider apartments and townhomes as places of residence as opposed to single family homes. These population groups typically include retirees, students, and younger couples without children. Other factors that may not be a big factor on determining the future for the Flagstaff region, but is ultimately impacted, are environmental factors such as conservation of open space, air and water quality, threats to endangered or threatened species. These indicators may not vary greatly between scenarios, but they are an important factor to consider. The indicators attempt to get at the major issues surrounding development, which can help the community decide what the future can look like.

From a global perspective, uncertainties about the availability and cost of water, the cost of energy including fuel, climate change and risk of wildfire, and even some minor demographic trends might encourage the community to prefer a more "resilient and sustainable" future that is supported by a more dense development pattern. On the other hand, one might consider existing regulations, market preferences, and lending practices and see wisdom in continuing with present practice. Provided the results in this report, the public can make informed decisions about their preferences for deciding one type of community character over another.

The goal of this document is to serve as a resource for decision-makers, including citizens, to move toward establishing a future vision for growth in the Flagstaff Region. This study is just one of several analyses that are being used as qualitative assessments against the guiding principles and assumptions developed through the Flagstaff Regional Plan 2012. The next steps in the scenario planning process involve taking the information in this report and developing the preferred scenario, one that fits within the guiding principles of the Flagstaff Regional Plan.

The CAC will discuss each scenario and each of the indicators to determine the preferred scenario. It may be the case that optimal characteristics from certain scenarios will be combined to create a new, preferred scenario. Much work will need to be done at the local level to evaluate the preferred development scenario and support recommendations before they might become reality.

APPENDIX - ASSUMPTION TABLES

PLACE TYPES															
	RN	ME	SN	SNL	UN	BP	IH	INS	CC	UC	RC	NC	MC	SMU	UMU
	RURAL NEIGHBORHOOD	MOUNTAIN ESTATES	SUBURBAN NEIGHBORHOOD	SUBURBAN NEIGHBORHOOD LIGHT	URBAN NEIGHBORHOOD	BUSINESS PARK	HEAVY INDUSTRIAL	INSTITUTIONAL	COMMERCIAL CORRIDOR	URBAN CENTER	REGIONAL CENTER	NEIGHBORHOOD CENTER	METRO CORE	SUBURBAN MIXED-USE	URBAN MIXED-USE
Site Efficiency	99%	99%	95%	85%	95%	80%	90%	80%	75%	80%	80%	80%	90%	90%	90%
FAR	--	--	--	--	0.3	0.4	0.25	0.4	0.23	0.45	0.3	0.3	1.2	0.5	0.7
Density	0.25	1	7	3.5	18	--	--	--	--	13	10	10	15	12	22
% Residential	100%	100%	100%	100%	85%	--	--	--	--	--	--	25%	60%	30%	40%
% Non Residential	--	--	--	--	15%	100%	100%	100%	100%	100%	100%	75%	40%	70%	60%
% Office	--	--	--	--	25%	15%	10%	10%	30%	25%	--	--	30%	25%	25%
% Retail	--	--	--	--	25%	--	--	10%	50%	30%	75%	75%	45%	40%	40%
% Industrial	--	--	--	--	10%	70%	90%	--	--	5%	--	--	--	5%	--
% Service	--	--	--	--	30%	15%	--	10%	20%	20%	25%	25%	10%	15%	10%
% Institutional	--	--	--	--	10%	--	--	70%	0%	20%	--	--	15%	15%	25%
Building Height	2	1	2	1	3	4	3	3	3	5	4	3	5	2	5
% Single Family	1	1	0.8	0.8	0.1	--	--	--	--	--	--	--	--	0.2	--
% Townhome	--	--	0.1	0.1	0.4	--	--	--	--	--	--	0.4	0.4	0.3	0.4
% Apartment	--	--	0.1	0.1	0.5	--	--	--	--	--	--	0.6	0.6	0.5	0.6
Household Size	2.6 persons per household														
Number of Stories	2	1	2	1	3	4	3	3	3	5	4	3	5	2	5
Retail Employment Rate	1 Employee for Every 900 square feet of floor space														
Industrial Employment Rate	1 Employee for Every 370 square feet of floor space														
Service Employment Rate	1 Employee for Every 320 square feet of floor space														
Office Employment Rate	1 Employee for Every 320 square feet of floor space														
Institutional Employment Rate	1 Employee for Every 400 square feet of floor space														
Trip Generation	10 trips per household														
Vehicle Trip Share	96.5%	96.5%	81.0%	89.0%	63.0%	78.0%	79.0%	55.0%	75.0%	51.0%	59.0%	57.0%	35.0%	67.0%	43.0%
Transit Trip Share	0.0%	0.0%	2.0%	1.0%	12.0%	2.0%	1.0%	20.0%	11.0%	18.0%	15.0%	10.0%	23.0%	10.0%	18.0%
Bike Trip Share	0.5%	0.5%	7.0%	5.0%	10.0%	8.0%	8.0%	10.0%	6.0%	11.0%	12.0%	12.0%	12.0%	9.0%	14.0%
Walking Trip Share	3.0%	3.0%	10.0%	5.0%	15.0%	12.0%	12.0%	15.0%	8.0%	20.0%	14.0%	21.0%	30.0%	14.0%	25.0%
Average Vehicle Trips per Household	10	10	10	10	8					5	5	5	5	7	5
Average Trip Length	9.76 miles*														

APPENDIX - ASSUMPTION TABLES CONTINUED

PLACE TYPES															
	RN	ME	SN	SNL	UN	BP	IH	INS	CC	UC	RC	NC	MC	SMU	UMU
	RURAL NEIGHBORHOOD	MOUNTAIN ESTATES	SUBURBAN NEIGHBORHOOD	SUBURBAN NEIGHBORHOOD LIGHT	URBAN NEIGHBORHOOD	BUSINESS PARK	HEAVY INDUSTRIAL	INSTITUTIONAL	COMMERCIAL CORRIDOR	URBAN CENTER	REGIONAL CENTER	NEIGHBORHOOD CENTER	METRO CORE	SUBURBAN MIXED-USE	URBAN MIXED-USE
Average Passenger Car Fuel Efficiency	22.9 miles/gallon**														
Residential Water Use Rates (gallons/day/HH)^	218	218	218	218	174					161	174	174	161	174	161
Retail Water Use Rates (gallons/day/acre)^					874	874		874	874	874	874	874	874	874	874
Industrial Water Use Rates (gallons/day/acre)^					5,497	5,497	5,497							5,497	
Service/Office/Institutional Water Use Rates (gallons/day/acre)^					874	874	874	874	874	874	874	874	874	874	874
Cost per Linear Feet (LF) of Water Pipe	2,239,969														
Cost per LF of Waste Water Pipe	1,439,793														
Cost per LF of Reclaimed Water Pipe	67,199 (also assumes 3% of water lines)														
Cost per LF of Stormwater Pipe	28,796 (also assumes 2% of sewer lines)														
Cost per New LF of Feeder Line	$100														
Cost per New LF Trunk Line	$200														
New Water Production Cost (cost per gallon)	$25 per gallon														
New Wastewater Treatment (cost per gallon)	$13 per gallon														
O&M Water Cost (cost per gallon)	$0.46 per gallon														
O&M Waste Water Cost (cost per gallon)	$0.44 per gallon														
Cost per VMT	$1.46														
Cost per Transit Trip	$3.47														
Cost for Developing Protected Open Space	$10,000 and $2,000 per acre														
Size Factor (for H+T)	1.00	1.00	1.00	1.00	0.95	--	--	--	--	--	--	1.00	0.85	0.95	0.85
Distance Factor (for H+T)	0.85	0.90	1.00	1.00	1.10	--	--	--	--	--	--	1.00	1.10	1.00	1.05

* Average length of trip for vehicles associated with the dwelling units. Default value is from the US Bureau of Transportation Statistics (2006).
** Average fuel efficiency of cars used by residents. Default value is from the US Bureau of Transportation Statistics (2005).
^ Formulas for determining the water demand also took into consideration the percentage of each non-residential use per place type, which are also shown in this table.

APPENDIX - ASSUMPTION TABLES CONTINUED

PLACE TYPES															
	RN	ME	SN	SNL	UN	BP	IH	INS	CC	UC	RC	NC	MC	SMU	UMU
	RURAL NEIGHBORHOOD	MOUNTAIN ESTATES	SUBURBAN NEIGHBORHOOD	SUBURBAN NEIGHBORHOOD LIGHT	URBAN NEIGHBORHOOD	BUSINESS PARK	HEAVY INDUSTRIAL	INSTITUTIONAL	COMMERCIAL CORRIDOR	URBAN CENTER	REGIONAL CENTER	NEIGHBORHOOD CENTER	METRO CORE	SUBURBAN MIXED-USE	URBAN MIXED-USE
Average Owner Monthly Cost	$1,326														
Average Renter Monthly Cost	$949														
CNT Existing No. of Homes	$35,182														
Single Family Use	100 million BTUs														
Multifamily - Apartment Use	50 million BTUs														
Multifamily - Townhome Use	83 million BTUs														
Commercial Energy Use	2,550,126 million BTUs														
Industrial Energy Use	834,683 million BTUs														
% Retail Energy Use	18%														
% Service Energy Use	55%														
% Institutional Energy Use	27%														
% Industrial Energy Use	35%														

* Average length of trip for vehicles associated with the dwelling units. Default value is from the US Bureau of Transportation Statistics (2006).

** Average fuel efficiency of cars used by residents. Default value is from the US Bureau of Transportation Statistics

^ Formulas for determining the water demand also took into consideration the percentage of each non-residential use per Place Type, which are also shown in this table.

APPENDIX - ASSUMPTION TABLES CONTINUED

INDICATOR FORMULAS	
Population	New Households * Average Household Size assumption by Place Type
Average Residential Density	(Sum (Total Residential Area by Place Type * Density by Place Type)) / (Sum (Total Residential Area by Place Type))
Employment	((Non-Residential Square Feet * Percent Institutional assumption) / Institutional Employment Rate assumption) + ((Non-Residential Square Feet * Percent Industrial assumption) / Industrial Employment Rate assumption) + ((Non-Residential Square Feet * Percent Office assumption) / Office Employment Rate assumption) + ((Non-Residential Square Feet * Percent Retail assumption) / Retail Employment Rate assumption) + ((Non-Residential Square Feet * Percent Service assumption) / Service Employment Rate assumption)
Average Non-Residential Density	(Sum (Total Non-Residential Area by Place Type * FAR by Place Type)) / (Sum (Total Non-Residential Area by Place Type))
Land Use Profiles	Sum of Parcel Area by Place Type / 43560
Total Trips	New Households * Person Trip Generation assumption
Transit Trips	Total Trips * % Transit Trip Share assumption by Place Type
Bicycle Trips	Total Trips * % Bicycle Trip Share assumption by Place Type
Walk Trips	Total Trips * % Walk Trip Share assumption by Place Type
Vehicle Trips	Total Trips * % Vehicle Trip Share assumption by Place Type
VMT	New Households * Average Vehicle assumption * Average Vehicle Trip Length assumption
Fuel Consumption	VMT * Passenger Car Fuel Efficiency * 365
New Households (HHs)	((Parcel Area * Site Efficiency assumption by Place Type * % Residential assumption by Place Type) / 43,560) * Density assumption by Place Type
Single Family HHs	New Households * % Single Family assumption by Place Type
Multifamily - Apartment HHs	New Households * % Apartment assumption by Place Type
Multifamily - Townhome HHs	New Households * % Townhome assumption by Place Type
Retail Square Feet	Build Area * FAR assumption * % Non-Residential assumption * % Retail by Place Type
Industrial Square Feet	Build Area * FAR assumption * % Non-Residential assumption * % Industrial by Place Type
Service Square Feet	Build Area * FAR assumption * % Non-Residential assumption * % Service by Place Type
Office Square Feet	Build Area * FAR assumption * % Non-Residential assumption * % Office by Place Type
Institutional Square Feet	Build Area * FAR assumption * % Non-Residential assumption * % Institutional by Place Type
Water Demand	Sum (New Households * Daily Water Use by Place Type) + (Retail Square Feet * Retail Daily Water Use assumption by Place Type / 43,560) + (Industrial Square Feet * Industrial Daily Water Use assumption by Place Type / 43,560) + ((Service Square Feet + Office Square Feet + Institutional Square Feet) * Service Daily Water Use assumption by Place Type / 43,560)
Building Footprint	((Parcel Area * Site Efficiency assumption by Place Type * FAR assumption by Place Type) / Number of Stories assumption by Place Type) / 43560
Annual NOx Emissions	VMT * 1.5 * 365 * 0.0022046226 / 2000
Annual VOC Emissions	VMT * 1.8 * 365 * 0.0022046226 / 2000
Annual CO2 Emissions	VMT * 0.8 * 365 / 2000

APPENDIX - ASSUMPTION TABLES CONTINUED

INDICATOR FORMULAS	
Consumed AZGFD Conservation Priority Areas	Summed Acres of AZGFD that were marked for development
Consumed Wildlife Corridor	Summed Acres of Wildlife Corridor that were marked for development
Proximity to Passive Parks (1/4 mile)	Summed Population within a ¼ mile of passive parks or the FUTS
Proximity to Active Parks (1/2 mile	Summed Population within a ½ mile of active parks
Developed Unprotected Open Space	Summed Acres where Unprotected Open Space that were marked for development

NOTE: Parcel Area is the area of the parcel in GIS, in square feet. It is created in GIS when the parcel shapefile was created.

SUMMARY OF INDICATOR OUTPUTS (PHASES 2 AND 3)								
Indicator	Units	Existing	Scenario A	Scenario B	Scenario D	Percent Difference Comparison		
DEVELOPMENT YIELDS						A>B	A>D	B>D
Population		76,800	72,500	72,200	71,600	-0.4%	-1.2%	-0.8%
New Households		29,600	27,900	27,700	27,500	-0.7%	-1.4%	-0.7%
Single Family		23,300	20,600	15,100	11,600	-26.7%	-43.7%	-23.2%
Multifamily - Apartment		3,300	3,800	6,900	8,900	81.6%	134.2%	29.0%
Multifamily - Townhome		3,000	3,500	5,700	7,000	62.9%	100.0%	22.8%
Total Acres Identified for Growth	acres		16,000	14,200	13,500	-11.3%	-15.6%	-4.9%
Average Residential Density			3.50	4.50	5.50	28.6%	57.1%	22.2%
Average Non-residential Density			0.30	0.35	0.54	16.7%	80.0%	54.3%
Total Area		19,410	10,280	8,620	6,790	-16.1%	-33.9%	-21.2%
RN Area		10,100	3,500	2,800	2,000	-65.3%	-72.3%	-20.0%
ME Area		4,700	1,400	1,600	800	-70.2%	-66.0%	14.3%
SN Area		1,500	3,300	2,200	1,300	120.0%	46.7%	-33.3%
UN Area		180	230	610	700			
SNL Area		0	200	80	1,000			
BP Area		100	300	60	100			
IH Area		700	90	300	100			
INS Area		1,100	200	90	0			
CC Area		800	700	200	0			
UC Area		0	0	90	0			
RC Area		200	200	70	30			
NC Area		30	80	70	10			

APPENDIX - ASSUMPTION TABLES CONTINUED

SUMMARY OF INDICATOR OUTPUTS (PHASES 2 AND 3)								
Indicator	Units	Existing	Scenario A	Scenario B	Scenario D	Percent Difference Comparison		
DEVELOPMENT YIELDS						A>B	A>D	B>D
UMU Area		0	0	50	300			
SMU Area		0	80	400	150			
MC Area		0	0	0	300			
Total Residential Area	acres	16,460	8,640	7,340	6,050	-15.0%	-30.0%	-17.6%
RN_Residential Area		10,100	3,500	2,800	2,000			
ME_Residential Area		4,700	1,400	1,600	800			
SN_Residential Area		1,500	3,300	2,200	1,300			
UN_Residential Area		150	200	520	600			
SNL_Residential Area			200	80	1,000			
MC_Residential Area			0	0	200			
RA_Residential Area			0	0	0			
SMU_Residential Area			20	100	50			
UMU_Residential Area			0	20	100			
NC_Residential Area		10	20	20	0			
Total Non-Residential Area	acres	2,950	1,640	1,280	740	-22.0%	-54.9%	-42.2%
UN_Non-Residential Area		30	30	90	100			
BP_Non-Residential Area		100	300	60	100			
IH_Non-Residential Area		700	90	300	100			
INS_Non-Residential Area		1,100	200	90	0			
CC_Non-Residential Area		800	700	200	0			
UC_Non-Residential Area		0	0	90	0			
MC_Non-Residential Area		0	0	0	100			
RC_Non-Residential Area		200	200	70	30			
NC_Non-Residential Area		20	60	50	10			
RA_Non-Residential Area			0	0	0			
SMU_Non-Residential Area			60	300	100			
UMU_Non-Residential Area			0	30	200			
Total Employment	Number of jobs	77,100	38,700	41,100	39,600	6.2%	2.3%	-3.6%

APPENDIX - ASSUMPTION TABLES CONTINUED

SUMMARY OF INDICATOR OUTPUTS (PHASES 2 AND 3)								
Indicator	Units	Existing	Scenario A	Scenario B	Scenario D	Percent Difference Comparison		
DEVELOPMENT YIELDS						A>B	A>D	B>D
Retail Employment		7,100	6,200	6,100	6,400			
Industrial Employment		18,500	9,000	10,200	7,900			
Office Employment		13,400	9,200	10,900	11,900			
Institutional Employment		26,700	5,400	5,900	6,000			
Service Employment		11,400	8,900	8,000	7,400			
TRANSPORTATION/MOBILITY						A>B	A>D	B>D
Total Trips	number of trips	598,000	279,000	278,000	275,000			
Vehicle Trips		526,000	224,000	208,000	190,000	-0.4%	-1.4%	-1.1%
Transit Trips		1,700	8,100	15,800	23,400	-7.1%	-15.2%	-8.7%
Bike Trips		10,900	18,900	21,200	23,500	95.1%	188.9%	48.1%
Walk Trips		59,400	27,600	31,800	38,200	12.2%	24.3%	10.8%
VMT	miles	2,831,000	2,655,000	2,467,000	2,262,000	15.2%	38.4%	20.1%
Annual Fuel Consumption	miles/gallon	45,121,000	42,323,000	39,319,000	36,062,000	-7.1%	-14.8%	-8.3%
WATER USE						A>B	A>D	B>D
Total Water Demand	gals per day	7,686,000	6,641,000	6,317,000	5,957,000	-4.9%	-10.3%	-5.7%
Residential Water Demand	gals per HH per day	6,320,000	5,950,000	5,570,000	5,300,000			
Retail Water Demand	gals per acre per day	128,000	111,000	111,000	116,000			
Industrial Water Demand	gals per acre per day	865,000	420,000	467,000	368,000			
Service/Office/ Institutional Water Demand	gals per acre per day	373,000	160,000	169,000	173,000			
ENVIRONMENT						A>B	A>D	B>D
Building Footprint	acres	1,200	700	700	600	0.0%	-14.3%	-14.3%
Annual NOx Emissions	grams/gallon	1,700	1,600	1,500	1,400	-6.3%	-12.5%	-6.7%
Annual VOC Emissions	grams/gallon	2,100	1,900	1,800	1,600	-5.3%	-15.8%	-11.1%
Annual CO_2 Emissions	lbs/gallon	413,000	388,000	360,000	330,000	-7.2%	-14.9%	-8.3%
Total acres Wildlife corridors	acres		219,000					
Consumed Wildlife Corridor Land	acres impacted by development		4,800	3,600	3,100	-25.0%	-35.4%	-13.9%
Total acres AZGFD levels 1 & 2	acres		10,300					
Low Conservation Area	acres impacted by development		1,500	1,200	1,200	-20.0%	-20.0%	0.0%

APPENDIX - ASSUMPTION TABLES CONTINUED

SUMMARY OF INDICATOR OUTPUTS (PHASES 2 AND 3)								
Indicator	Units	Existing	Scenario A	Scenario B	Scenario D	Percent Difference Comparison		
ENVIRONMENT						A>B	A>D	B>D
Total acres AZGFD levels 3 & 4	acres		46,000					
Middle Conservation Area	acres impacted by development		4,500	4,100	3,300	-8.9%	-26.7%	-19.5%
Total acres AZGFD levels 5 & 6	acres		275,000					
High Conservation Area	acres impacted by development		4,200	3,400	2,200	-19.0%	-47.6%	-35.3%
Total acres AZGFD Land	acres		342,000					
Population within 1/4 mile of Passive Parks	population		65,900	66,000	69,000	0.2%	4.7%	4.5%
Population within 1/2 mile of Active Parks	population		24,200	33,100	39,000	36.8%	61.2%	17.8%
Total acres existing Unprotected Open Space	acres		26,600					
Consumed Unprotected Open Space (OS)	acres		2,300	2,000	1,000	-13.0%	-56.5%	-50.0%
Total Protected OS Acres Consumed^			600	300	100	-50.0%	-83.3%	-66.7%
Total Acres Where Unprotected OS Changed to Protected OS			5,800	5,500	6,700	-5.2%	15.5%	21.8%
Acres coded G1*			1,014	783	1,893			
Acres coded as O1*			578	578	578			
Acres coded as O2*			4,190	4,160	4,190			
Consumed Unprotected Open Space	acres		2,300	2,000	1,000			
FISCAL						A>B	A>D	B>D
Capital Costs	Dollars		$5,120,820,000	$5,221,210,000	$5,258,950,000	2.0%	2.7%	0.7%
Leisure Expenditures			$178,530,000	$177,600,000	$176,230,000	-0.5%	-1.3%	-0.8%
Public Safety Expenditures			$1,163,000,000	$1,220,000,000	$1,193,000,000	4.9%	2.6%	-2.2%
General Government Expenditures			$59,850,000	$60,950,000	$59,870,000	1.8%	0.0%	-1.8%
Utilities			$810,250,000	$754,190,000	$737,950,000	-6.9%	-8.9%	-2.2%
Transportation			$2,480,000,000	$2,255,000,000	$2,100,000,000	-9.1%	-15.3%	-6.9%
Transit			$429,190,000	$753,470,000	$991,900,000	75.6%	131.1%	31.6%
O&M Costs	Dollars		$97,302,000	$103,345,000	$107,377,000	6.2%	10.4%	3.9%
Leisure Expenditures			$11,990,000	$11,920,000	$11,830,000	-0.6%	-1.3%	-0.8%
Public Safety Expenditures			$25,090,000	$24,960,000	$24,770,000	-0.5%	-1.3%	-0.8%
General Government Expenditures			$41,970,000	$41,840,000	$41,660,000	-0.3%	-0.7%	-0.4%

APPENDIX - ASSUMPTION TABLES CONTINUED

SUMMARY OF INDICATOR OUTPUTS (PHASES 2 AND 3)								
Indicator	Units	Existing	Scenario A	Scenario B	Scenario D	Percent Difference Comparison		
FISCAL						A>B	A>D	B>D
Utilities (Water and Wastewater)			$5,245,000	$4,988,000	$4,708,000	-4.9%	-10.2%	-5.6%
Transportation			$3,872,000	$3,597,000	$3,299,000	-7.1%	-14.8%	-8.3%
Transit			$9,135,000	$16,040,000	$21,110,000	75.6%	131.1%	31.6%
Cost of Developing Protected Open Space			$11,296,000	$8,986,000	$20,086,000	-20.4%	77.8%	123.5%
Cost for Acres coded G1			$10,140,000	$7,830,000	$18,930,000			
Cost for Acres coded as O1			$1,156,000	$1,156,000	$1,156,000			
Cost for Acres coded as O2			-	-	-			
Total Combined Costs	Dollars		$5,218,122,000	$5,324,555,000	$5,366,327,000	1.5%	1.9%	0.3%
Total Revenues per Place Type	Dollars		$82,408,000	$80,204,000	$82,896,000	-2.7%	0.6%	3.4%
BP			$2,111,000	$527,000	$1,182,000			
CC			$25,760,000	$8,452,000	$0			
IH			$304,000	$1,093,000	$533,000			
INS			$444,000	$188,000	$0			
MC			$0	$0	$24,990,000			
ME			$2,340,000	$2,664,000	$1,314,000			
NC			$2,950,000	$2,478,000	$307,000			
RC			$8,178,000	$3,134,000	$1,202,000			
RN			$3,728,000	$3,071,000	$2,113,000			
SMU			$3,345,000	$18,960,000	$6,531,000			
SN			$28,169,000	$18,460,000	$11,100,000			
SNL			$1,187,000	$413,000	$5,214,000			
UC			$0	$5,264,000	$0			
UMU			$0	$2,450,000	$14,500,000			
UN			$3,892,000	$13,050,000	$13,910,000			
Other Revenues	Dollars		$57,585,000	$57,281,000	$56,846,000	-0.5%	-1.3%	-0.8%
HURF			$10,920,000	$10,860,000	$10,780,000			
Water & Wastewater Fund			$17,690,000	$17,600,000	$17,470,000			
Environmental Services			$9,863,000	$9,811,000	$9,736,000			
Airport			$1,383,000	$1,375,000	$1,365,000			
Stormwater			$1,191,000	$1,185,000	$1,176,000			

APPENDIX - ASSUMPTION TABLES CONTINUED

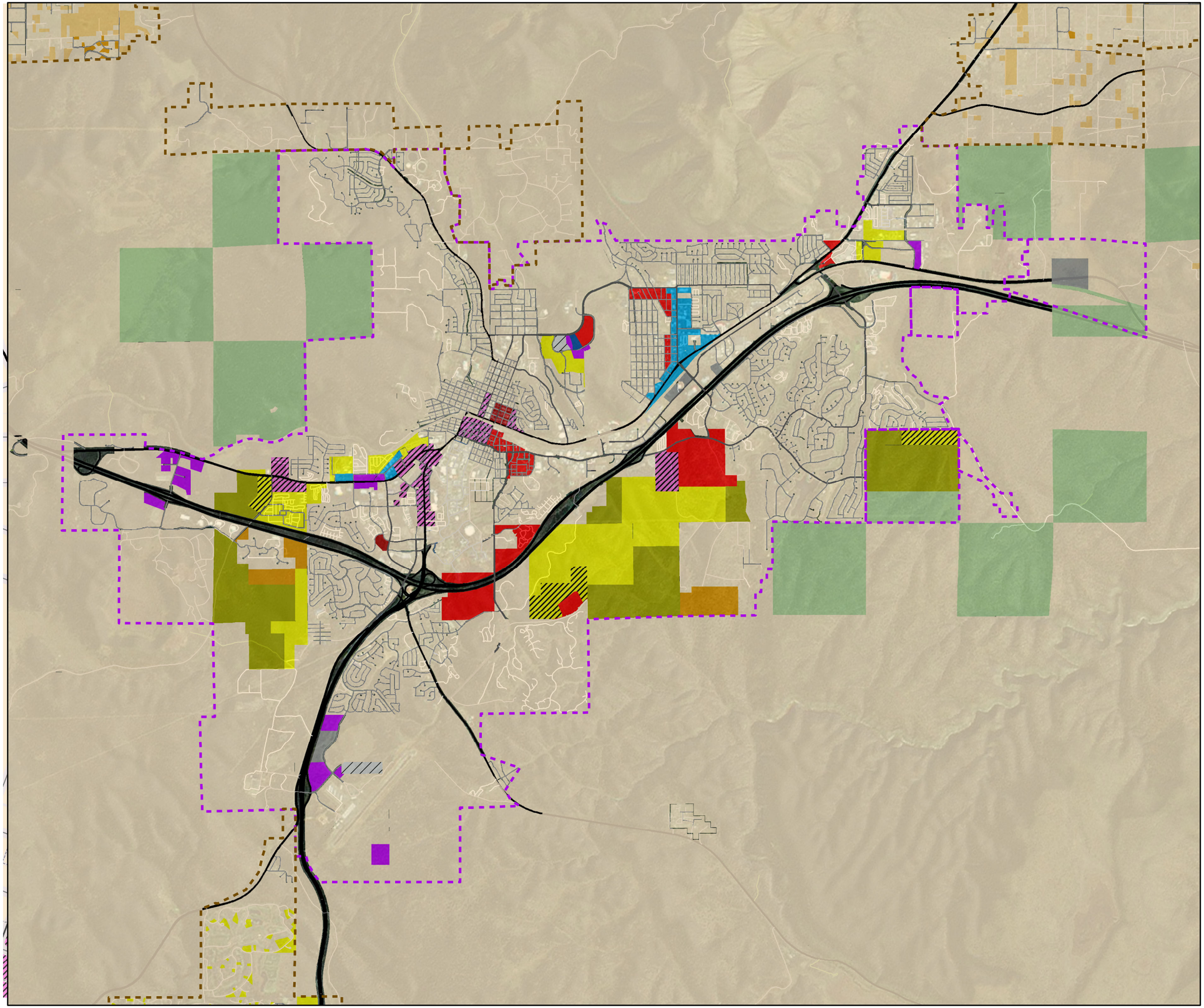
SUMMARY OF INDICATOR OUTPUTS (PHASES 2 AND 3)								
Indicator	Units	Existing	Scenario A	Scenario B	Scenario D	Percent Difference Comparison		
FISCAL						A>B	A>D	B>D
State Sales Tax & Income Tax Sharing			$11,180,000	$11,120,000	$11,030,000			
Franchise Tax			$1,924,000	$1,914,000	$1,899,000			
Fines & Forfeituers			$1,187,000	$1,181,000	$1,172,000			
Auto-in-lleu			$2,247,000	$2,235,000	$2,218,000			
Total Combined Revenues	Dollars		$139,993,000	$137,485,000	$139,742,000	-1.8%	-0.2%	1.6%
Housing Costs per PT	Dollars		$293,600,000	$274,690,000	$261,680,000			
RN			$29,110,000	$27,240,000	$25,950,000			
ME			$30,820,000	$28,840,000	$27,470,000			
SN			$34,250,000	$32,040,000	$30,520,000			
UN			$35,790,000	$33,490,000	$31,900,000			
SNL			$34,250,000	$32,040,000	$30,520,000			
MC			$32,020,000	$29,960,000	$28,540,000			
SMU			$32,540,000	$30,440,000	$29,000,000			
UMU			$30,570,000	$28,600,000	$27,240,000			
NC			$34,250,000	$32,040,000	$30,540,000			
Transpo Costs per PT	Dollars		$218,580,000	$160,670,000	$123,460,000			
RN			$30,930,000	$22,710,000	$17,470,000			
ME			$28,870,000	$21,200,000	$16,310,000			
SN			$24,750,000	$18,170,000	$13,980,000			
UN			$22,680,000	$16,650,000	$12,810,000			
SNL			$26,810,000	$19,860,000	$15,140,000			
MC			$18,560,000	$13,630,000	$10,480,000			
SMU			$22,680,000	$16,660,000	$12,810,000			
UMU			$20,620,000	$15,140,000	$11,650,000			
NC			$22,680,000	$16,650,000	$12,810,000			
Total Housing Affordability	Dollars		$512,180,000	$435,360,000	$385,140,000	-0.5%	-1.3%	-0.8%
RN			$60,040,000	$49,950,000	$43,420,000			
ME			$59,690,000	$50,040,000	$43,780,000			
SN			$59,000,000	$50,210,000	$44,500,000			
UN			$58,470,000	$50,140,000	$44,710,000			
SNL			$61,060,000	$51,900,000	$45,660,000			

APPENDIX - ASSUMPTION TABLES CONTINUED

SUMMARY OF INDICATOR OUTPUTS (PHASES 2 AND 3)								
Indicator	Units	Existing	Scenario A	Scenario B	Scenario D	Percent Difference Comparison		
FISCAL						A>B	A>D	B>D
MC			$50,580,000	$43,590,000	$39,020,000			
SMU			$55,220,000	$47,100,000	$41,810,000			
UMU			$51,190,000	$43,740,000	$38,890,000			
NC			$56,930,000	$48,690,000	$43,350,000			
Energy Use	BTUs		4,662,000	4,611,000	4,320,000	-1.1%	-7.3%	-6.3%
Housing Energy Use			2,545,000	2,333,000	2,191,000			
Single Family			2,068,000	1,518,000	1,168,000			
Multifamily - Apartment			191,000	348,000	448,000			
Multifamily - Townhome			286,000	467,000	575,000			
Non-Residential Energy Use			2,117,000	2,278,000	2,129,000			
Retail			227,000	225,000	236,000			
Service			754,000	788,000	805,000			
Industrial			741,000	838,000	649,000			
Institutional			395,000	427,000	439,000			

Appendix A2 – Preferred "Scenario E" Land Use Map

SCENARIO E



Legend

Rural Growth Boundary
Urban Growth Boundary

FS_REVISED1

Unchanged Parcels

PT_BAU

BP
IH
INS
MC
ME
NC
OPS_P
RC
RN
SMU
SN
SNL
UMU
UN

Road_Centerlines

Display Class

Interstate
Ramp
Primary/Major Hwy
Secondary/Minor Hwy
Primary Road
Local Road
Alley
Private Drive
Forest Service
NAU

N
W
E
S

0 0.1 0.2 0.3
Miles

Indicator Name	Scenario A	Scenario B	Scenario D	Scenario E	Scenario E Change from Scenario D
Total Population	**72,533**	**72,154**	**71,598**	**72,079**	**482**
HH	27,897	27,752	27,538	27,723	**185**
RN Population	2,223	1,831	1,260	1,260	**-**
ME Population	3,634	4,139	2,041	2,041	**0**
SN Population	56,870	37,265	22,416	25,073	**2,657**
UN Population	6,903	23,137	24,666	21,793	**(2,873)**
BP Population	-	-	-	-	**-**
IH Population	-	-	-	-	**-**
INS Population	-	-	-	-	**-**
CC Population	-	-	-	-	**-**
UC Population	-	-	-	-	**-**
RC Population	-	-	-	-	**-**
NC Population	426	358	44	44	**(0)**
SMU Population	677	3,836	1,322	1,884	**562**
UMU Population	-	962	5,693	5,693	**0**
MC Population	-	-	6,256	3,594	**(2,662)**
SNL Population	1,799	626	7,900	10,697	**2,796**
Total Employment	**38,717**	**41,130**	**39,689**	**41,891**	**2,201**
Retail Employment	6,166	6,120	6,407	5,663	**(744)**
Industrial Employment	9,002	10,188	7,888	10,843	**2,955**
Office Employment	9,190	10,885	11,939	11,474	**(465)**
Institutional Employment	5,447	5,894	6,053	6,691	**638**
Service Employment	8,912	8,043	7,403	7,220	**(183)**
RN Jobs	-	-	-	-	**-**
ME Jobs	-	-	-	-	**-**
SN Jobs	-	-	-	-	**-**
UN Jobs	856	2,869	3,059	2,703	**(356)**
BP Jobs	10,086	2,516	5,647	8,167	**2,520**
IH Jobs	2,276	8,087	3,941	5,279	**1,337**
INS Jobs	7,030	2,976	-	1,736	**1,736**
CC Jobs	11,859	3,891	-	-	**-**
UC Jobs	-	3,274	-	-	**-**
RC Jobs	3,142	1,204	462	462	**(0)**
NC Jobs	1,037	871	108	108	**(0)**
SMU Jobs	2,431	13,776	4,746	6,766	**2,020**
UMU Jobs	-	1,664	9,848	9,848	**0**
MC Jobs	-	-	11,879	6,824	**(5,055)**
SNL Jobs	-	-	-	-	**-**
Developed Area	15,989	14,249	13,464	13,149	**(315)**
Building Footprint	699	690	648	619	**(29)**
Single Family	20,623	15,140	11,648	13,259	**1,611**
Multifamily - Apartment	3,813	6,949	7,488	7,253	**(234)**
Multifamily - Townhome	3,462	5,663	5,996	5,829	**(167)**
RN_Residential Area	3,455	2,846	1,959	1,959	**-**
ME_Residential Area	1,412	1,608	793	793	**0**
SN_Residential Area	3,289	2,155	1,296	1,450	**154**
UN_Residential Area	155	520	555	490	**(65)**
NC_Residential Area	20	17	2	2	**(0)**
RA_Residential Area	-	-	-	-	**-**
SMU_Residential Area	24	137	47	67	**20**
UMU_Residential Area	-	19	111	111	**0**
SNL_Residential Area	10,132,677	3,528,056	44,490,899	60,238,730	**15,747,831**
UN_Non-Residential Area	27	92	98	87	**(11)**
BP_Non-Residential Area	256	64	143	207	**64**
IH_Non-Residential Area	85	301	147	196	**50**
INS_Non-Residential Area	203	86	-	50	**50**
CC_Non-Residential Area	745	244	-	-	**-**
UC_Non-Residential Area	-	88	-	-	**-**
RC_Non-Residential Area	186	71	27	27	**(0)**
NC_Non-Residential Area	61	52	6	6	**(0)**
RA_Non-Residential Area	-	-	-	-	**-**
SMU_Non-Residential Area	56	319	110	157	**47**
UMU_Non-Residential Area	-	28	166	166	**0**
MC_Non-Residential Area	-	-	12,939,960	7,433,619	**(5,506,341)**
Daily Vehicle Trips	272,064	252,754	231,813	240,345	**8,532**
VMT	**2,655,340**	**2,466,875**	**2,262,498**	**2,345,772**	**83,274**
Bike Trips	1,834	6,686	12,171	10,299	**(1,872)**
Transit Trips	4,201	14,860	26,460	22,331	**(4,128)**
Walk Trips	876	3,216	4,932	4,252	**(680)**
Total Trips	278,974	277,516	275,376	277,228	**1,852**
Annual Fuel Consumption	42,323,111	39,319,189	36,061,646	37,388,939	**1,327,293**
Annual NOx Emissions	1,603	1,489	1,365	1,416	**50**
VOC Emissions	1,923	1,787	1,639	1,699	**60**
CO2 Emissions	387,680	360,164	330,325	342,483	**12,158**
					-
Retail Water Demand	15,660	65,936	137,854	112,318	**(25,537)**
Industrial Water Demand	94,173	334,619	163,082	218,407	**55,325**
Service Water Demand	57,219	51,643	47,530	46,357	**(1,173)**
Residential Water Demand	5,946,143	5,566,229	5,300,707	5,438,536	**137,829**

Indicator Name	Scenario A	Scenario B	Scenario D	Scenario E	Scenario E Change from Scenario D
Wildlife Corridors	4,797	3,623	3,135	3,135	-
AZGFD_1	1,487	1,234	1,237	1,237	-
AZGFD_2	4,495	4,112	3,335	3,333	**(2)**
AZGFD_3	4,226	3,381	2,207	2,207	-
Pop. in 0.25 mile Proximity to Passive Parks	65,897	65,951	69,020	69,502	**482**
Pop. in 0.5 mile Proximity to Active Parks	24,228	33,080	38,953	36,999	**(1,954)**
Acres of Consumed Unprotected Open Space	2,340	1,959	973	973	-
Total AZGFD	15,989	14,249	13,464	13,438	**(26)**
Leisure Expenditures	$ 163,753,178	$ 162,897,325	$ 161,641,449	$ 162,728,501	**$ 1,087,052**
Residential Public Safety Expenditures	$ 17,671,994	$ 17,579,632	$ 17,444,100	$ 17,561,413	**$ 117,313**
Non-Residential Public Safety Expenditures	$ 9,603,544	$ 11,027,232	$ 9,668,369	$ 11,704,441	**$ 2,036,072**
Residential Government Expenditures	$ 8,859,933	$ 8,813,627	$ 8,745,677	$ 8,804,493	**$ 58,815**
Non-Residential Government Expenditures	$ 9,604,515	$ 11,031,321	$ 9,676,918	$ 11,711,406	**$ 2,034,488**
Residential Public Works Expenditures	$ 30,163,666	$ 30,006,016	$ 29,774,681	$ 29,974,918	**$ 200,237**
Non-Residential Public Works Expenditures	$ 9,609,777	$ 11,053,479	$ 9,723,244	$ 11,749,151	**$ 2,025,907**
Retail Transportation Expenditure	$ 287	$ 1,207	$ 2,524	$ 2,056	**$ (467)**
Residential Transportation Expenditure	$ 392,225,245	$ 304,631,513	$ 260,599,543	$ 284,350,284	**$ 23,750,741**
Service Transportation Expenditure	$ 882	$ 1,245	$ 1,184	$ 1,133	**$ (51)**
Industrial Transportation Expenditure	$ 34	$ 122	$ 59	$ 79	**$ 20**
Property Taxes	**$ 36,538,571**	**$ 30,315,466**	**$ 29,872,165**	**$ 32,242,938**	**$ 2,370,773**

Appendix B – Evaluation of Transportation Packages

Table B1 – Scenario D Transportation Network Packages

Package Number	Package Name	Description
Existing Base	Summer 2010	This package represents the 2010 transportation network and demographic conditions.
Future Base	ECD-TPB-Base	This package will include the 2010 transportation network enhanced with committed projects (funded in the five-year TIP). Level of service for bicycles, pedestrians, and transit will reflect current conditions.
Base with Transit	ECD-Transit V1	This package will expand Future Base (Package 2) to include high level of service for bicycles/pedestrians; transit LOS will be consistent with proposed service scenarios in Regional Transit Plan Scenario 1 (high productivity transit).
1	Many Roads (Many)	This package will focus on developing new roads to improve connectivity while limiting expansion of the main arterials. The intent is to distribute travel demand across the network. This package may include bypass routes. Level of service for bicycles, pedestrians, and transit will reflect current conditions.
2	Many Roads Plus High LOS for Bike/Ped (Many-TransitV1)	This package will expand "Many Roads" to add high level of service for bicycles/pedestrians; transit LOS will be consistent with proposed service scenarios in Regional Transit Plan Scenario 1 (high productivity transit).
3	Many-TransitV2	This package will expand "Many Roads" to add lower level of service for bicycles, pedestrians; transit LOS will be consistent with proposed service scenarios in Regional Transit Plan Scenario 2 (geographic coverage).
3.1	Many-TransitU1	Many Roads plus varying levels of transit service *(description not provided to the Consultant – scenario was developed by FMPO)*
3.2	Many-TransitU2	Many Roads plus variation of transit service *(description not provided to the Consultant – scenario was developed by FMPO)*

Package Number	Package Name	Description
3.3	Many-TransitV1-EEh	Many Roads plus variation of transit service *(description not provided to the Consultant – scenario was developed by FMPO)*
3.4	Many-TransitV1-EEm	Many Roads plus variation of levels of transit service *(description not provided to the Consultant – scenario was developed by FMPO)*
4	Wide	This package will focus on widening improvements of the main arterials in the FMPO area such as Milton Road, Route 66, and US 180. Level of service for bicycles, pedestrians, and transit will reflect current conditions.
5	Wide-TransitV1	This package will expand Wider Roads to add high level of service for bicycles/pedestrians; transit LOS will be consistent with proposed service scenarios in the Regional Transit Plan Scenario 1 (high productivity transit).
6	Wide-TransitV2	*(description not provided to the Consultant – scenario was developed by FMPO)*

Flagstaff Transportation Scenarios

		1	2	3		4		5		6		7		8						9		10		11	
		Existing Base	Future Base	Base w Transit		Package 1		Package 2		Package 3		Package 3.1		Package 3.2		Package 3.3		Package 3.4		Package 4		Package 5		Package 6	
		(Summer 10)	(ECD-TPB-Base)	(ECD-TransitV1)	Reduction from Base	(Many)	Reduction from Base	(Many-TransitV1)	Reduction from Base	(Many-TransitV2)	Reduction from Base	(Many-TransitU1)	Reduction from Base	(Many-TransitU2)	Reduction from Base	(Many-TransitV1-EEh)	Increase from Base	(Many-TransitV1-EEm)	Reduction from Base	(Wide)	Reduction from Base	(Wide-TransitV1)	Reduction from Base	(Wide-TransitV2)	Reduction from Base
Region	Total Delay	6,130	89,771	63,754	29%	41,908	53%	27,863	69%	30,154	66%	27,424	69%	27,262	70%	123,104	37%	57,923	35%	32,741	64%	27,331	70%	29,799	67%
	per capita (min)	4.88	36.66	26.04		17.12		11.38		12.32		11.20		11.13		50.28		23.66		13.37		11.16		12	
	Total VHT	62,944	189,615	157,729	17%	134,730	29%	116,345	39%	120,524	36%	115,663	39%	115,384	39%	233,124	23%	155,344	18%	122,756	35%	114,552	40%	118,591	37%
	per capita (hrs)	0.83	1.29	1.07		0.92		0.79		0.82		0.79		0.79		1.59		1.06		0.84		0.78		0.81	
	Total VMT	2,223,654	3,797,633	3,599,237	5%	3,561,343	6%	3,401,332	10%	3,461,112	9%	3,393,594	11%	3,390,015	11%	4,532,657	19%	3,875,452	-2%	3,453,782	9%	3,361,207	11%	3,410,882	10%
	per capita (miles/day)	29	26	24		24		23		24		23		23		31		26		24		23		23	

Methodology:
Model Indicators were produced using TransCAD by joining the model NETWORK for each scenario with the ASSIGNMENT output file (AllDay-flow3D.bin). The Linc Calc function was used to produce the indicators at the regional level and also in each district.

Flagstaff Transportation Scenarios

	1	2		3	4	5					6	7	8
	Existing Base	**Future Base**	**Base w Transit**	**Package 1**	**Package 2**	**Package 3**	**Package 3.1**	**Package 3.2**	**Package 3.3**	**Package 3.4**	**Package 4**	**Package 5**	**Package 6**
	(Summer 10)	**(ECD-TPB-Base)**	**(ECD-TransitV1)**	**(Many)**	**(Many-TransitV1)**	**(Many-TransitV2)**	**(Many-TransitU1)**	**(Many-TransitU2)**	**(Many-TransitV1-EEh)**	**(Many-TransitV1-EEm)**	**(Wide)**	**(Wide-TransitV1)**	**(Wide-TransitV2)**
Transit Mode Share	0.6%	1.0%	2.5%	1.6%	2.5%	1.8%	2.7%	2.8%	2.4%	2.5%	1.6%	2.5%	1.8%
% of Population in High Transit Level-of-Service (LOS)	10.0%	12%	20%	17.0%	20%	22%	20%	20%	20%	20%	15%	20%	22%
% of Population in Medium Transit LOS	12.0%	12%	28%	17.0%	28%	10%	28%	28%	28%	28%	29%	28%	10%
% of Employment in High Transit LOS	20.0%	16%	27%	33.0%	27%	31%	27%	27%	27%	27%	28%	27%	31%
% of Employment in Medium Transit LOS	16%	21%	27%	18%	27%	11%	27%	27%	27%	27%	26%	27%	11%
O-D Flows ?													
Walk / Bicycle Mode Share	14.4%	13.4%	16.0%	15.6%	16.4%	15.8%	16.4%	16.4%	15.7%	16.1%	15.4%	16.1%	15.5%
% of Population in High Walk / Bike Level-of-Service (LOS)	6.0%	21%	28%	21%	28%	25%	28%	28%	28%	28%	25%	28%	25%
% of Population in Medium Walk / Bike LOS	19.0%	27%	31%	27%	31%	30%	31%	31%	31%	31%	23%	31%	30%
% of Employment in High Walk / Bike LOS	15.0%	30%	38%	30%	38%	38%	38%	38%	38%	38%	38%	38%	38%
% of Employment in Medium Walk / Bike LOS	10.0%	17%	12%	14%	12%	12%	12%	12%	12%	12%	9%	12%	12%
SUM TRANSIT LOS CALCS	290	402		453	530	502					453	530	502
SUM BIKE LOS CALCS	286	297		396	413	405					396	413	405
SUM WALK LOS CALCS	260	264		358	398	369					358	398	369

Methodology:
The Mode Share indicators were used from the model output file "summary3d.txt". The percent of population and employment indicators were generated using CommunityVIZ (CV). The base and future population and employment were used from SCENARIO D from the land use models that were developed during earlier phases of the Flagstaff Scenario Development Process. The Transit, Bike and Walk LOS were developed by the City of Flagstaff and for each transportation package a unique distribution of TAZs were coded. These files for each transportation package was title "3Dcalcs.bin". For each package we tagged the TAZ shapefile with the 3Dcalcs file to get the new multi-modal LOS distribution for each package. Using the CV model we then developed indicators to determine what the proportion of population and employment was in medium and high transit, bike and walk TAZs to develop the above indicators.

Flagstaff Transportation Scenarios

		1	2	3		4		5		6		7		8						9		10		11	
		Existing Base	Future Base	Base w Transit		Package 1		Package 2		Package 3		Package 3.1		Package 3.2		Package 3.3		Package 3.4		Package 4		Package 5		Package 6	
		(Summer 10)	(ECD-TPB-Base)	(ECD-TransitV1)	Reduction from Base	(Many)	Reduction from Base	(Many-TransitV1)	Reduction from Base	(Many-TransitV2)	Reduction from Base	(Many-TransitU1)	Reduction from Base	(Many-TransitU2)	Reduction from Base	(Many-TransitV1-EEh)	Reduction from Base	(Many-TransitV1-EEm)	Reduction from Base	(Wide)	Reduction from Base	(Wide-TransitV1)	Reduction from Base	(Wide-TransitV2)	Reduction from Base
Region	Total Congested Lane Miles	4.6	51.0	38.0	26%	27.6	46%	12.3	76%	14.6	71%	11.7	77%	11.7	77%	23.7	54%	13.7	73%	15.3	70%	10.9	79%	12.8	75%
		1,777.0	1,342.0	1,342.0	-	1,390.0	-	1,395.0	-	1,395.0	-	1,395.0	-	1,395.0	-	1,395.0	-	1,395.0	-	1,419.0	-	1,419.0	-	1,419.0	-
	Percent of Total	0%	3.8%	2.8%	26%	2.0%	48%	0.9%	77%	1.0%	73%	0.8%	78%	0.8%	78%	1.7%	55%	1.0%	74%	1.1%	72%	0.8%	80%	0.9%	76%
	Total Congested Vehicle Miles	30,126	476,205	345,225	28%	238,356	50%	105,401	78%	127,767	73%	101,647	79%	100,989	79%	230,878	52%	118,480	75%	128,729	73%	96,268	80%	110,460	77%
	Total Congested Vehicle Hours	55.4	1,341.4	881.6	34%	476.1	65%	190.3	86%	227.2	83%	183.5	86%	181.1	86%	1,979.9	-48%	213.7	84%	303.5	77%	210.8	84%	251.5	81%
	Average Travel Speed		20.0	22.8		26.4		29.2		28.7		29.3		29.4		19.4	-	24.9	-	28.1		29.3		28.8	

Methodology:

To determine congestion at the regional and district level a number of steps needed to occur. Firstly, we needed to add fields to the NETWORK file for each package to copy over results from the ASSIGNMENT output. These fields were: TOT_FLOW, TOT_CAPACITY, DISTRICT, AB_FLOW, BA_FLOW, AB_TIME, BA_TIME. After joining the ASSIGNMENT output and copying over the data we were able to proceed to the next step. We also added the fields DISTRICT, V_C, and VEHICLE_HRS. Then we exported the TransCAD file to shapefile to be able to use in CV.

In CV, we created three Dynamic Attributes: Lane Miles, Vehicle Miles and Vehicle Hours.

Formulas

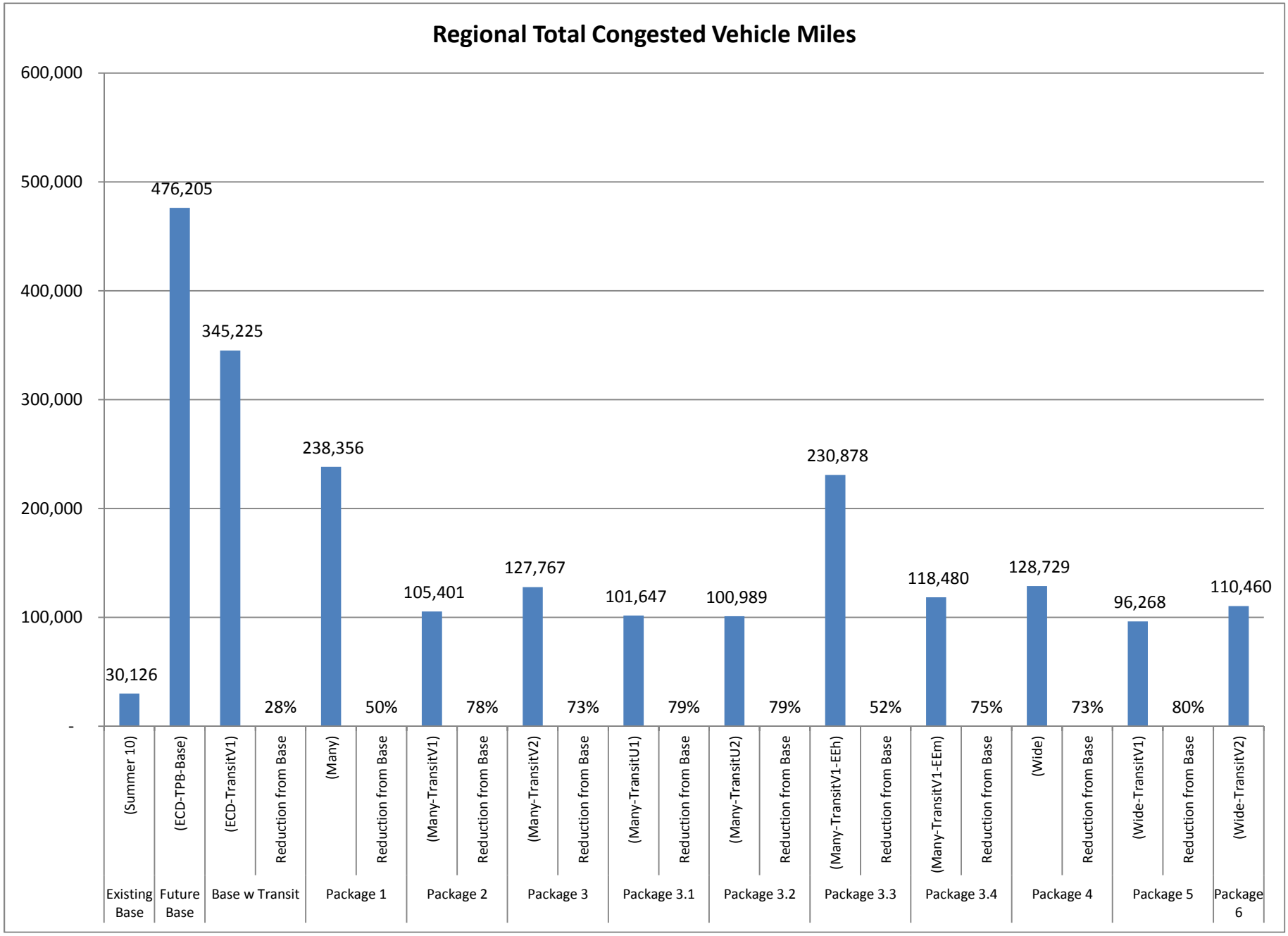
Lane Miles: Length * (AB_LANES+BA_LANES)

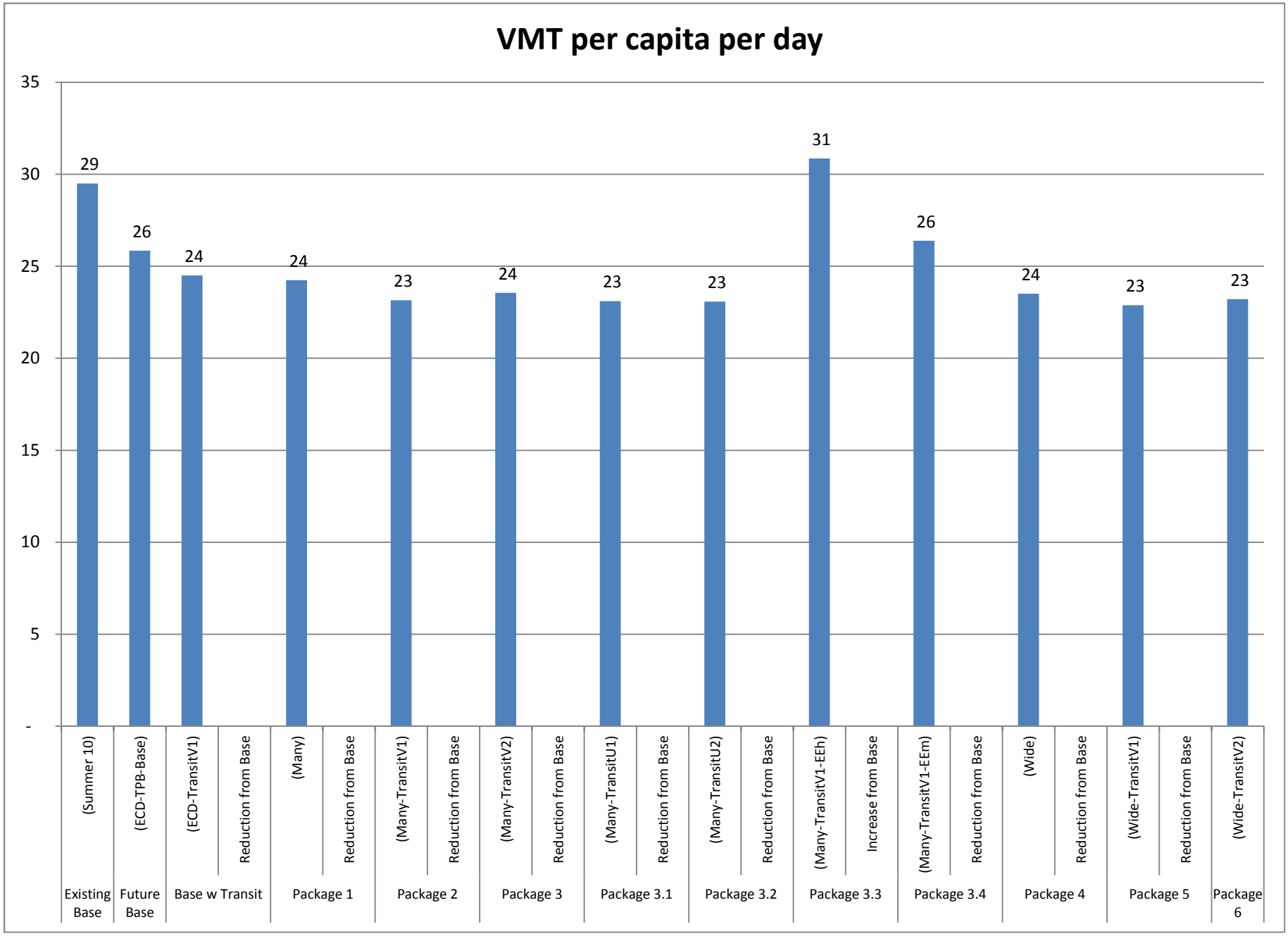
Vehicle Miles: Length * TOT_FLOW

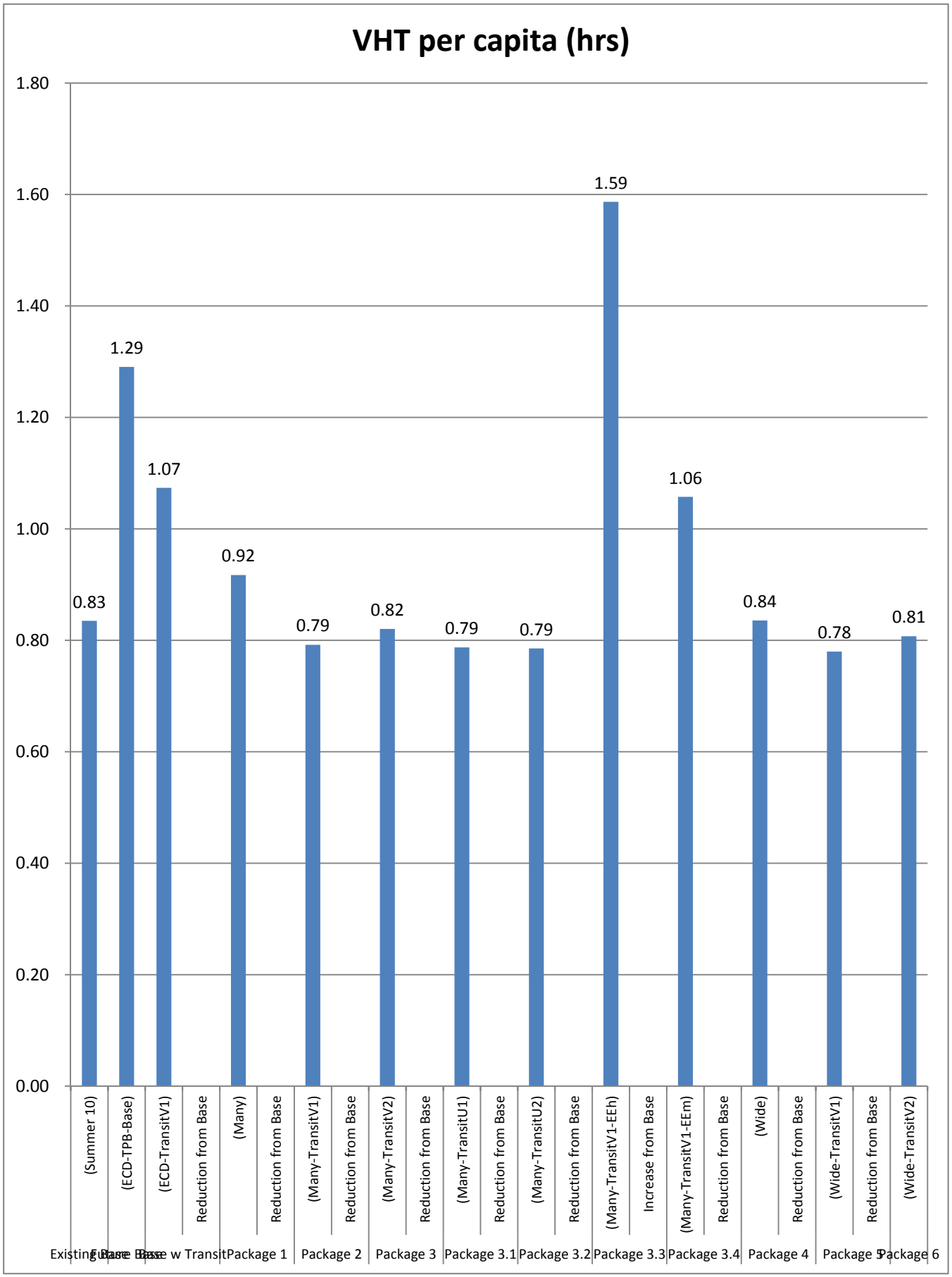
Vehicle Hours: ((AB_FLOW * AB_TIME) + (BA_FLOW * BA_TIME))/3600

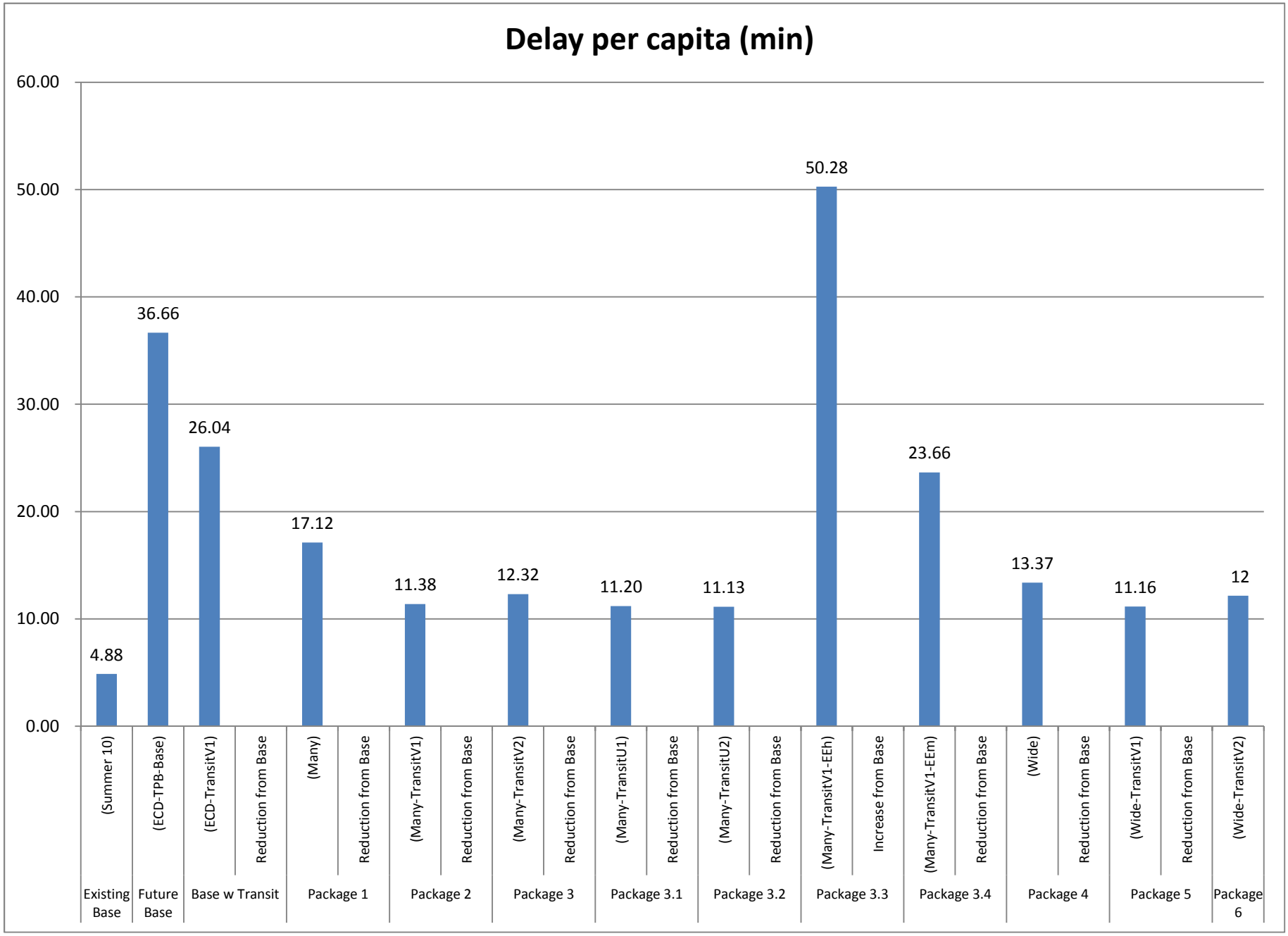
At the regional level an indicator was created to summarize these attributes. However, at the district level the GIS summarize function was used to summarize each of the attributes by District.

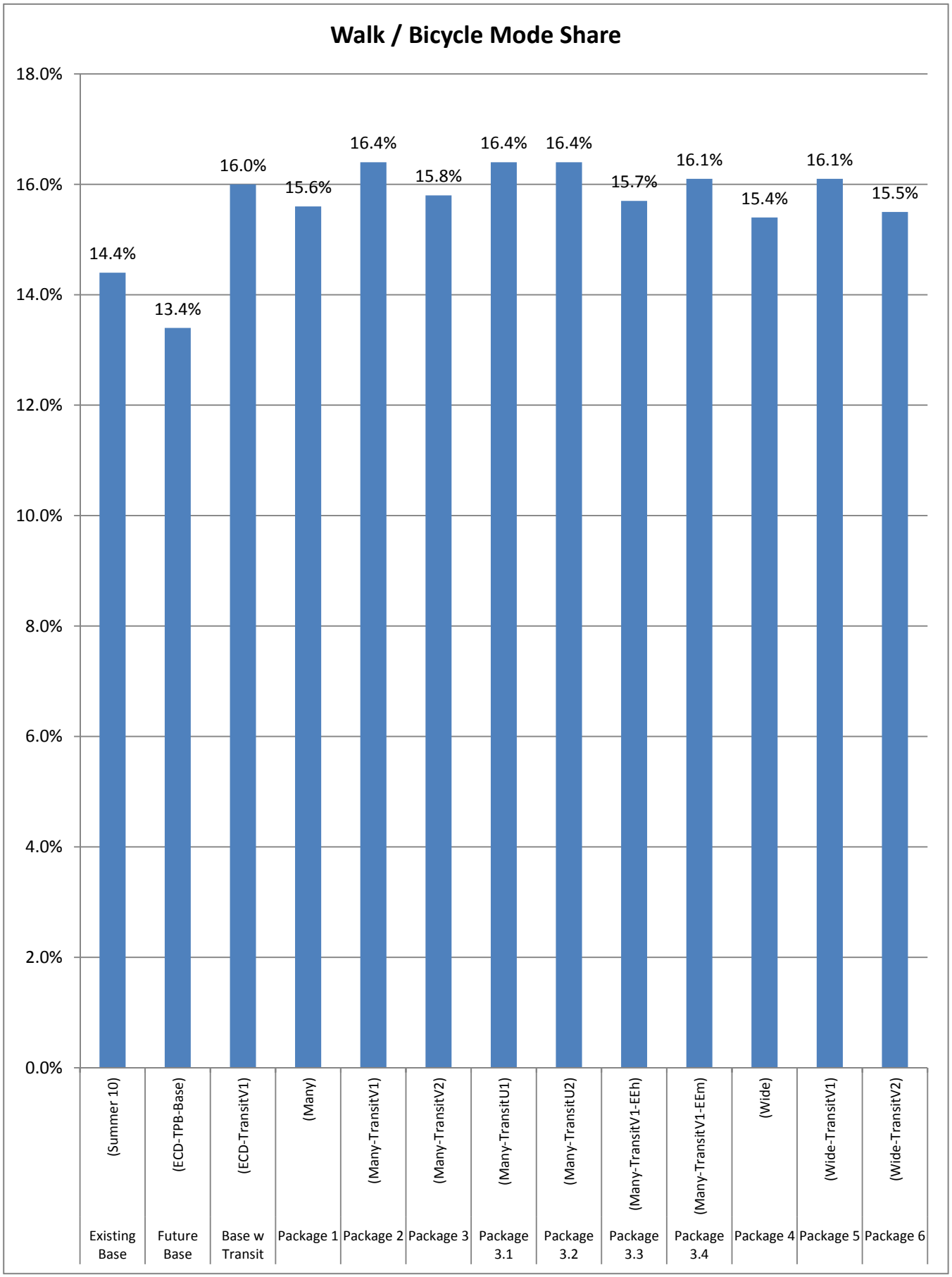
The numbers were summarized based on a V/C ratio being >= to 1.0

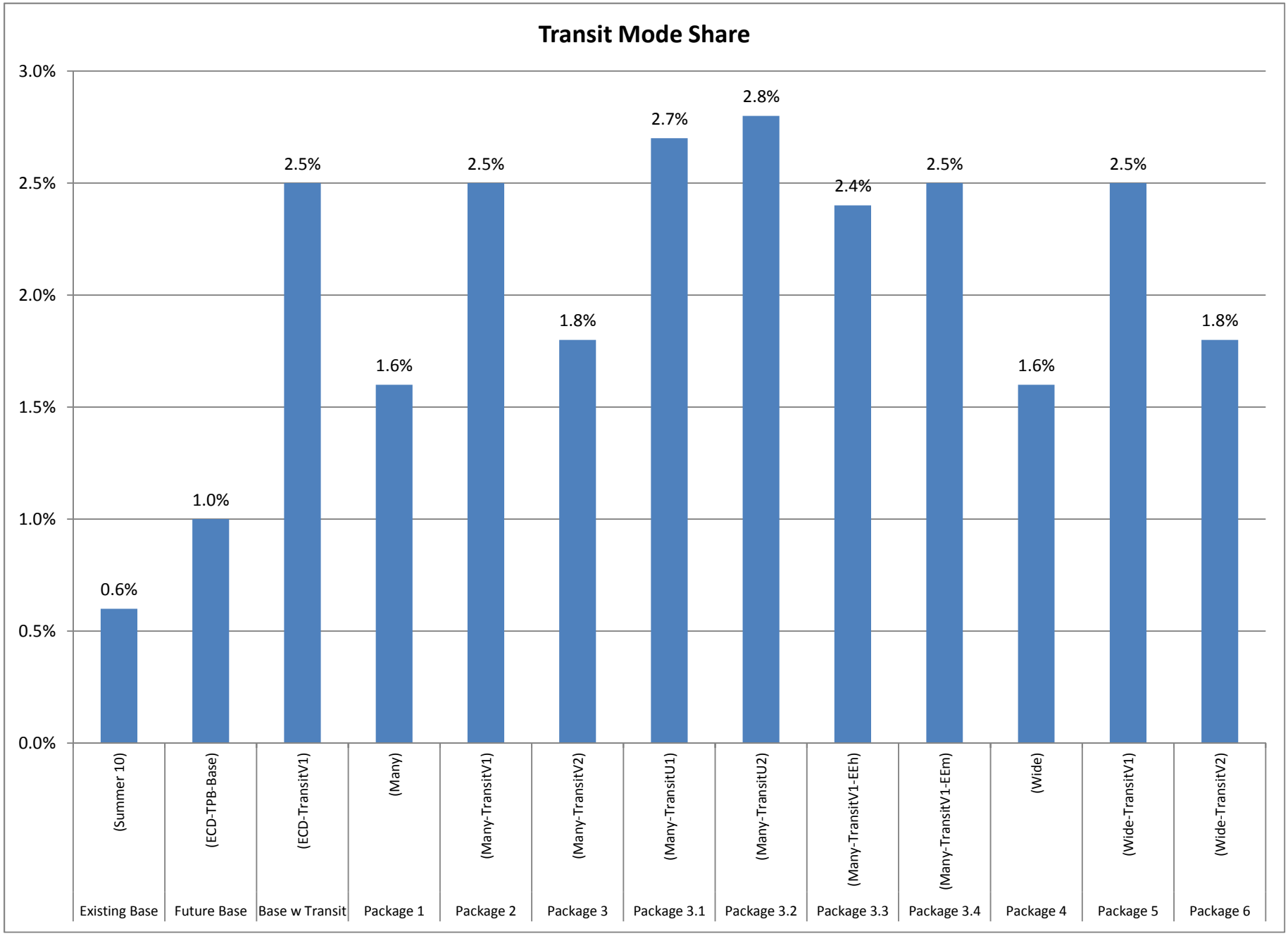

Regional Total Congested Vehicle Miles
600,000
500,000
400,000
300,000
200,000
100,000
-
30,126
476,205
345,225
28%
238,356
50%
105,401
78%
127,767
73%
101,647
79%
100,989
79%
230,878
52%
118,480
75%
128,729
73%
96,268
80%
110,460
(Summer 10)
(ECD-TPB-Base)
(ECD-TransitV1)
Reduction from Base
(Many)
Reduction from Base
(Many-TransitV1)
Reduction from Base
(Many-TransitV2)
Reduction from Base
(Many-TransitU1)
Reduction from Base
(Many-TransitU2)
Reduction from Base
(Many-TransitV1-EEh)
Reduction from Base
(Many-TransitV1-EEm)
Reduction from Base
(Wide)
Reduction from Base
(Wide-TransitV1)
Reduction from Base
(Wide-TransitV2)
Existing Base
Future Base
Base w Transit
Package 1
Package 2
Package 3
Package 3.1
Package 3.2
Package 3.3
Package 3.4
Package 4
Package 5
Package 6


VMT per capita per day
35
30
25
20
15
10
5
-
29
26
24
24
23
24
23
23
31
26
24
23
23
(Summer 10)
(ECD-TPB-Base)
(ECD-TransitV1)
Reduction from Base
(Many)
Reduction from Base
(Many-TransitV1)
Reduction from Base
(Many-TransitV2)
Reduction from Base
(Many-TransitU1)
Reduction from Base
(Many-TransitU2)
Reduction from Base
(Many-TransitV1-EEh)
Increase from Base
(Many-TransitV1-EEm)
Reduction from Base
(Wide)
Reduction from Base
(Wide-TransitV1)
Reduction from Base
(Wide-TransitV2)
Existing Base
Future Base
Base w Transit
Package 1
Package 2
Package 3
Package 3.1
Package 3.2
Package 3.3
Package 3.4
Package 4
Package 5
Package 6


VHT per capita (hrs)
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.83
1.29
1.07
0.92
0.79
0.82
0.79
0.79
1.59
1.06
0.84
0.78
0.81
(Summer 10)
(ECD-TPB-Base)
(ECD-TransitV1)
Reduction from Base
(Many)
Reduction from Base
(Many-TransitV1)
Reduction from Base
(Many-TransitV2)
Reduction from Base
(Many-TransitU1)
Reduction from Base
(Many-TransitU2)
Reduction from Base
(Many-TransitV1-EEh)
Increase from Base
(Many-TransitV1-EEm)
Reduction from Base
(Wide)
Reduction from Base
(Wide-TransitV1)
Reduction from Base
(Wide-TransitV2)
Existing Base
Future Base
Base w Transit
Package 1
Package 2
Package 3
Package 3.1
Package 3.2
Package 3.3
Package 3.4
Package 4
Package 5
Package 6


Delay per capita (min)
60.00
50.00
40.00
30.00
20.00
10.00
0.00
4.88
36.66
26.04
17.12
11.38
12.32
11.20
11.13
50.28
23.66
13.37
11.16
12
(Summer 10)
(ECD-TPB-Base)
(ECD-TransitV1)
Reduction from Base
(Many)
Reduction from Base
(Many-TransitV1)
Reduction from Base
(Many-TransitV2)
Reduction from Base
(Many-TransitU1)
Reduction from Base
(Many-TransitU2)
Reduction from Base
(Many-TransitV1-EEh)
Increase from Base
(Many-TransitV1-EEm)
Reduction from Base
(Wide)
Reduction from Base
(Wide-TransitV1)
Reduction from Base
(Wide-TransitV2)
Existing Base
Future Base
Base w Transit
Package 1
Package 2
Package 3
Package 3.1
Package 3.2
Package 3.3
Package 3.4
Package 4
Package 5
Package 6


Walk / Bicycle Mode Share
18.0%
16.0%
14.0%
12.0%
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
14.4%
13.4%
16.0%
15.6%
16.4%
15.8%
16.4%
16.4%
15.7%
16.1%
15.4%
16.1%
15.5%
(Summer 10)
(ECD-TPB-Base)
(ECD-TransitV1)
(Many)
(Many-TransitV1)
(Many-TransitV2)
(Many-TransitU1)
(Many-TransitU2)
(Many-TransitV1-EEh)
(Many-TransitV1-EEm)
(Wide)
(Wide-TransitV1)
(Wide-TransitV2)
Existing Base
Future Base
Base w Transit
Package 1
Package 2
Package 3
Package 3.1
Package 3.2
Package 3.3
Package 3.4
Package 4
Package 5
Package 6


Transit Mode Share
3.0%
2.5%
2.0%
1.5%
1.0%
0.5%
0.0%
0.6%
1.0%
2.5%
1.6%
2.5%
1.8%
2.7%
2.8%
2.4%
2.5%
1.6%
2.5%
1.8%
(Summer 10)
(ECD-TPB-Base)
(ECD-TransitV1)
(Many)
(Many-TransitV1)
(Many-TransitV2)
(Many-TransitU1)
(Many-TransitU2)
(Many-TransitV1-EEh)
(Many-TransitV1-EEm)
(Wide)
(Wide-TransitV1)
(Wide-TransitV2)
Existing Base
Future Base
Base w Transit
Package 1
Package 2
Package 3
Package 3.1
Package 3.2
Package 3.3
Package 3.4
Package 4
Package 5
Package 6

Appendix C – Evaluation of Draft Policies

FLAGSTAFF REGIONAL PLAN 2012

REVIEW OF DRAFT POLICIES

The Regional Plan 2012 is organized into three sections (listed below). Included in each section are the plan elements and draft policies, all of which is coordinated to support the Plan's vision. The draft policies are being developed based on public input and research. The purpose of this document is to evaluate each of the draft policies for consistency, clarity, satisfaction of mandated plan elements, and necessary topic areas.

The vision for the Regional Plan 2012 is as follows:

> *"The Greater Flagstaff community embraces the region's extraordinary cultural and ecological setting on the Colorado Plateau through active stewardship of the natural and built environments. Residents and visitors encourage and advance intellectual, environmental, social and economic vitality for today's citizens and future generations."*

Environmental Quality Section

1. Environmental Planning Element
2. Open Space Element
3. Water Resources Element
4. Energy Element

Community Character Section

1. Recreation Element
2. Community Character Element
3. Public Services and Facilities Element – *Draft Policies not available at the time of this review*
4. Public Buildings Element – *Draft Policies not available at the time of this review*
5. Safety Element – *Draft Policies not available at the time of this review*
6. Social Element – *Draft Policies not available at the time of this review*

Development/Transportation/Growth Section

1. Circulation Element
2. Housing Element
3. Land Use Element – *Draft Policies not available at the time of this review. However, the existing policies were reviewed to provide a preliminary critique for this Element.*
4. Growth Areas Element – *Draft Policies not available at the time of this review*
5. Cost of Development Element – *Draft Policies not available at the time of this review*
6. Economic Development Element – *Draft Policies not available at the time of this review*

REVIEW OF DRAFT POLICIES

The draft policies were evaluated against four criteria:

1) **Complies with State Statutes** – ensures that each policy is in accordance with state mandates. A copy of the current statutes are included at the end of this document
2) **Consistency within the Element** – identifies policies that are contradictory within the Element
3) **Consistent with other Elements** – examines consistency across all policies. This review will determine if policies are in their proper place, repetitive, contradict each other, etc. As noted above, many Elements were not available at the time of this review. Therefore, the evaluation for this criterion was conducted with only those Elements that were available.
4) **Wording** – looks at how the policy is worded, if it is clear, is a policy worded as a strategy, etc.

Legend

◯ = Meets the criteria and no changes are recommended
• = Meets the criteria, but changes could be made for further clarification
X = Doesn't meet the criteria

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
Environmental Planning Element				
<u>Goal: Climate</u> To integrate the best available science about climate change and its projected regional effects into development of adaptation strategies to promote sustainable use of energy, water, air, ecosystems, and wildlife for current and future generations. Contribute to state or national programs and policies aimed at reducing the region's carbon footprint.				
1. Develop <u>water use policies</u> which attempt to: integrate current best projections of climate change effects on the Colorado Plateau's water resources, emphasize conservation and water harvesting, and minimize the energy-intensive transport and pumping of water and encourage cooperation with our neighbors.	◯	◯	◯ Include a reference to the Water Resources Element	◯

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
Environmental Planning Element				
2. Encourage energy efficiency and conservation in the public, commercial and residential sectors through ordinances, codes, and other legally binding tools that lead to more efficient lighting, better insulation, and increased use of alternative energy for the generation of electrical power.	○	○	• Repetitive - Is this policy necessary since there is an Energy section?	○
3. Promote management strategies to increase the resiliency of our ecosystems to the effects of climate change, including thinning and other restoration techniques for our ponderosa pine forests to reduce their vulnerability to catastrophic wildfire and insect pest outbreaks while maintaining a natural diversity of plants and animals.	○	○	○ This could be moved to the Ecosystem Health goal with a reference to the climate section.	○
4. Promote transportation options such as increased use of public transit and bike facilities that will reduce congestion, fossil fuel consumption, and overall carbon emissions.	○	○	○ Reinforces linkage between environmental impacts and transportation, but could be duplicative of the Circulation Element	○
5. Maintain and restore important wildlife corridors throughout the planning area to allow wildlife to find suitable habitat in the face of climate change by moving along vegetational and elevational gradients.	○	• Move to Wildlife section with a reference to this Climate section	○	• Use of "vegetational"
6. Revisit relevant Policies and Strategies in this element when better knowledge of the likely effects of climate change on the region's resources becomes available.	○	○	○	• Make a strategy. Change to "…are developed."
General Comments for all policies under the Climate Goal Policies 2, 4 and 6 are along the same vein as the Air Quality policies. They could be combined or these could be moved so they follow or precede the Air Quality policies.				

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
Environmental Planning Element				
Goal: Ecosystem Health Protect, improve and maintain ecosystem health and plant and animal community diversity across all land ownership in the Flagstaff region.				
1. Encourage public awareness that the region's ponderosa pine forest is a fire-dependent ecosystem and strive to restore more natural and sustainable forest composition, structure, and processes.	○	○	○	○
2. All landowners and land management agencies are encouraged to emphasize coordinated forest ecosystem restoration and catastrophic fire risk reduction for the lands under their respective jurisdictions.	○	○ This seems similar to policy 6 under this goal. A single policy could be created.	○	○
3. The City of Flagstaff and Coconino County support the efforts of land management agencies to manage recreation, resource protection and community fire risk reduction.	○	○	○	● This is more of a statement than a policy
4. Community residents, property owners, and other agencies are encouraged to participate in forest planning, management, and restoration efforts as opportunities arise.	○	○ This seems similar to policies 5 and 7 under this goal. A single policy could be created.	○	● This could be reworded so it reads like a policy rather than a statement (i.e. "Encourage community residents..."
5. Residents, property owners, and government agencies are encouraged to pursue opportunities for interagency cooperation and community collaboration to accomplish natural resource goals that might not be accomplished individually.	○	○ This seems similar to policies 4 and 7 under this goal. A single policy could be created. This is the same policy as #7 under Environmentally Sensitive Lands	○	○

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
Environmental Planning Element				
6. Promote conservation and ecological restoration of the region's diverse ecosystem types and associated animals including grassland, pinyon-juniper, wetland, and ponderosa pine forests on both public and private lands in a landscape context.	○	• This seems similar to policy 2 under this goal. A single policy could be created. This is the same policy as #8 under Environmentally Sensitive Lands	○	○
7. Support and encourage collaborative multiple-stakeholder riparian restoration efforts along the Rio de Flag and other watercourses, including the return of native vegetation, channel structure and, where possible, preservation and restoration of in-stream flows.	○	• This seems similar to policies 4 and 5 under this goal. A single policy could be created.	○	○
8. Preserve Flagstaff's wetland and riparian areas and discourage inappropriate development that may adversely affect wildlife habitat, recreational opportunities, viewsheds, and ecosystems.	○	○	○	○
9. Ensure that future development does not further deplete the region's biodiversity by formulating conservation investment mechanisms that protect and enhance biodiversity.	○	○	○	• Flip the order of the sentence so it starts positive, "Formulate conservation investment mechanisms … to ensure that future …"
General Comments for all policies under the Ecosystem Health Goal There is a lot of overlap with the Environmentally Sensitive Lands goal, and the intents of both goals are similar. The policies could potentially be combined under one goal. Most of the focus appears on flora with little on fauna – should the title change since there is a Wildlife section.				

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
Environmental Planning Element				
Goal: Noxious and Invasive Weeds Control populations of invasive noxious weeds, eradicate where possible, and prevent new infestations.				
1. The City and County will cooperate with the SFPWMA to inventory, eradicate, and control invasive non-native weeds (including those required for compliance with State regulations); prevent establishment of new infestations through public awareness and education; and restore disturbed areas with native species.	○	○ Public awareness and involvement is covered under policy 6. Restoration is covered in polices 4, 5, and 6. Therefore, those parts could be removed from this policy.	○	• There are many objectives to this policy: cooperation with SFPWMA, public awareness, and restoration. Suggest concluding this policy at "…State regulations."
2. Weed management plans shall be required for new development projects where applicable to control existing populations and prevent new infestations.	○	○	○	○
3. The City and County will adopt weed control measures to be applied to road and utility infrastructure construction and maintenance projects, and will pursue aggressive weed-control strategies in public rights-of-way and other City and County-owned properties.	○	○	○	○
4. The City and County Parks and Recreation Departments will pursue opportunities with other agencies and volunteer groups to control the spread of non-native invasive plants and noxious weeds on public park lands and natural areas.	○	○	○	• This could be a strategy
5. Landscaping for new developments shall require the use of native plants and drought-tolerant species appropriate to the area or edible plants grown for food. Disturbed areas shall be restored and revegetated with native species to the greatest extent possible.	○	○	○	○
6. The City and County will support public education and eradication programs to help residents learn how to identify and control the spread of noxious weeds and invasive plants on private property.	○	○	○	○

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
Environmental Planning Element				
Goal: Wildlife Protect wildlife populations, localized and larger-scale wildlife habitats, ecosystem processes, and wildlife movement areas throughout the planning area.				
1. Encourage local development that protects, conserves, and when possible enhances and restores important wildlife habitat through proactive planning, creative design, and flexible zoning, e.g. by allowing higher-than-zoned housing density in one area of a parcel in exchange for maintenance of open space with high value for wildlife.	○	○	○	○ The example in this policy could be made a strategy
2. Use open space acquisition to conserve important wildlife habitat, and consider the effects of proposed recreational uses of open space on a variety of wildlife species. Explore the development of a conservation lands system as a means to achieve comprehensive open space conservation across the planning area.	○	○	○ Refer to the Open Space Element	• The second sentence of this policy could be a separate policy in the Open Space Element.
3. Protect sensitive and uncommon habitats such as ephemeral wetlands, riparian habitats, springs and seeps, rare plant communities, and open prairie ecosystems including the physical elements such as water sources and soil types on which they depend.	○	○	○	○
4. Protect populations of rare and sensitive animal species and their habitats, including threatened and endangered species and species of special conservation concern.	○	○	○	○
5. Identify, conserve and manage important wildlife movement corridors for a broad range of species through planning and open space conservation, and when possible integrate wildlife passage structures such as overpasses and culverts into roadway, bridge and culvert design.	○	○ Intent of this policy is similar to policy 2 under this goal. These could be combined.	○	○
6. Support the control and removal of exotic and invasive plants and animals, both terrestrial and aquatic, which can alter and degrade wildlife habitat, and develop targeted educational strategies to help	○	○	○ Reference the Noxious and Invasive Weeds goal	○

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
prevent their introduction.				
Environmental Planning Element				
7. Use a combination of proactive planning, public education, and enforcement of existing regulations to limit the negative impacts of domestic pets and the size of populations of "pest" wildlife species, and minimize human-wildlife conflicts by discouraging the feeding of wildlife.	○	○	○	○ The last statement, "by discouraging the feeding of wildlife" could be made a strategy
8. Encourage developers to avoid or minimize impacts to Gunnison's prairie dog colonies whenever possible and encourage the humane relocation of prairie dogs to suitable habitat when necessary. Promote public awareness of the positive "keystone" role of prairie dogs in grassland ecosystems and consider the development of a mitigation policy to obtain suitable habitat for prairie dog translocation with financial support from project developers.	○	○	○	• Potentially change to a strategy
9. Update maps of wildlife movement corridors and species and habitat distributions included in this plan on an ongoing basis as new research data become available from sources such as federal, state and local agencies, Northern Arizona University's GRAIL laboratory, and local biologists.	○	○	○	• Potentially change to a strategy
Goal: Environmentally Sensitive Lands Preserve and enhance the natural qualities of environmentally-sensitive lands.				
1. The City and County encourage the preservation and restoration of natural wetlands, floodplains, riparian areas, seeps and springs, distinctive landscape features, and other environmentally-sensitive lands.	○	○	○	• This could be reworded so it reads like a policy rather than a statement
2. Development projects shall be designed to minimize the alteration of natural landforms and maximize conservation of distinctive natural features.	○	○	○	○

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
3. Development proposals and other land management activities shall be assessed in a broad landscape context.	○	○	○	• Revise the wording for clarity (what is broad landscape context?)
Environmental Planning Element				
4. The City and County favor the use of all available mechanisms for the preservation of environmentally-sensitive lands, including but not limited to public acquisition, conservation easements, transfer of development rights, or cluster development with open space designations.	○	○	○	• This could be reworded so it reads like a policy rather than a statement
5. Development proposals affecting natural wetlands shall require a wetland delineation by the U.S. Army Corps of Engineers prior to the public review process in order to provide complete and essential information for decision makers.	○	○	○	○
6. Integrated conservation design practices, such as open space dedication, conservation subdivisions, and cluster development are encouraged for new developments in order to conserve sensitive and unique natural areas.	○	○	○	○
7. Encourage residents, property owners and government agencies to pursue opportunities for interagency cooperation and community collaboration to accomplish natural resource goals that might not be accomplished individually.	○	• This is the same policy as #5 under Ecosystem Health	○	○
8. Promote conservation and ecological restoration of the region's diverse ecosystems types including grassland, pinyon-juniper, wetland, and ponderosa pine forests on both public and private lands in a landscape context.	○	• This is the same policy as #6 under Ecosystem Health	○	○
9. Work with governmental agencies, organizations, landowners and residents to promote and accomplish conservation of the most sensitive areas.	○	○	○	○
10. Any proposed development in environmentally sensitive areas shall require extended public review process.	○	○	○	○

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
General Comments for all policies under the Environmentally Sensitive Lands Goal The intent of these policies is along the same vein as the Ecosystem Health policies. To limit repetition, they could be combined.				

Environmental Planning Element				
Goal: Soils Protect soils through conservation practices.				
1. Development projects shall be reviewed for soil and dust mitigation practices.	○	○	○	○
2. County Policy: In areas of shallow or poor soils where standard on-site wastewater systems are not feasible, very low density development, integrated conservation design, a centralized treatment facility and/or technologically advanced environmentally sensitive systems shall be preferred.	○	○	○	• Perhaps state the policy and then site the specific county policy at the end of the sentence.
3. Construction projects shall employ strategies to minimize soil compaction or destruction of vegetation. [From the ERI book:]"… If mechanized equipment is to be used, soil moisture content should be monitored closely before treatment in order to avoid operation on overly saturated soil."	○	○	○	○
4. Areas where prescribed fires will be conducted should be prepared adequately to keep the fire cool and fast-moving in order to avoid damaging or sterilizing the soil.	○	○	○	• Change to a strategy
5. Encourage slope stability practices to reduce the effects of erosion and soil transport into ephemeral stream drainages during periods of high.	○	○	○	• Is a word missing at the end of the policy?
6. Grassy openings shall be evaluated and conserved with the same care devoted to forested areas.	○	○	• Should be moved to the Ecosystem Health goal unless more detail can be added to tie it back to soils.	○ Reference the appropriate policy pertaining to forested areas

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
Environmental Planning Element				
7. Soil disturbances should be planned cognizant of their potential effect on vegetation, noxious weed invasion and erosion.	○	• The intent of this policy is similar to that of policy 3 above. These can probably be combined.	○	• Should it be developers who are cognizant? Reword so that "soil disturbances" aren't cognizant. Should it be "effect" instead of "effort"?
Goal: Water Quality Protect, preserve, and improve the quality of surface water and groundwater in the region for human health and environmental sustainability.				
1. The City of Flagstaff and other surrounding municipal wastewater treatment systems should explore the feasibility and cost benefit of additional treatment technologies and closely monitor the research on the potential impacts to human health and our regional water supplies.	○	○	○	○
2. The City of Flagstaff and Coconino County shall identify and implement methods for diverting contaminants from the waste stream, including the proper disposal of PPCP's and endocrine disrupting compounds (EDC's).	○	○ Combine this policy with policy 7 under this goal.	○	○
3. The City of Flagstaff and its regional partners shall implement best management practices to protect and maintain Upper Lake Mary and its watershed.	○	○	○	○
4. The City of Flagstaff and Coconino County Public Works Departments shall identify and implement best management practices with respect to road maintenance and snow removal that eliminates, or minimizes to the extent possible, the illicit discharge of contaminants	○	○	○	○

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
into waterways, and provides appropriate mitigation measures when discharges cannot be entirely avoided.				

Environmental Planning Element				
5. Residents are encouraged to adopt practices to prevent the discharge of household-related substances from residential properties including the proper disposal of products such as paint, motor-oil and other hazardous materials.	○	○	○	○
6. The City and County should implement and require Low Impact Development to maintain natural runoff volumes; e.g. on site detention of stormwater by designing detention areas into landscape features.	○	○	○	○
7. Identify and mitigate downstream impacts of development.	○	• This is similar to policy 2 under this goal. This policy can probably be removed.	○	○ This is extremely broad and open ended
8. The City of Flagstaff and Coconino County shall work with regional partners in educating agricultural users in practices for eliminating contaminants from stormwater runoff.	○	○	○	○
General Comments for all policies under the Water Quality Goal To consolidate goals and policies, these should be removed from the Environmental Planning Element and incorporated into the Water Resources Element, or a clear distinction should be made to justify two separate sections with water policies. For these policies in particular there was very specific call out of specific agencies that has not generally been present in other sections.				
Goal: Air Quality Proactively improve and maintain the region's air quality for continued compliance with National Air Ambience Quality Standards.				
1. Engage public agencies concerned with the improvement of air quality, and implement state and regional plans and programs to attain overall federal air quality standards and in particular ozone, particulate matter and carbon monoxide on a long-term basis.	○	○	○	○
2. Pursue reduction of total emissions of high priority pollutants from	○	○	○	○

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
commercial and industrial sources and area-wide smoke emissions.				
3. Reduce vehicle miles traveled by promoting land-use that incorporates walkable, mixed-use, compact development.	○	○	○	• Tie back into air quality
Environmental Planning Element				
4. Promote the use of alternative modes of transportation such as ridesharing, bicycling, walking, and transit throughout the region.	○	• Similar to Climate policy #4	○	• Tie back into air quality
5. Where locally desired, formation of road improvement districts, dust control districts and road maintenance districts shall be encouraged as a means of solving dust problems and allocating costs to those affected.	○	○	○	• Last part ("…and allocating costs…" could be removed and introduced as part of a strategy
6. All new City roads shall be paved to prevent fugitive dust.	○	○	○	• Careful using "all". Can be expensive and not always necessary.
General Comments for all policies under the Climate Goal These policies are along the same vein as the Air Quality policies. They could be combined or these could be moved so they follow or precede the Air Quality policies.				
Goal: Dark Skies Preserve Dark Skies as a natural resource, urban character and economic generator to a thriving astronomy, planetary and space science industry.				
1. Balance needs of astronomical research and industry needs with community character, growth and sustainability.	○	○	○	○
2. Research and employ emerging, energy efficient, illumination technologies and update regulations as necessary.	○	○	○	○
3. Mandate new uses, zone changes and retrofits be compliant to lighting code.	○	○	○	○
4. Promote the benefit of dark skies through outreach.	○	○	○	○
5. Any regional plan amendment within the Zone I district shall include a preliminary Lumen Analysis calculating potential maximum lumens	○	○	○	• This could be a strategy

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
permissible.				
6. City and County shall vigorously enforce existing lighting codes.	○	○ Intent is similar to policy 3 under this goal. They could be combined.	○	○
Environmental Planning Element				
7. Protection of dark skies and light 'trespass' is required of all new development.	○	○	○	○
8. Protect dark skies and light trespass with shielded lighting and standards and defined intensities.	○	○ Similar to #7 and #9	○	○
9. Outdoor lighting of recreational facilities should use lighting systems that illuminate only the facility.	○	○	○	● Seems like this could be a strategy under policy #8
10. Gas station must follow current lighting regulations.	○	○	○	● Is this referring to a specific gas station or all stations? Why only gas stations? Should this be elaborated on and included as a strategy under policy 3?
11. Beyond the standards of the outdoor lighting codes, discourage developments which require all-night outdoor illumination in the Lighting Zone I district, and encourage development that does not require outdoor night lighting.	○	○	○	● Last portion of this policy is repetitive. Could be reworded and shortened if started with "Encourage development…"
Goal: Natural Quiet Preserve natural quiet, soundscapes through reduction of noise pollution.				
1. Recognize urban environment soundscape differs greatly from rural areas through the creation of applicable noise ordinance with	○	○	○	● Wording is confusing

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
respective criteria.				

Environmental Planning Element				
2. Major commercial and industrial land use and transportation proposals adjacent to residential and natural areas shall be evaluated as to their potential noise impacts utilizing criteria to be established by the City of Flagstaff and Coconino County. Criteria shall include mitigation provisions of the adverse impacts of noise on existing and proposed land.	○	○	○	○
Open Space Element				
Open Space Goal The region will have a system of open lands, such as natural areas, wildlife corridors and habitat areas, trails, and greenways to support the natural environment that sustains our quality of life, cultural heritage, and ecosystem health.				
1.1 Form and use the appropriate Stake Holders Group (federal, state, city, county, non-profit and interested citizens) for coordinated open space planning, acquisition, conservation and protection.	○	○	○	• Change "Stake Holders" to "stakeholders"
1.2 A Green Infrastructure will facilitate non-motorized connectivity, preserves natural lands and priority open lands, and promotes opportunities for people to interact with nature.	○	○	○	• A Green Infrastructure system? This is more of a statement, not a policy.
1.3 Open Spaces may serve as natural environment buffer zones to protect scenic views and roadways, to separate disparate uses, and by separating private development from public lands, scenic by-ways and wildlife habitats.	○	○	○	○
1.4 Recognize the importance and protect, where feasible, the natural aspects of open spaces.	○	○ Combine with 1.3	○	○
1.5 Establish a Conservation Land System (CLS) to inventory, map, and	○	○	○	○

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
manage the region's "green infrastructure".				
General Comments for all policies under the Climate Goal Even though it is implied, there should be a goal specifying the purpose of acquiring or preserving open space with the intent of protecting natural areas, as referred to in policy 6 of the Environmentally Sensitive Lands goal.				
Water Resources Element				
Water Goal 1 Maintain a sustainable water budget incorporating regional hydrology, ecosystem needs, and social and economic well-being.				
1.1 Participate in and support regional processes to develop a sustainable water budget.	○	○	○	○
1.2 Seek opportunities to partner with adjacent landowners and managers to improve water yield and hydrologic processes on these lands.	○	○	○	○ Who should seek opportunities? The City? Individuals? Developers?
Water Goal 2 The City manages a coordinated system of water, wastewater, and reclaimed water utility service facilities and resources and identifies funding to pay for new resources.				
2.1 Develop and adopt an integrated water master plan that addresses water resources, water production and its distribution, wastewater collection and its treatment, and reclaimed water treatment and its distribution.	○	○	○	○
2.2 Maintain and/or develop facilities to provide reliable, safe and cost effective water, wastewater and reclaimed water services.	○	○	○	○This is extremely broad
Water Goal 3 Satisfy current and future human water demands and the needs of the natural environment through sustainable and renewable water resources and strategic conservation measures.				
3.1 The City, County, and all regional partners shall work together to address regional human and environmental water needs.	○	○ Similar to policy 1.1. Can they be comibined?	○	○ This is extremely broad
3.2 Low-water consuming businesses and industries shall be favored over water intensive uses. Note: define "High-water use" (based upon science).	○	○	○	• Favored how? May want to reword so it doesn't discourage businesses from

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
				locating in Flagstaff. Maybe similar to Energy Goal 2 policy #1.

Water Resources Element				
3.3 Integrate sound water conservation and reuse systems into new and updated public facilities.	○	○	○	○
3.4 Use reclaimed water and water harvesting wherever appropriate.	○	○	○	• Could have more detail. With redevelopment, new development? Encourage homeowners?
3.5 Encourage and educate water users to practice water conservation by installing high-efficiency low-flow plumbing fixtures, repairing leaks promptly, harvesting rainwater, planting native and drought-tolerant landscaping, and utilizing gray water systems.	○	○	○	• This could be a strategy
3.6 Adopt a water conservation ordinance that includes standards for plumbing fixtures, appliances, gray water, and rainwater harvesting.	○	○	○	• This could be a strategy
3.7 Encourage private well owners to install meters to understand how much water is used as well as alert property owners to possible leaks.	○	○	○	• This could be a strategy
3.8 The city shall estimate the volume of local water resources it has available and make periodic updates as appropriate.	○	○	○ I believe there was a prior reference to a water budget	○
3.9 The City shall implement a water management program that creates a linkage between new growth and a minimum 100 year water supply.	○	○	○	○
3.10 The City shall identify adequate funding sources to pay for new resources to ensure a long-term renewable water supply.	○	○	○	•

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
STRATEGY? Same as Policy 4.2 below?				This could be a strategy

Water Resources Element				
Water Goal 4 Avoid leap-frog development by logically enhancing and extending public water, wastewater, and reclaimed water services including their treatment, distribution, and collection systems in both urbanized and newly developed areas of the City.				
4.1 The Regional Plan Land Uses shall guide the Integrated Water Master Plan to better plan for the necessary infrastructure sizing and location to accommodate planned growth and resource management.	○	○	○	○
4.2 The City shall maintain a financially stable utility to provide reliable, high quality utility services.	○	○ Other policies talk about efficient water treatment facilities	○	○ Shouldn't the water be before utility?
4.3 Developments requiring city-level services shall be located within the Urban Growth Boundary.	○	○	○	○
Energy Element				
Energy Goal 1 Increase Energy Efficiency				
Education				
1. Promote and encourage innovative building practices through instruction on efficient building materials and methodology with the collaboration of government, Flagstaff Unified School District, Northern Arizona University, Coconino community College, and community partners.	○	○	○	• Wording is confusing
2. Support workforce training for the installation and maintenance of energy efficient technologies.	○	• Similar to policy 5 under Energy goal 2. Consider	○	○

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
		removing one.		
3. Empower all community members to make smarter energy choices through education and incentives.	○	○	○	○

Energy Element				
Building				
4. Promote energy efficient technologies and design in all new and retrofit buildings for residential, commercial and industrial projects.	○	○	○	○
Transportation				
5. Promote and encourage the expansion and use of energy efficient modes of transportation. a. Public transportation b. Bicycles (Flagstaff Urban Trail System; bike lanes; bicycle parking) c. Pedestrians (sidewalk grid, crosswalks, street planting strips and medians, underpasses)	○	○	○ Reinforces linkage between energy and transportation, but could be duplicative of the Circulation Element	○
6. Promote and encourage the use of fuel efficient vehicles and vehicles that use renewable fuels and/or electricity. a. Promote the installation of hybrid vehicle re-fueling stations in convenient and accessible locations. b. Encourage the installation of hybrid vehicle re-fueling stations in cooperative arrangements with other Arizona municipalities. c. Promote the installation of super-compact parking spaces in the highest value locations.	○	○	○	• Sub-bullets can be made into strategies
Energy Goal 2 Expand production and use of Renewable Energy				
1. Promote renewable energy sources over non-renewable energy	○	○	○	○

Environmental Quality Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Complies with State Statutes	Consistency within the Element	Consistent with Other Element Policies	Wording
sources for all land uses.		Could potentially be combined with policy 4 under this goal		
2. Pursue, promote, and support commercial scale renewable energy production such as biomass facilities, solar electricity, wind power, waste-to-energy and other alternative energy technologies.	○	○	○	○
Energy Element				
3. Promote education in both the public and private sector so that renewable energy production and use is incorporated into everyday learning.	○	○	○	○
4. Pursue, promote and reward small scale renewable energy production and use on the local level at individual residential, commercial and industrial parcels.	○	○ This provides greater detail than policy 1 under this goal, but could be repetitive	○	○
5. Support workforce training for renewable energy installation and maintenance.	○	• Similar to policy 2 under Energy goal 1. Consider removing one	○	○
6. Expansion and development of transmission grid infrastructure which supports renewable energy production.	○	○	○	○

Community Character Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
Recreation Element				
Recreation Goal 1 The region will have a healthy system of convenient and accessible parks, recreation facilities and trails.				
1.1 Active and passive recreational sites shall be integrated and within walking distance throughout the region to promote a healthy community for all city and county residents and visitors.	○	○	○	● May need to elaborate the "within walking distance" statement. Is "shall" the proper word choice?
1.2 Promote partnerships to offer parks, recreation facilities and resources with public and private entities.	○	○	○	○Meaning unclear
1.3 New or updated public facilities will include parks, open space and/or recreational opportunities where feasible.	○	○	○	○
1.4 Incorporate sustainable building and maintenance technologies and Universal Design into parks and recreation facilities.	○	○	○	● This policy has many thoughts in it and needs to be clarified. Universal Design is a separate concept from sustainability and maintenance. Consider making it a separate policy or reword this policy so it is clear that when building

Community Character Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
				recreation facilities sustainability and UD are incorporated.

Community Character Element				
CD1 Goal New buildings, public spaces and landscaping will reflect the design traditions of Flagstaff.				
CD1.1 - Promote quality design and development for all future projects to enhance a positive image and identity for the Region.	○	○	○	○ What is "Qaulity Design"
CD1.4- Utilities need to be included as part of the overall design aesthetic.	○	○ Numbering is off	○	• This is more of a statement rather than a policy
CD1.5- Develop urban infrastructure which supports revitalization and redevelopment.	○	○ Numbering is off	○	○ Very broad.
CD2 Goal The built environment shall reflect and respect the region's natural setting and dramatic views.				
CD2.1 – Preserve the natural character of the region through planning and design to maintain views to significant landmarks, retain sloping landforms, and conserve stands of ponderosa pine.	○	○	○	○
CD2.2—Protect the region's topographical features, mountains, canyons and forested settings from development.	○	• Intent of this policy is similar to CD2.1. They can probably be combined.	○	○ How? Prevent development or better manage development?
CD2.3—Protect and enhance Gateway points and corridors.	○	○	○ Duplicative of policy T4.3	○ How?
CD2.4—Development patterns will be designed to maintain the open character of rural areas, protect open lands, and protect and	○	○	○	○

Community Character Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
maintain sensitive environmental areas.				
CD2.5—Encourage Cluster Development	○	• Intent of this policy is similar to CD2.4. They can probably be combined.	○	• Clarify "cluster development"
Community Character Element				
Arts, Science, Education (ASE) 1 Goal Support and promote artist, scientific and educational community resources for all to experience.				
ASE1.1—Provide first class arts, research and educational facilities.	○	○	○	○ define first class
ASE1.2—Coordinate educational master plans (NAU, CCC, FUSD and Charter Schools) with regional planning efforts.	○	○	○	○
ASE1.3—Integrate public art into public and private development projects.	○	○	○	○ Should a statement be included such as, "when feasible"? How much? 1% or project cost?
ASE1.4— Complete sidewalks and FUTS connections for all schools, community college and university campuses.	○	○	○ Reference the Circulation Element, Goal T8 (Pedestrian Infrastructure)	○
ASE1.5— Promote and expand scientific research as a key component to the Flagstaff Region's character.	○	○	○	○
Heritage Preservation (HP) 1 Goal Preserve heritage resources and consider regional heritage in future developments				
HP1.1—Protect historical, archeological and cultural resources by identification and preservation.	○	○	○	○
HP1.2—Preserve and improve the quality of historic housing, buildings and structures and neighborhoods through their restoration and rehabilitation.	○	○ Could be combined with policy HP1.1	○	○
Neighborhood Preservation and Revitalization (NP) 1 Goal				

Community Character Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
The Flagstaff region will foster and maintain healthy and diverse neighborhoods, from urban to suburban to rural.				
NP1.1—Preserve and Enhance Existing Neighborhoods	○	○	○	• Elaborate or combine with NP1.2 How?

Community Character Element				
NP1.2—Changes to neighborhoods should respect traditions, identifiable styles, proportions, streetscapes, relationships between buildings, yards and roadways; and use historically appropriate and compatible building and structural materials for the historic districts.	○	○	○	○ How?
NP 1.4--Interconnect neighborhoods through streets, sidewalk patterns, and/or trails.	○	○	○ Duplicative of Goal T1 and policy T5.3	○
Neighborhood Preservation and Revitalization (NP) 2 Goal Downtown Flagstaff serves as the primary focal point of the community character.				
NP2.1--Future Downtown Development and contiguous development shall respect the established intensity of the historic core, historical architecture and urban design, and allow increases in intensity and density outside the historic core.	○	○ This is similar to policy NP1.2, except it's for the Downtown area	○	○ How?
Revitalization and Redevelopment (RR) 1 Goal Revitalization and Redevelopment of the urban core shall be compatible with and enhance Community Character.				
RR1.1—Promote Quality Infill Development which is contextual with surrounding development.	○	○	○	○ define quality
RR1.2—Promote Identified Redevelopment Areas	○	○	○	• Elaborate to explain intent
RR1.3—Promote Redevelopment over Infill	○	• Intent is similar to policy RR1.1. Consider removing	○	• Elaborate to explain intent

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
Circulation Element				
Goal T1: Mobility and Accessibility Improve the mobility of people and goods throughout the region by providing efficient, effective, convenient, accessible, and safe transportation options for travel to employment, education, medical, tourist attractions and other desired destinations. The transportation system will be supportive of desired land use patterns and functional, attractive design.				
T1.1 – Develop a multimodal, regional transportation system that offers attractive choices among modes for the efficient movement of people and goods.	○	○	○	○ key wording change needed
T1.2 – Provide a regional balance of transportation infrastructure, facilities and services by mode, including automobile, truck, public transit, bicycle, pedestrian, rail and aviation.	○	○ This is similar to Policy T1.4. Reference the bicycle, pedestrian, and transit goals under this element	○	○ this sounds good but doesn't really say or mean anything tangible
T1.3 – Promote convenient multimodal access to public places having high concentrations of trips, including activity centers, schools, parks, recreation areas, monuments, historic sites and tourist attractions.	○	○	○	○
T1.4 – Encourage alternate modes of transportation improvement projects, as appropriate and in context with area type, through the provision of bicycle lanes, sidewalks and FUTS trails.	○	○ This is similar to Policy T1.2. Reference the bicycle, pedestrian, and transit goals under this element	○	○ key wording change needed

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
T1.5 – Provide a continuous system of functional segments and points of convenient transfer from one mode to another.	○	○	○	• Write for the layperson – what are functional segments and points of convenient transfer?
Circulation Element				
T1.6 – Manage the operation and interaction of all modal systems for efficiency, effectiveness, safety, and to be mitigate traffic congestion.	○	○	○	• Wording at the end of the sentence needs to be changed, "…and to be mitigate…"
T1.7 – Provide and promote travel demand management strategies and incentives to more fully utilize alternate modes of travel and to reduce peak period demand, including car pooling, flexible hours and other travel reduction techniques.	○	○	○	• Break up this sentence - "…peak period demand. These may include carpooling…"
T1.8 – Develop a complete, all-mode transportation system that is universally accessible.	○	○ The intent of this policy is covered in policies 1.1-1.7. Should be part of the goal statement	○	○ Extremely broad
T1.9 – Accommodate a full range of trip purposes within the transportation system.	○	○ This policy may not be a necessary policy since it is implied in policies 1.1-1.7	○	• Needs elaboration. How? What does this mean?
T1.10 – Identify and pursue funding mechanisms for maintenance of existing transportation investments and for future improvements needed to maintain mobility within the transportation system.	○	○	○	• Change to a strategy

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
T1.11 – Develop and adopt measures requiring on-site improvements for both public and private projects.	○	○	○	• Change to a strategy Does not make sense – what kind of on-site improvements and for what purpose

Circulation Element				
T1.12 – Promote investments in the transportation systems that complement investments in other public infrastructure and utilities and promote a beneficial impact on the region's economic vitality.	○	○	○	• Sounds like this is saying that investments in transportation should be complementary to other infrastructure projects and should spur more investment so that money can be used more efficiently in the community. Is that what this is saying? There are many thoughts in this statement. Perhaps break it down and clarify.
Goal T2: Safety Plan, design, construct and operate transportation infrastructure and services to reduce crash frequency and severity, and associated hazards.				
T2.1 – Improve transportation safety for all modes through engineering, education, enforcement, encouragement and evaluation.	○	○	○	○
T2.2 – Provide safety programs and infrastructure to protect the most	○	○	○	○

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
vulnerable travelers, including our youth, elderly, mobility impaired, pedestrians and bicyclists.		A greater distinction needs to be made between T2.1 and T2.2. They both deal with programs and infrastructure to improve safety.		

Circulation Element				
Goal T3: Environmental Considerations Provide transportation systems infrastructure in a way that balances conservation and development goals to avoid, minimize or mitigate impacts to the natural and built context.				
T3.1 – Design and assess transportation improvement plans and projects to comply with air quality standards, and develop and implement strategies to maintain clean air standards.	○	○	○ Reference Air Quality	○
T3.2 – Reduce energy expenditures associated with transportation.	○	○	○ Reference Energy goal	• Elaborate to explain intent (similar to T3.1)
T3.3 – Promote transportation investments that will enhance and protect the quality and livability of neighborhoods and community places.	○	• This seems similar to T1.12	○	○Extremely broad
T3.4 – Review and revise parking and other terminal regulations to provide for their use as flexible tools to achieve other overall regional plan policies.	○	• Should be moved to the Mobility and Accessibility goal	○	• This policy could be clarified. It is unclear what it is trying to accomplish. Parking is a very valuable tool in driving mode choice and promoting mixed-use, compact development. There is an opportunity

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
				here to elaborate on this.
T3.5 – Design transportation infrastructure that implements eco-system based design strategies to manage stormwater and minimize adverse environmental impacts.	○	○	○	• Define "eco-system based design strategies" or use different wording
T3.6 – Seek to minimize noise, vibration, dust, and light impacts of transportation projects on nearby land uses.	○	○ many of these in other sections	○	○ How?
T3.7 – Design transportation infrastructure to mitigate impacts to plants, animals, their habitats and linkages between them.	○	○	○	○ How?

Circulation Element				
Goal T4: Quality Design Regional road, transit and other modal systems, and their component parts, will be designed with a level of service and connectivity appropriate to the context of their built and natural environment. Promote transportation infrastructure and services that enhance the quality of life of the communities within the region. Fluff and not substance.				
T4.1 – Promote context sensitive solutions (CSS) and desired community character elements in all transportation investments.	○	○	○	○ key wording change
T4.2 – Design all streets, roads and highways to safely and attractively accommodate all transportation users, including drivers, bus riders, pedestrians and bicyclists.	○	○ redundant of other multi-modal statements	○	• Include a statement that says, "when appropriate", or "in conformance with the surrounding community character"
T4.3 – Design gateways and corridors with aesthetics and architectural features reflecting the region's unique heritage and landscapes.	○	○ redundant of other statements	○ Reference the Community Character Section	○
T4.4 – Design transportation facilities and infrastructure with sensitivity to historic and prehistoric sites and buildings.	○	○	○	○
T4.5 – Design well-landscaped, attractive transportation facilities and infrastructure.	○	○ This can possibly be combined with policy 4.4	○	○ Broad

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
T4.6 – Design transportation systems which incorporate elements that complement our landscapes and views.	○	○	○	• Can be combined with T4.5
Goal T5: Automobile and Truck Infrastructure Promote an effective, well-planned system of roadways that establishes a functional, safe, and aesthetic hierarchy of streets while incorporating the latest advanced technologies.				
T5.1 – Promote efficient transportation connectivity to major trade corridors and special districts, which enhance the region's standing as a major economic hub.	○	○	○	○ Broad and vague
T5.2 – Implement a road and street classification system that is based on context, function type, use, and visual quality.	○	○	○	○ Key wording change?
Circulation Element				
T5.3 – Integrate vehicular circulation within neighborhoods.	○	○	○	• Elaborate to explain intent
T5.4 – Design streets with continuous pedestrian infrastructure of sufficient width to provide safe accessible use and opportunities for shelter.	○	• Should be moved to Goal T8 - Pedestrian Infrastructure	○	○
T5.5 – Design neighborhood streets using appropriate traffic calming techniques and street widths to sustain the quality of life in the neighborhoods.	○	○	○	○
T5.6 – Identify rights-of-way for transportation corridors to be addressed in a future Roads and Streets Master Plan.	○	○	○	• Change to a strategy
T5.7 – Support area economic vitality by improving roadway geometrics for freight movements.	○	○	○	○
Goal T6: Public Transit Infrastructure and Services Provide a public transit system that is readily accessible, convenient, efficient, safe and desirable to an increasing proportion of persons in the region.				
T6.1 – Encourage optimal availability and utilization of public transit facilities and services through the 5-year transit master planning process.	○	○	○	○ define optimal
T6.2 – Provide public transit centers that are effectively distributed throughout the region to increase the availability of public transit.	○	○	○	○ transit centers or access to transit (stops, stations, etc.)

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
T6.3 – Develop multiuse corridors of sufficient land use intensity and diversity to support high capacity transit **[Move to Land Use Element per working group direction?]**	○	○	○	○
T6.4 – Provide convenient public transit connections at urban activity centers.	○	○	○	○
T6.5 – Support mobility serves for older adults and mobility impaired persons.	○	○	○	• Should "serves" be "services"?

Circulation Element				
T6.6 – Develop an integrated system that seamlessly links all modes of transportation into a system that maximizes the public's ability to use alternate modes of transportation.	○	○	○	○ exceedingly broad
T6.7 – Include public transit planning as an integral part of the development process.	○	○	○	○
General Comments for all policies under the Public Transit Goal In the Goal statement, "…increasing proportion of persons…" is awkward. Seems like it is trying to say that the transit system should strive to be accessible to all people with the goal of increasing ridership. Since the transit will likely be placed along corridors with "sufficient land use intensity and diversity", a parking policy should be added to ensure parking regulations support transit and the surrounding land uses.				
Goal T7: Bicycle Infrastructure Plan for bikeways and bicycle infrastructure that provide for the safe and efficient means of transportation and recreation throughout the region.				
T7.1 – Develop recognition of bicycling as a legitimate and beneficial form of transportation.	○	○	○	• Perhaps this can be incorporated into the goal statement instead.
T7.2 – Establish and maintain a comprehensive system of bikeways and	○	○	○	○ eliminate seamlessly

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
FUTS trails that seamlessly connect neighborhoods, shopping, employment, schools, parks, open space, and public transit hubs.				
T7.3 – Educate bicyclists and motorists about bicyclist safety through education programs, targeted enforcement and detailed crash analysis.	○	○	○	○
T7.4 – Design bikeways and bicycle infrastructure consistently throughout the region.	○	○	○	○
T7.5 – Develop bikeways and bicycle infrastructure that serve the needs of advanced, basic and beginner bicyclists.	○	○	○	○

Circulation Element				
T7.6 – Provide short and long term bicycle parking at all places where bicyclists want to go, including commercial areas, employment centers, multi-family developments, schools and institutions, recreational facilities and transit facilities.	○	○	○	• Consider rewording "…at all places where bicyclists want to go..." to "…at major destinations, including…"
T7.7 – Ensure that policies to increase cycling and meet the needs of bicyclists and fully integrated into all relevant City plans, policies, studies, strategies, and regulations.	○	○	○	• Remove the "to" in "Ensure that polices to increase…" Replace the second "and" with "are"
Goal T8: Pedestrian Infrastructure Plan and encourage the use of pedestrian infrastructure, including the urban trail system (FUTS), as a critical element of a safe and livable community to meet the transportation and recreational needs of the community.				
T8.1 – Provide accessible pedestrian infrastructure with all street construction and reconstruction; all private residential, commercial, and industrial development; and all public development in the urban area.	○	○	○	• Is it appropriate to use "all"?
T8.2 – Develop a program for the installation of pedestrian infrastructure in already developed urban areas where they do not currently exist.	○	○	○	○

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
T8.3 – Design pedestrian infrastructure that is accessible, direct, safe, comfortable, aesthetically pleasing and continuous.	○	○ seems obvious	○	○
T8.4 – Improve pedestrian visibility and safety and raise awareness of the benefits of walking.	○	○	○	○
T8.5 – Identify specific pedestrian mobility and accessibility challenges and develop measures for implementation of necessary improvements.	○	○	○	○
Goal T9: Rail Freight and Passenger Rail Strengthen and support rail service opportunities for the region's businesses and travelers.				
T9.1 – Seamlessly integrate passenger rail with other travel modes including improvements to the downtown passenger rail station and surroundings.	○	○	○	○
Circulation Element				
T9.2 – Promote Amtrak service and enhance opportunities for interregional passenger rail service.	○	○	○	○
T9.3 – Promote development of rail spurs and an intermodal freight facility or facilities as needed to support viable economic growth.	○	○	○	○
T9.4 – Protect opportunities and design transportation infrastructure to facilitate intermodal freight transfers where appropriate.	○	○	○	• Consider rewording this to start with "design". "Protect opportunities" should be removed or expanded upon
Goal 10: Air Service Strengthen and expand the role of Flagstaff Pulliam Airport as the dominant hub for passenger, air freight and other services in Northern Arizona.				
T10.1 – Maintain and expand Flagstaff Pulliam Airport as an important link to the national air transportation system.	○	• May be more appropriate if included in the goal. All other policies fall beneath this overarching statement.	○	○
T10.2 – Improve multimodal access and service to and from the airport including transit, bicycle and parking services.	○	○	○	○

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
T10.3 – Seek opportunities to expand destinations and frequency of regional air service throughout the west and southwest.	○	○	○	○
T10.4 – Plan and manage transportation infrastructure to discourage land uses incompatible with the airport and flight zones.	○	○	○	○
Goal 11: Public Support Build and sustain public support for the implementation of transportation planning goals and objectives, including the financial underpinnings of the plan, by actively seeking meaningful community involvement.				
T11.1 – Maintain the credibility of the regional transportation planning process through the application of professional standards in the collection and analysis of data and in the dissemination of information to the public.	○	○	○	○
Circulation Element				
T11.2 – Approach public involvement proactively throughout regional transportation planning, prioritization and programming processes, including open access to communications, meetings, and documents related to the plan.	○	○	○	○
T11.3 – Include and involve all segments of population, including those groups protected under Title VI of the Civil Rights Act of 1964 and Executive Order 12898 Environmental Justice provisions, including future amendments to those provisions.	○	○	○	○
T11.4 – Promote effective intergovernmental relations through agreed upon procedures to consult, cooperate and coordinate transportation related activities and decisions, including regional efforts to secure funding for the improvements of transportation services, infrastructure and facilities.	○	○	○	• Add the word "on" after "coordinate"
T11.5 – Attempt to equitably distribute the burdens and benefits of transportation investments to all segments of the community.	○	○ This is more of an access issue than public involvement. Consider moving to Goal T1.	○	○

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
Housing Element				
<u>Goal 1</u> Promote housing opportunity for all economic sectors of the population to ensure a variety of types and price points.				
1. Further housing that is decent, safe and sanitary.	○	○	○	• Should "Further" be replaced with "Develop" or "Promote"?

Housing Element				
2. Support on-going <u>funding for community housing</u> non-profit organizations which provide housing services, further the development of housing stock and promote innovative solutions to attainable housing needs for clients along the housing continuum – from homelessness to homeownership.	○	○	○	○
3. Further and <u>advance the establishment of home ownership</u> and affordable rental opportunities for all economic sectors.	○	○	○	• Start this policy with "Advance" and remove "Further and"
4. <u>Eliminate substandard housing</u> units by conserving and upgrading the existing housing stock.	○	○	○	• Potentially reword – "Conserve and upgrade the existing housing stock as appropriate to eliminate substandard…"
5. Maintain and expand governmental relationships to increase resources for the <u>development of affordable housing</u>.	○	○	○	○

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
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6. Seek opportunities for and eliminate barriers to adaptive-reuse for affordable housing.	○	○	○	○
Goal 2 Support and assistance will be given to all new and existing neighborhoods that integrate: a variety of housing types and densities; public amenities and services with close proximity to retail, office and/or employment opportunities.				
1. Encourage accessory dwelling units.	○	○	○	● Elaborate to explain intent
2. Preserve, enhance and revitalize existing neighborhoods.	○	○	○	● Elaborate to explain intent
3. Provide incentives for infill development.	○	○	○	● Elaborate to explain intent
Housing Element				
4. Coordinate and encourage community, developer and governmental efforts to provide a variety of types of quality housing and related services to ensure affordable housing options along the housing continuum – from homelessness to homeownership.	○	○	○	○

REVIEW OF DRAFT POLICIES

The following policies for the Land Use Element were reviewed separately since they are existing policies. Draft Land Use policies were not available at the time of this review; therefore the existing land use policies were used.

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
Existing Land Use Element				
<u>Goal LU1</u> Greater Flagstaff will have a compact land use pattern within a well-defined boundary that shapes growth in a manner that preserves the region's natural environment, livability, and sense of community. Flagstaff will continue to offer the primary types of housing design developments that have defined its land use patterns: the conventional and traditional neighborhood scale which provide a choice of housing types and supporting non-residential uses within walking distances.				
LU1.1—Develop a Structural Framework for the Regional Land Use and Transportation Plan The Regional Plan sets the framework for implementing the region's desired land use pattern as defined by districts, activity centers, corridors, and public lands/multiple-use open spaces.	○	○ This is more of an explanation, instead of a policy	○	○
LU1.2—<u>Establish an Urban Growth Boundary</u> The Regional Plan establishes an Urban Growth Boundary (UGB) for lands within and adjacent to the city, identifying areas that are presently suitable for urban development, areas that are suitable for future urban development, and areas to be preserved as open lands.	○	○	○	• UGB is already established. Need to decide whether to maintain it. UGBs are defined by identifying existing and future suitable land for development; it does not define those areas.
LU1.3—Designate Areas to be <u>Reserved for Future Urban Development</u> Lands suitable for future urban development have been specifically identified and designated in the Regional Plan as Planning Reserve Areas within the Urban Growth Boundary. These lands shall serve as a "holding area" for future urban development.	○	○	○	○ CAC suggested the following wording, "Designate areas for future urban development". May need to clarify that this is within the UGB

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
Existing Land Use Element				
LU1.4—Encourage Development Within the Urban Growth Boundary Lands designated for compact development shall be made more attractive to develop than lands outside the Urban Growth Boundary (UGB). By aligning public policies and investments with this policy, the Regional Plan can assure preservation of open space lands outside the UGB, thus preserving the character of the community and minimizing sprawling development.	○	○	○	○
LU1.5—Provide for New Mixed-Use Neighborhoods The Regional Plan designates new development areas within the Urban Growth Boundary for development as mixed-use neighborhoods. The criteria for these areas includes average densities, a mix of mutually supportive and integrated residential and non-residential land uses, and a network of interconnected streets, and pedestrian and bicycle connections. Designated areas include Canyon del Rio and the West Side Area, and may include other future areas identified as Planning Reserve Areas. Additionally, existing older neighborhoods, such as Southside, Sunnyside, and parts of downtown, may be suitable for limited and sensitively designed mixed-use development.	○	○	○	○ May need to clarify that this is within the UGB
LU1.6—Require Urban Development to Locate within City Boundaries In order to ensure that all urban development can be provided with adequate public facilities and services, it is the policy of this Regional Plan that all urban land uses shall be located within the Urban Growth Boundary, within the city's corporate boundary limits. The Regional Plan encourages urban land uses to locate only within incorporated areas in order to obtain City services, utilities, and fire protection. The City shall consider the annexation of land into the city limits when the annexation of such property is consistent with the goals and policies of the Regional Land Use and Transportation Plan.	○	○	○	• Needs to be more specific in the event that the description isn't part of the policy

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
Existing Land Use Element				
LU1.7—Promote Infill Development If properly designed, infill development can serve an important role in achieving quality, mixed-use neighborhoods. The Regional Plan promotes infill development in the city's Urban Growth Boundary, in preference to development of outlying or more remote lands adjacent to the city. Development of infill areas in the city shall occur in a manner that is in character and context with existing, surrounding development. In some instances, sensitively designed, high quality infill development can help stabilize and revitalize existing older neighborhoods.	○	○ encouraged in other items	○	• Needs to be more specific in the event that the description isn't part of the policy
LU1.8—Promote Targeted Redevelopment The Regional Plan identifies areas in the city that may be appropriate for redevelopment due to substandard physical conditions. The intent is to promote and facilitate redevelopment of targeted areas, including consideration of specific area plans, active participation by the City in redevelopment projects, and identification of potential financing sources for projects. Objectives include targeting redevelopment to specific, identified areas; orientation towards resident ownership of housing; stabilization and preservation of existing neighborhoods; and quality design that fosters a sense of neighborhood and community.	○	○	○ Refer to the Community Character Section	○
LU1.9—Promote Quality Design The Regional Plan promotes quality design and development. Particular emphasis shall be placed on improved character of the public realm, including attention to streetscape design, and sensitivity to neighborhood character and context for new development in or near existing neighborhoods. Quality design shall be an important element in successful infill development and redevelopment. In addition, plan policies have been developed which address design standards that minimize risks due to natural hazards, such as floods and wildfire.	○	○	• This is duplicative of the policies in the Community Character Section. Probably isn't necessary to keep	○ nice description of "quality design"

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
Existing Land Use Element				
LU1.10—Place Emphasis on all Transportation Modes The Regional Plan provides for key roadway connections, with highest priority for missing pieces in core parts of the street grid system, including north/south connections. All commercial and residential areas shall include full accommodation for pedestrian and bicycle travel and transit access.	○	○	• This is duplicative of the policies in the Circulation Element. Reword so that the policy incorporates some of the ideas from the description (i.e. "All commercial and residential areas shall…"	○
Policy LU1.11—Place Emphasis on and Encourage Traditional Neighborhood Development and Redevelopment Design The Regional Plan promotes the creation and establishment of neighborhood units with mixed land uses, a variety of dwelling types, activity centers that are walkable, alternate modes of transportation routes, and design that is sensitive to existing surrounding development.	○	○	• This is duplicative of the policies in the Housing Element.	○
Goal LU2 The integrity of individual communities in the county will be supported by maintaining separation between existing communities; respecting existing area plans, as well as encouraging consistency with the Regional Plan; and preserving the integrity of open space boundaries identified in the Greater Flagstaff Open Spaces and Greenways Plan, as a major defining element of the Region's Growth Area Boundaries.				
LU2.1—Establish Rural Growth Boundaries The Regional Plan establishes Rural Growth Boundaries for lands in unincorporated areas of the county that are suitable for rural development. The primary objective of these areas shall be to define the extent of lands within the county that are suitable for rural development, preserve their character, retain open lands separating these communities, and to protect public multiple-use lands designated as priority for open space retention from conversion to private use for development. In general, residential development in unincorporated areas shall be in accordance with existing zoning, except as provided for in Strategy CFS1.1(d).	○	• A rural growth boundary has already been established. This will need to be changed so support maintenance of the RGB.	○	○

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
Existing Land Use Element				
LU2.2—Establish Opportunities for Rural Activity Centers The Regional Plan incorporates opportunities for activity centers in specifically designated areas in the county. These centers shall be characterized by a defined range of uses as appropriate to each individual location and community, and by size limits and design standards so as to maintain a scale appropriate to the community it serves.	○	○	○	○
LU2.3—Promote the 1-5 Coordination of Regional Plan and Area Plans The Regional Plan includes recommendations that apply to areas that currently have area plans in place, or for which area plans shall be developed in the future or are currently under development. The intent is that, over time, the policies of the Regional Plan shall be incorporated into area plans, in a manner that takes into account local conditions and preferences of area residents.	○	○	○	○
LU2.4—Cluster Development as an Alternative Development Pattern The County shall continue to allow cluster development in appropriate locations as a means of preserving rural resources, such as wildlife habitat and open space, and to minimize service and utility costs.	○	○	• Based on policies in the other Elements, cluster development is being highly promoted and is no longer just an "Alternative Development Pattern". May consider revising this language to complement the other elements and encourage cluster development, as opposed to just supporting it.	○

Development/Transportation/Growth Section Goals and Policies				
Draft Policy	Evaluation Criteria			
	Consistency with State Laws	Consistency within the Element	Consistent with Other Element Policies	Wording
Existing Land Use Element				
LU2.5—Restrict Development At the Periphery of the Planning Area Rural character should be preserved in areas that are at the periphery or just outside the boundaries of the Planning Area, as defined by the Flagstaff Metropolitan Planning Organization boundary.	○	○	○	○ Does this have the same intent as the RGB? Could they be combined into one policy?
Goal LU3 The Regional Land Use and Transportation Plan will be coordinated with state and federal land management policies.				
LU3.1—The City and County Shall Work with Federal and State Agencies to Better Manage Future Urban Lands in a Manner Consistent with City and County Planning Policies	○	○	○	○
LU3.2—Pursue Master Planning and Establish Open Space Buffers on Lands Adjacent to Forest Service Lands. Where appropriate and feasible, conserve a buffer of open space lands adjacent to Forest Service urban interface wildlands.	○	○	○	○
LU3.3—Mitigate the Impacts of Usage on Forest Service Lands The City and County shall work with the Forest Service and residents to mitigate impacts of usage on Forest Service lands.	○	○	○	○
LU3.4—Work Towards Determining Appropriate Levels of Recreational Uses in Urban Interface Area The Forest Service, in conjunction with the City and County, will work towards determining the most appropriate levels of recreational uses, relationships, and interactions that should occur on the urban interface Forest Service lands.	○	○	○	○
General Comments for all policies under the Land Use Goal It is unclear whether the descriptions beneath the policy part of the policy or if they are meant to provide background information and clarity. If these descriptions are not technically part of the policy, then the policies should be reworded to include the important parts of the descriptions.				

In addition to the comments made on the specific policies, an overarching observation is that each element and the associated polices are formatted differently. The policies should be easy to identify from the goal statements and strategies. The formatting should also allow the reader to reference a desired policy within an element and across elements of the Regional Plan. In regards to organization, the Open Space Element was found to have a desired format that could be applied to all elements of the Regional Plan. Below is an example of how the Open Space Element is organized.

Open Space GOAL

The region will have a system of open lands, such as natural areas, wildlife corridors and habitat areas, trails, and greenways to support the natural environment that sustains our quality of life, cultural heritage, and ecosystem health.

Policy 1.1: Form and use the appropriate Stake Holders Group (federal, state, city, county, non-profit and interested citizens) for coordinated open space planning, acquisition, conservation and protection.

Strategies for implementation:

a. Use the guiding documents of the *Greater Flagstaff Area Open Spaces and Greenways Plan*, the City of Flagstaff Urban Open Spaces Plan, and the City's *Long Range Master Plan for Parks, Recreation and Open Space*, and County Area Plans which have Open Space Objectives as the framework for the inter-agency group.
b. Form the inter-agency institutional framework group.
c. Use Inter-agency planning and acquisition for collaborative buying power. Ownership, operation and maintenance should center in a single entity.

Policy 1.2: A Green Infrastructure[11] will facilitate non-motorized connectivity, preserves natural lands and priority open lands, and promotes opportunities for people to interact with nature.

Strategies for implementation:

a. The inventory, criteria and objectives should be used as part of an open spaces management program to acquire, protect, and manage properties and their resources and values.
b. Map proposed open space 'connections', 'priority open lands' and 'Neighborwoods'.
c. Priority open lands to consider as collaborative efforts for preservation will include Picture Canyon and Walnut Canyon.
d. The FUTS Masterplan is one means of connection by open space and trails.
e. Identify tools and clearly articulate legal means to acquire and maintain connections, priority open lands and neighborwoods.
f. All subdivision applications be assessed for open space and recreational amenities (parks, open space and trails) within walking distance of project; either provided within subdivision or already in close proximity.
g. Permit recreational use of regional open space lands where it is consistent with the Land Use Plan and other policies.

The City of Tucson 2001 General Plan uses a similar format. Below is an example from the Housing Element.

Decent, Safe, Sanitary Housing

Background An adequate supply of decent, safe, and sanitary housing is necessary for the well-being of the community. A number of factors can cause residential units to become unsafe or unhealthy to live in. Examples include lack of maintenance, unsafe electrical wiring, fire, flooding, and severe infestation. Preventing these problems from occurring and addressing them when they do occur protect the safety and welfare of the residents and assist in meeting housing needs throughout the city.

Policy 1: **Promote housing that is decent, safe, and sanitary.**

Supporting Policies

1.1 Continue to maintain an up-to-date building code that is consistent with the national uniform building codes.

1.2 Enforce applicable building and safety codes.

1.3 Devise strategies for ensuring that mobile homes, including rentals and owner-occupied units, are in compliance with applicable building and safety codes.

1.4 Explore funding sources to assist property owners in bringing housing units into compliance with applicable building and safety codes, so that the costs of upgrades do not price the units out of the range of current residents.

1.5 Seek out programs that will assist low- and moderate-income residents transition to a safer unit when rehabilitation of the existing unit is not feasible or when rehabilitation will make the unit unaffordable to the current residents.

Under this format are that each policy is visibly distinct from the goal statement and strategies and it is easy to reference to specific policies within the element. However, if this exact format were to be used in all elements, it would be difficult to reference specific policies across elements. In this regard, the Circulation Element uses a good technique by noting the policies by section letter, then by goal number, then policy number, as shown below.

Goal T7
Bicycle Infrastructure: Plan for bikeways and bicycle infrastructure that provide for the save and efficient means of transportation and recreation throughout the region.

Policy T7.1
Develop recognition of bicycling as a legitimate and beneficial form of transportation

Policy T7.2
Establish and maintain a comprehensive system of bikeways and FUTS trails that seamlessly connect neighborhoods, shopping, employment, schools, parks, open space, and public transit hubs.

Under this format, policies for each element would have their own identifying letter, making them easy to reference and locate. It should be noted that some goals are currently formatted with their own specific letters (i.e. Heritage Preservation, Neighborhood Preservation and Revitalization, and Revitalization and Redevelopment), and these should be reformatted so that they each don't act like their own element but rather as goals under one comment element, making them easy to reference. The following is a brief outline of how the goals and policies could be labeled for easy reference and organization.

Environmental Planning Element

EP 1

Climate:

Policy EP1.1 – 1.6

EP 2

Ecosystem Health:

Policy EP2.1 – 2.9

EP 3

Noxious and Invasive Weeds:

Policy EP3.1 – 3.6

EP 4

Wildlife:

Policy EP4.1 – 4.9

EP 5

Environmentally Sensitive Lands:

Policy EP5.1 – 5.10

EP 6

Soils:

Policy EP6.1 – 6.7

EP 7

Water Quality:

Policy EP7.1 – 7.8

EP 8

Air Quality:

Policy EP8.1 – 8.6

Environmental Planning Element

EP 9

Dark Skies:

Policy EP9.1 – 9.11

EP 10

Natural Quiet:

Policy EP10.1 – 10.2

Community Character Element

CC 1

Recreation:

Policy CC1.1 – 1.4

CC 2

New Buildings:

Policy CC2.1 – 2.4

CC 3

Natural Setting:

Policy CC3.1 – 3.5

CC 4

Arts, Science, Education:

Policy CC4.1 – 4.5

CC 5

Heritage Preservation:

Policy CC5.1 – 5.2

Relevant State Statutes

The following are the relevant Statues from the Arizona Revised Statutes that guide the development of general plans for incorporated jurisdictions within Arizona.

9-461.05. General plans; authority; scope
A. Each planning agency shall prepare and the governing body of each municipality shall adopt a comprehensive, long-range general plan for the development of the municipality. The planning agency shall coordinate the production of its general plan with the creation of the state land department conceptual land use plans under title 37, chapter 2, article 5.1 and shall cooperate with the state land department regarding integrating the conceptual state land use plans into the municipality's general land use plan. The general plan shall include provisions that identify changes or modifications to the plan that constitute amendments and major amendments. The plan shall be adopted and readopted in the manner prescribed by section 9-461.06.

B. The general plan shall be so prepared that all or individual elements of it may be adopted by the governing body and that it may be made applicable to all or part of the territory of the municipality.

C. The general plan shall consist of a statement of community goals and development policies. It shall include maps, any necessary diagrams and text setting forth objectives, principles, standards and plan proposals. The plan shall include the following elements:

1. A land use element that:

(a) Designates the proposed general distribution and location and extent of such uses of the land for housing, business, industry, agriculture, recreation, education, public buildings and grounds, open space and other categories of public and private uses of land as may be appropriate to the municipality.

(b) Includes a statement of the standards of population density and building intensity recommended for the various land use categories covered by the plan.

(c) Identifies specific programs and policies that the municipality may use to promote infill or compact form development activity and locations where those development patterns should be encouraged.

(d) Includes consideration of air quality and access to incident solar energy for all general categories of land use.

(e) Includes policies that address maintaining a broad variety of land uses, including the range of uses existing in the municipality when the plan is adopted, readopted or amended.

(f) For cities and towns with territory in the vicinity of a military airport or ancillary military facility as defined in section 28-8461, includes consideration of military airport or ancillary military facility operations. On or before December 31, 2005, if a city or town includes land in a high noise or accident potential zone as defined in section 28-8461, the city or town shall identify the boundaries of the high noise or accident potential zone in its general plan for purposes of planning land uses in the high noise or accident potential zone that are compatible with the operation of the military airport or ancillary military facility pursuant to section 28-8481, subsection J.

(g) Includes sources of currently identified aggregates from maps that are available from state agencies, policies to preserve currently identified aggregates sufficient for future development and policies to avoid incompatible land uses, except that this subdivision shall not be construed to affect any permitted underground storage facility or limit any person's right to obtain a permit for an underground storage facility pursuant to title 45, chapter 3.1.

2. A circulation element consisting of the general location and extent of existing and proposed freeways, arterial and collector streets, bicycle routes and any other modes of transportation as may be appropriate, all correlated with the land use element of the plan.

D. For cities and towns having a population of more than two thousand five hundred persons but less than ten thousand persons and whose population growth rate exceeded an average of two per cent per year for the ten year period before the most recent United States decennial census and for cities and towns having a population of ten thousand or more persons according to the most recent United States decennial census, the general plan shall include, and for other cities and towns the general plan may include:

1. An open space element that includes:

(a) A comprehensive inventory of open space areas, recreational resources and designations of access points to open space areas and resources.

(b) An analysis of forecasted needs, policies for managing and protecting open space areas and resources and implementation strategies to acquire additional open space areas and further establish recreational resources.

(c) Policies and implementation strategies designed to promote a regional system of integrated open space and recreational resources and a consideration of any existing regional open space plans.

2. A growth area element, specifically identifying those areas, if any, that are particularly suitable for planned multimodal transportation and infrastructure expansion and improvements designed to support a planned concentration of a variety of uses, such as residential, office, commercial, tourism and industrial uses. This element shall include policies and implementation strategies that are designed to:

(a) Make automobile, transit and other multimodal circulation more efficient, make infrastructure expansion more economical and provide for a rational pattern of land development.

(b) Conserve significant natural resources and open space areas in the growth area and coordinate their location to similar areas outside the growth area's boundaries.

(c) Promote the public and private construction of timely and financially sound infrastructure expansion through the use of infrastructure funding and financing planning that is coordinated with development activity.

3. An environmental planning element that contains analyses, policies and strategies to address anticipated effects, if any, of plan elements on air quality, water quality and natural resources associated with proposed development under the general plan. The policies and strategies to be developed under this element shall be designed to have community-wide applicability and shall not require the production of an additional environmental impact statement or similar analysis beyond the requirements of state and federal law.

4. A cost of development element that identifies policies and strategies that the municipality will use to require development to pay its fair share toward the cost of additional public service needs generated by new development, with appropriate exceptions when in the public interest. This element shall include:

(a) A component that identifies various mechanisms that are allowed by law and that can be used to fund and finance additional public services necessary to serve the development, including bonding, special taxing districts, development fees, in lieu fees, facility construction, dedications and service privatization.

(b) A component that identifies policies to ensure that any mechanisms that are adopted by the municipality under this element result in a beneficial use to the development, bear a reasonable relationship to the burden imposed on the municipality to provide additional necessary public services to the development and otherwise are imposed according to law.

5. A water resources element that addresses:

(a) The known legally and physically available surface water, groundwater and effluent supplies.

(b) The demand for water that will result from future growth projected in the general plan, added to existing uses.

(c) An analysis of how the demand for water that will result from future growth projected in the general plan will be served by the water supplies identified in subdivision (a) of this paragraph or a plan to obtain additional necessary water supplies.

E. The general plan shall include for cities of fifty thousand persons or more and may include for cities of less than fifty thousand persons the following elements or any part or phase of the following elements:

1. A conservation element for the conservation, development and utilization of natural resources, including forests, soils, rivers and other waters, harbors, fisheries, wildlife, minerals and other natural resources. The conservation element may also cover:

(a) The reclamation of land.

(b) Flood control.
(c) Prevention and control of the pollution of streams and other waters.
(d) Regulation of the use of land in stream channels and other areas required for the accomplishment of the conservation plan.
(e) Prevention, control and correction of the erosion of soils, beaches and shores.
(f) Protection of watersheds.

2. A recreation element showing a comprehensive system of areas and public sites for recreation, including the following and, if practicable, their locations and proposed development:
(a) Natural reservations.
(b) Parks.
(c) Parkways and scenic drives.
(d) Beaches.
(e) Playgrounds and playfields.
(f) Open space.
(g) Bicycle routes.
(h) Other recreation areas.

3. The circulation element provided for in subsection C, paragraph 2 of this section shall also include for cities of fifty thousand persons or more and may include for cities of less than fifty thousand persons recommendations concerning parking facilities, building setback requirements and the delineations of such systems on the land, a system of street naming and house and building numbering and other matters as may be related to the improvement of circulation of traffic. The circulation element may also include:
(a) A transportation element showing a comprehensive transportation system, including locations of rights-of-way, terminals, viaducts and grade separations. This element of the plan may also include port, harbor, aviation and related facilities.

(b) A transit element showing a proposed system of rail or transit lines or other mode of transportation as may be appropriate.

4. A public services and facilities element showing general plans for police, fire, emergency services, sewage, refuse disposal, drainage, local utilities, rights-of-way, easements and facilities for them.

5. A public buildings element showing locations of civic and community centers, public schools, libraries, police and fire stations and other public buildings.

6. A housing element consisting of standards and programs for the elimination of substandard dwelling conditions, for the improvement of housing quality, variety and affordability and for provision of adequate sites for housing. This element shall contain an identification

and analysis of existing and forecasted housing needs. This element shall be designed to make equal provision for the housing needs of all segments of the community regardless of race, color, creed or economic level.

7. A conservation, rehabilitation and redevelopment element consisting of plans and programs for:
    (a) The elimination of slums and blighted areas.

    (b) Community redevelopment, including housing sites, business and industrial sites and public building sites.

    (c) Other purposes authorized by law.

8. A safety element for the protection of the community from natural and artificial hazards, including features necessary for such protection as evacuation routes, peak load water supply requirements, minimum road widths according to function, clearances around structures and geologic hazard mapping in areas of known geologic hazards.

9. A bicycling element consisting of proposed bicycle facilities such as bicycle routes, bicycle parking areas and designated bicycle street crossing areas.

10. An energy element that includes:
    (a) A component that identifies policies that encourage and provide incentives for efficient use of energy.

    (b) An assessment that identifies policies and practices that provide for greater uses of renewable energy sources.

11. A neighborhood preservation and revitalization element, including:
    (a) A component that identifies city programs that promote home ownership, that provide assistance for improving the appearance of neighborhoods and that promote maintenance of both commercial and residential buildings in neighborhoods.
    (b) A component that identifies city programs that provide for the safety and security of neighborhoods.

F. The water resources element of the general plan does not require:
1. New independent hydrogeologic studies.
2. The city or town to be a water service provider.

G. The land use element of a general plan of a city with a population of more than one million persons shall include protections from encroaching development for any shooting range that is owned by this state and that is located within or adjacent to the exterior municipal boundaries on or before January 1, 2004. The general plan shall establish land use categories within at least one-half mile from the exterior boundaries of the shooting range that are consistent with the continued existence of the shooting range and that exclude incompatible uses such as residences, schools, hotels, motels, hospitals or churches except that land zoned to permit these incompatible uses on August 25, 2004 are exempt from this exclusion. For the purposes of this subsection, "shooting range" means a permanently located and improved area that is

designed and operated for the use of rifles, shotguns, pistols, silhouettes, skeet, trap, black powder or any other similar sport shooting in an outdoor environment. Shooting range does not include:

1. Any area for the exclusive use of archery or air guns.

2. An enclosed indoor facility that is designed to offer a totally controlled shooting environment and that includes impenetrable walls, floor and ceiling, adequate ventilation, lighting systems and acoustical treatment for sound attenuation suitable for the range's approved use.

3. A national guard facility located in a city or town with a population of more than one million persons.

4. A facility that was not owned by this state before January 1, 2002.

H. The policies and strategies to be developed under these elements shall be designed to have community-wide applicability and this section does not authorize the imposition of dedications, exactions, fees or other requirements that are not otherwise authorized by law.

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9-461.06. Adoption and amendment of general plan; expiration and readoption

A. In municipalities that have territory in a high noise or accident potential zone as defined in section 28-8461, the legislature finds that in general plans and amendments to general plans land use compatibility with the continued operation of a military airport or ancillary military facility as defined in section 28-8461 is a matter of statewide concern.

B. The general plan and any amendment to such plan shall be adopted or readopted in the manner provided in this article.

C. The governing body shall:

1. Adopt written procedures to provide effective, early and continuous public participation in the development and major amendment of general plans from all geographic, ethnic and economic areas of the municipality. The procedures shall provide for:
   (a) The broad dissemination of proposals and alternatives.
   (b) The opportunity for written comments.
   (c) Public hearings after effective notice.
   (d) Open discussions, communications programs and information services.
   (e) Consideration of public comments.

2. Consult with, advise and provide an opportunity for official comment by public officials and agencies, the county, school districts, associations of governments, public land management agencies, the military airport if the municipality has territory in the vicinity of a military airport or ancillary military facility as defined in section 28-8461, other appropriate government jurisdictions, public utility companies, civic, educational, professional and other organizations, property owners and citizens generally to secure maximum coordination of plans and to indicate properly located sites for all public purposes on the general plan.

D. At least sixty days before the general plan or an element or major amendment of a general plan is noticed pursuant to subsection E of this section, the planning agency shall transmit the proposal to the planning commission, if any, and the governing body and shall submit a copy for review and further comment to:

1. The planning agency of the county in which the municipality is located.

2. Each county or municipality that is contiguous to the corporate limits of the municipality or its area of extraterritorial jurisdiction.

3. The regional planning agency within which the municipality is located.

4. The department of commerce or any other state agency that is subsequently designated as the general planning agency for this state.

5. The department of water resources for review and comment on the water resources element, if a water resources element is required.

6. If the general plan or an element or amendment of the general plan is applicable to territory in the vicinity of a military airport or ancillary military facility as defined in section 28-8461, the military airport.

7. If the general plan or an element or major amendment of the general plan is applicable to property in the high noise or accident potential zone of a military airport or ancillary military facility as defined in section 28-8461, the attorney general. For the purposes of this paragraph, "major amendment" means a substantial alteration of the municipality's land use mixture or balance as established in the municipality's existing general plan land use element.

8. Any person or entity that requests in writing to receive a review copy of the proposal.

E. If the municipality has a planning commission, after considering any recommendations from the review required under subsection D of this section the planning commission shall hold at least one public hearing before approving a general plan or any amendment to such plan. When the general plan or any major amendment is being adopted, planning commissions in municipalities having populations over twenty-five thousand persons shall hold two or more public hearings at different locations within the municipality to promote citizen participation. Notice of the time and place of a hearing and availability of studies and summaries related to the hearing shall be given at least fifteen and not more than thirty calendar days before the hearing by:

1. Publication at least once in a newspaper of general circulation published or circulated in the municipality, or if there is none, the notice shall be posted in at least ten public places in the municipality.

2. Such other manner in addition to publication as the municipality may deem necessary or desirable.

F. Action by the planning commission on the general plan or any amendment to the plan shall be transmitted to the governing body of the municipality.

G. Before adopting the general plan, or any amendment to it, the governing body shall hold at least one public hearing. Notice of the time and place of the hearing shall be given in the time and manner provided for the giving of notice of the hearing by the planning commission as specified in subsection E of this section.

H. The adoption or readoption of the general plan or any amendment to such plan shall be by resolution of the governing body of the municipality, after notice as provided for in subsection E of this section. The adoption or readoption of or a major amendment to the general plan shall be approved by affirmative vote of at least two-thirds of the members of the governing body of the municipality. All major amendments to the general plan proposed for adoption by the governing body of a municipality shall be presented at a single public hearing during the calendar year the proposal is made. The general plan, or any amendment to the plan, shall be endorsed in the manner provided by the governing body to show that it has been adopted by the governing body. If the municipality includes property in the high noise or accident

potential zone of a military airport or ancillary military facility as defined in section 28-8461, the governing body of the municipality shall send notice of the approval, adoption or readoption of the general plan or major amendment to the general plan to the attorney general by certified mail, return receipt requested, within three business days after the approval, adoption or readoption. If the attorney general determines the approval, adoption or readoption of the general plan or major amendment to the general plan is not in compliance with section 28-8481, subsection J, the attorney general shall notify the municipality by certified mail, return receipt requested, of the determination of noncompliance. The municipality shall receive the notice from the attorney general within twenty-five days after the notice from the municipality to the attorney general is mailed pursuant to this subsection. The effective date of any approval, adoption or readoption of, or major amendment to, the general plan shall be thirty days after the governing body's receipt of the attorney general's determination of noncompliance. Within thirty days after the receipt of a determination of noncompliance by the attorney general as prescribed by this section, the governing body of the municipality shall reconsider any approval, adoption or readoption of, or major amendment to, the general plan that impacts property in the high noise or accident potential zone of a military airport or ancillary military facility as defined in section 28-8461. If the governing body reaffirms a prior action subject to an attorney general's determination of noncompliance pursuant to this section, the attorney general may institute a civil action pursuant to section 28-8481, subsection L. If the governing body timely sends notice pursuant to this subsection and the attorney general fails to timely notify the governing body of a determination of noncompliance, the general plan or major amendment to the general plan shall be deemed to comply with section 28-8481, subsection J. If the motion to adopt or readopt a general plan or an amendment to the general plan fails to pass, the governing body may reconsider the motion in any manner allowed by the governing body's rules of procedure, but any subsequent motion for the adoption or readoption of the general plan or a major amendment to the general plan must be approved by an affirmative vote of at least two-thirds of the members of the governing body. For the purposes of this subsection, "major amendment" means a substantial alteration of the municipality's land use mixture or balance as established in the municipality's existing general plan land use element. The municipality's general plan shall define the criteria to determine if a proposed amendment to the general plan effects a substantial alteration of the municipality's land use mixture or balance as established in the municipality's existing general plan land use element.

I. If the municipality does not have a planning commission, the only procedural steps required for the adoption of the general plan, or any amendment to such plan, shall be those provided in this article for action by the governing body.

J. A copy of the adopted general plan of a municipality shall be sent to the planning agency of the county within which the municipality is located, and such plan or any portion of the plan may be adopted as a part of the county general plan.

K. A general plan, with any amendments, is effective for up to ten years from the date the plan was initially adopted and ratified pursuant to subsection M of this section, or until the plan is readopted pursuant to this subsection and ratified pursuant to subsection M of this section or a new plan is adopted pursuant to this subsection and ratified pursuant to subsection M of this section, and becomes effective. On or before the tenth anniversary of the plan's most recent adoption, the governing body of the municipality shall either readopt the existing plan for an additional term of up to ten years or shall adopt a new general plan as provided by this article.

L. Except for general plans that are required to be submitted to the voters for ratification pursuant to subsection M of this section, the adoption or readoption of a general plan, and any amendment to a general plan, shall not be enacted as an emergency measure and is subject to referendum as provided by article IV, part 1, section 1, subsection (8), Constitution of Arizona, and title 19, chapter 1, article 4.

M. The governing body of a city or town having a population of more than two thousand five hundred persons but less than ten thousand persons and whose population growth rate exceeded an average of two per cent per year for the ten year period before the most recent United States decennial census, and any city or town having a population of ten thousand or more persons, shall submit each new general plan adopted pursuant to subsection K of this section to the voters for ratification at the next regularly scheduled municipal election or at a special election scheduled at least one hundred twenty days after the governing body adopted the plan pursuant to section 16-204. The governing body shall include a general description of the plan and its elements in the municipal election pamphlet and shall provide public copies of the plan in at least two locations that are easily accessible to the public and may include posting on the municipality's official internet website. If a majority of the qualified electors voting on the proposition approves the new plan, it shall become effective as provided by law. If a majority of the qualified electors voting on the proposition fails to approve the new plan, the current plan remains in effect until a new plan is approved by the voters pursuant to this subsection. The governing body shall either resubmit the proposed new plan, or revise the new plan as provided by this section, for subsequent submission to the voters at the next regularly scheduled municipal election or at a special election scheduled at least one hundred twenty days after the governing body readopted the new or revised new plan. All subsequent adoptions and submissions of the new plan or revised plans must comply with the procedures prescribed by this section until the plan is ratified.

N. In applying an open space element or a growth element of a general plan a municipality shall not designate private land or state trust land as open space, recreation, conservation or agriculture unless the municipality receives the written consent of the landowner or provides an alternative, economically viable designation in the general plan or zoning ordinance, allowing at least one residential dwelling per acre. If the landowner is the prevailing party in any action brought to enforce this subsection, a court shall award fees and other expenses to the landowner. A municipality may designate land as open space without complying with the requirements of this subsection if the land was zoned as open space and used as a golf course pursuant to a zoning ordinance adopted pursuant to article 6.1 of this chapter before May 1, 2000 and the designation does not impose additional conditions, limitations or restrictions on the golf course, unless the land is state trust land that was not planned and zoned as open space pursuant to title 37, chapter 2, article 5.1.

O. A person, after having participated in the public hearing pursuant to subsection H of this section, may file a petition for special action in superior court to review the governing body's decision that does not comply with the mandatory requirement prescribed in section 9-461.05, subsection C, paragraph 1, subdivision (g) within thirty days after the governing body has rendered its decision. The court may affirm, reverse or remand to the governing body, in whole or in part, the decision reviewed for further action that is necessary to comply with the mandatory requirements prescribed in section 9-461.05, subsection C, paragraph 1, subdivision (g).

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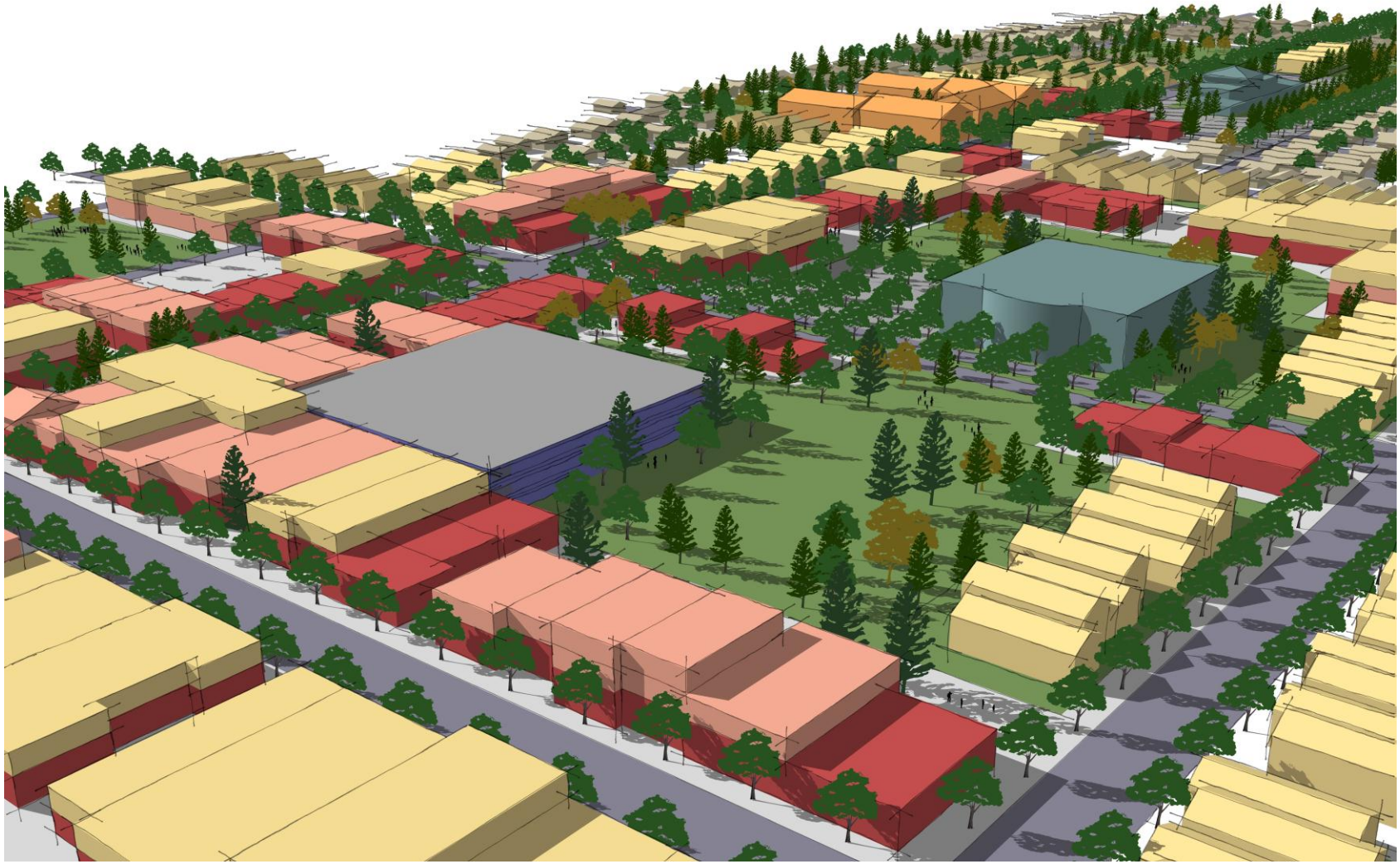
Appendix D – Visualization Support

Samples of visuals that were developed are included in this Appendix. Many other 'views' of the illustration were developed and provided to FMPO and the City of Flagstaff.

Overall Model-A

Urban-A

Urban-C



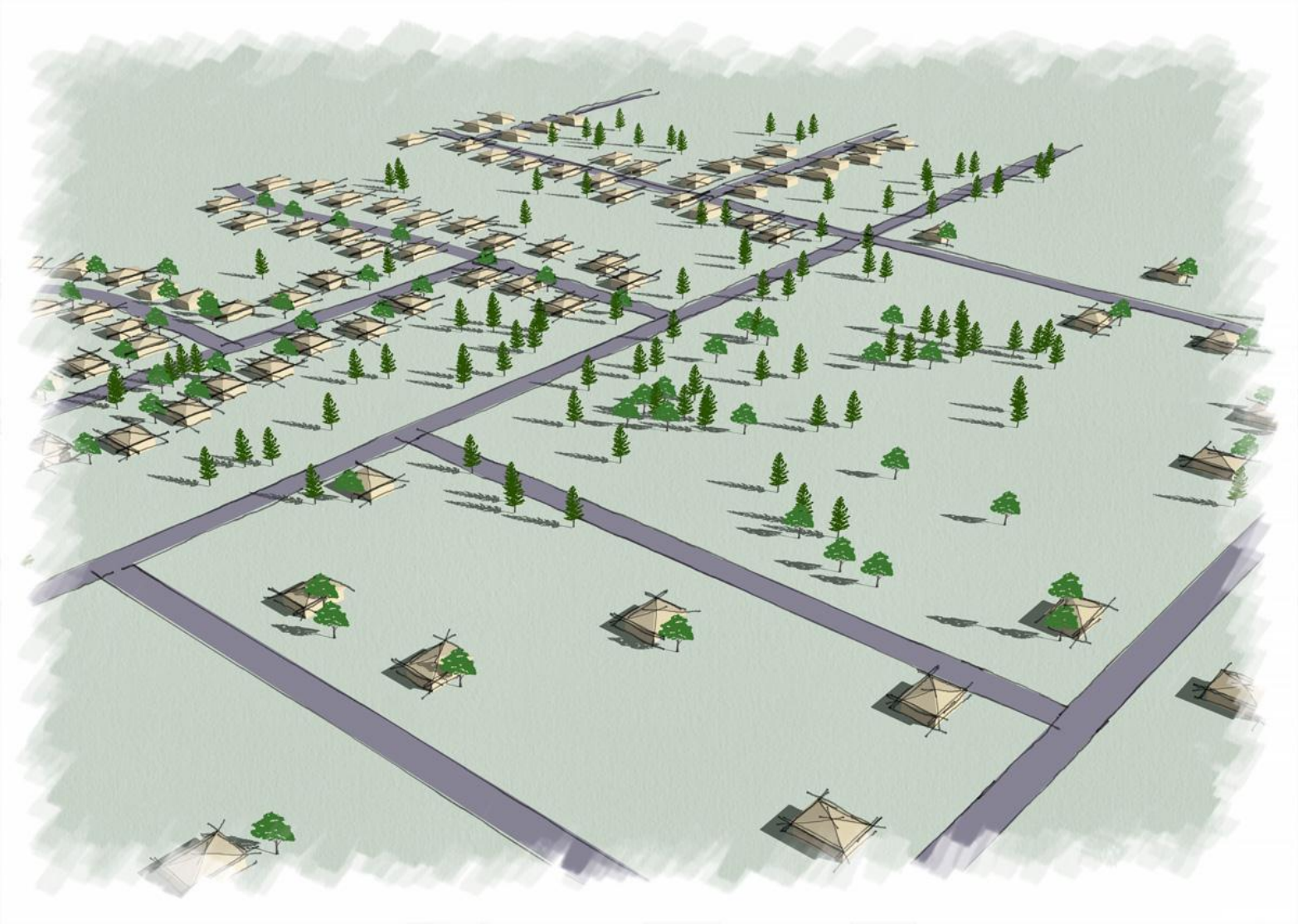
Urban-Spread-A

Urban-Spread-C

Suburban-B

Employment Center 1

Rural Neighborhood 1



Rural Neighborhood Center 1

Suburban Neighborhood 1

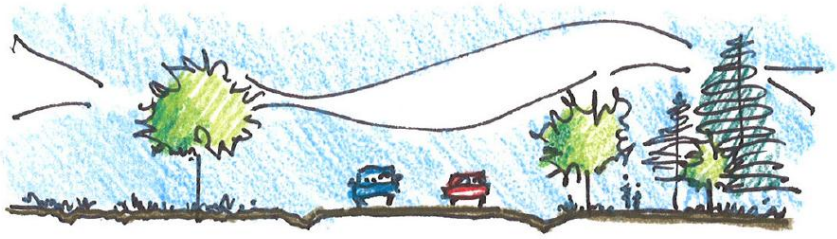
Suburban Neighborhood Center 1

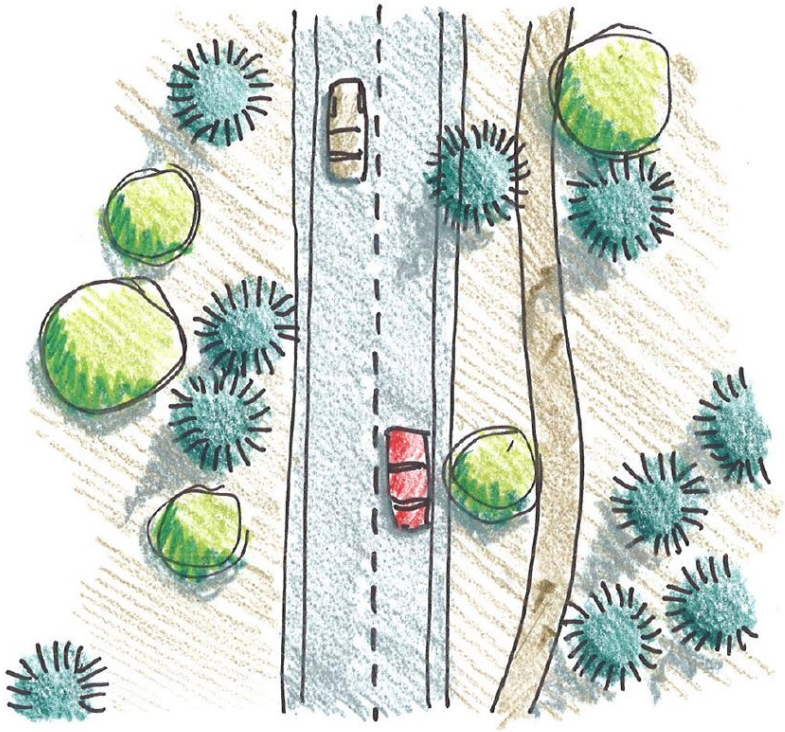
Urban Neighborhood 1

Urban Regional Center

Rural Streetscape Section

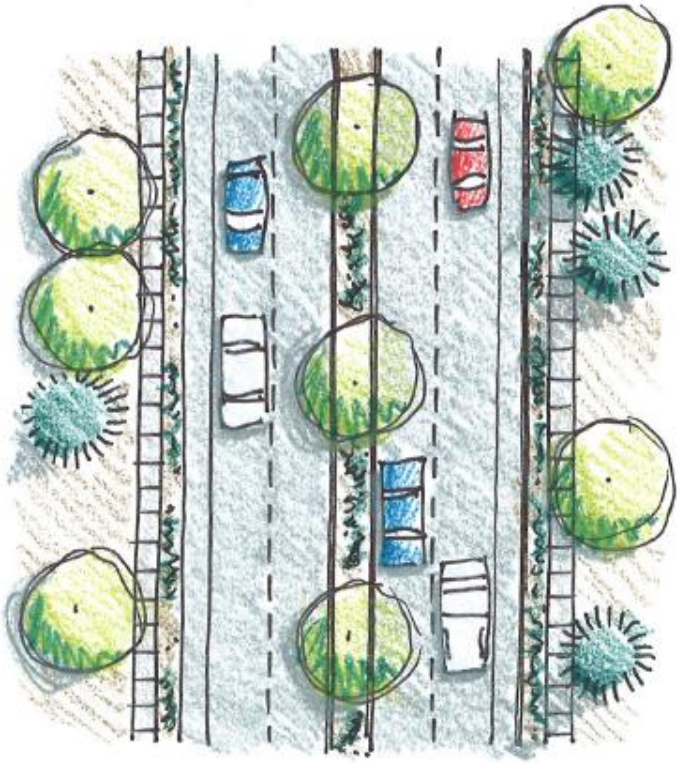
RURAL STREETSCAPE SECTION 12.6.2012





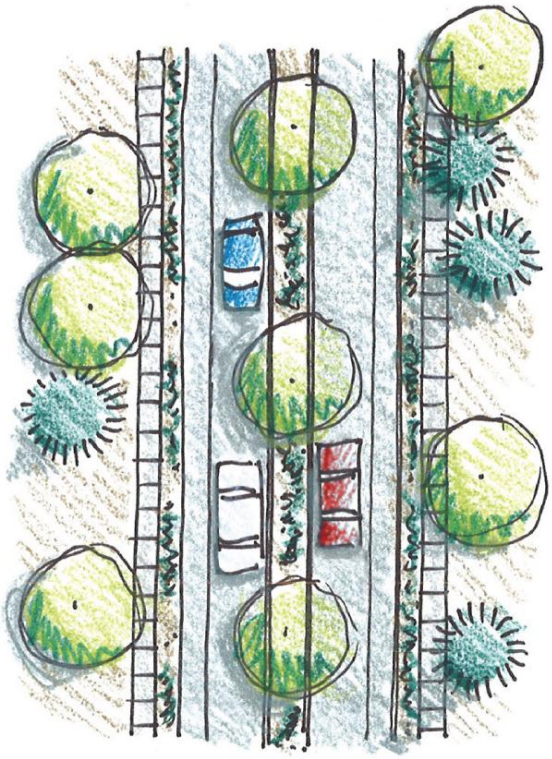
Suburban Streetscape (2 lanes)

SUBURBAN STREETSCAPE SECTION 12.6.2012

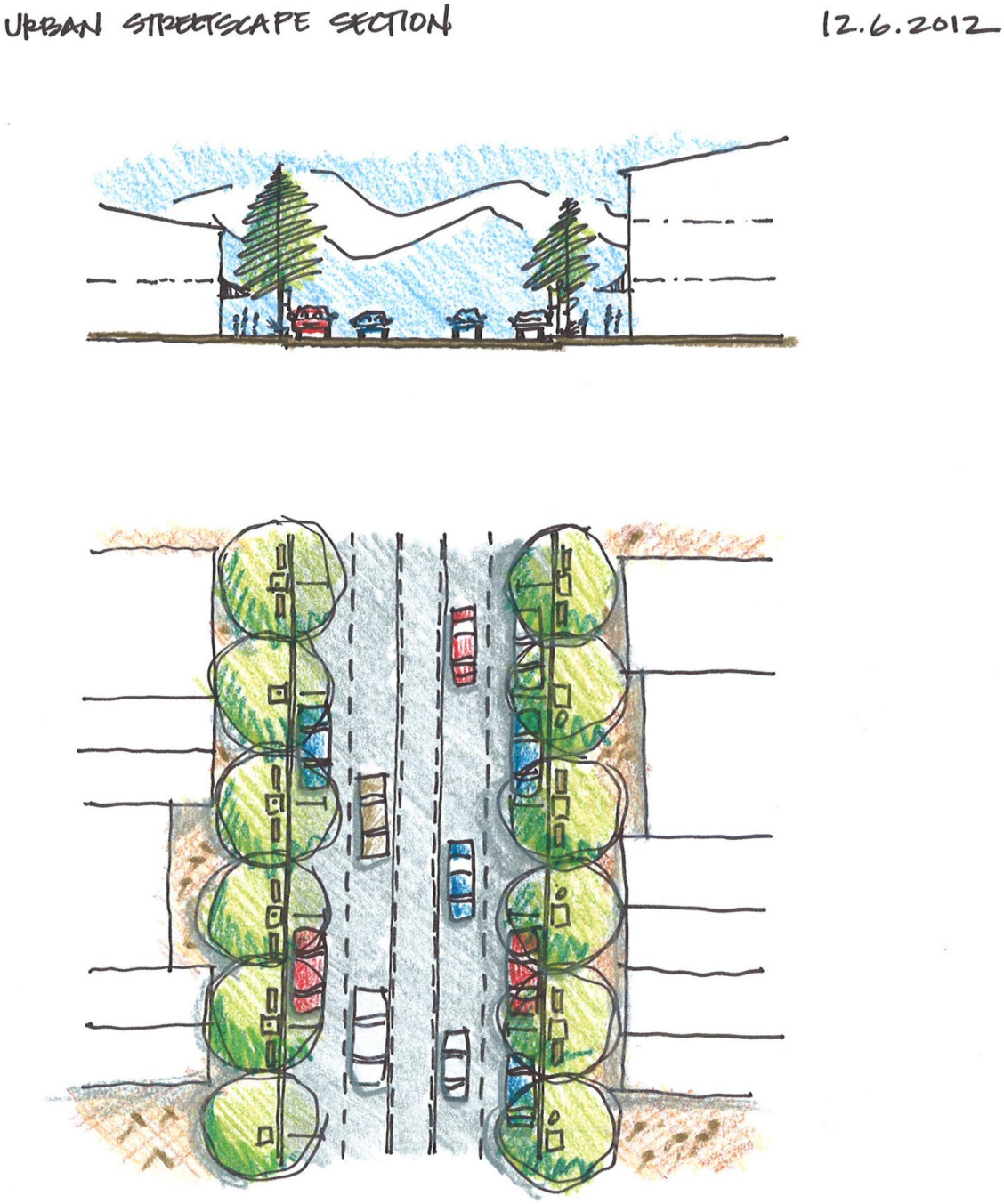


Suburban Streetscape (1 lane)

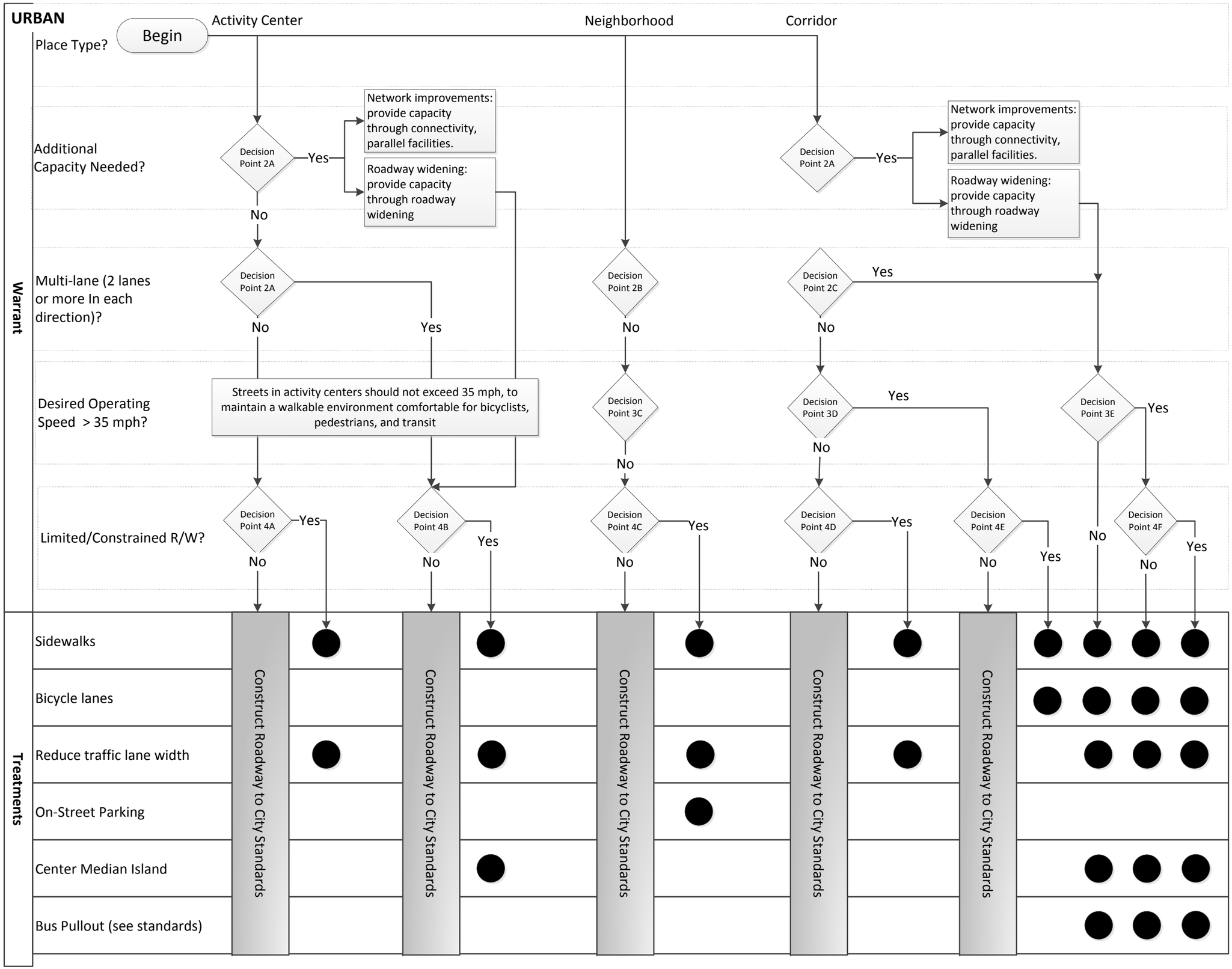
SUBURBAN STREETSCAPE SECTION 12.6.2012



Urban Streetscape (2 lanes)



Appendix E – Decision Matrix Flow Charts


URBAN
Begin
Place Type?
Activity Center
Neighborhood
Corridor
Additional Capacity Needed?
Decision Point 2A
Yes
No
Network improvements: provide capacity through connectivity, parallel facilities.
Roadway widening: provide capacity through roadway widening
Multi-lane (2 lanes or more In each direction)?
Decision Point 2B
Decision Point 2C
Desired Operating Speed > 35 mph?
Streets in activity centers should not exceed 35 mph, to maintain a walkable environment comfortable for bicyclists, pedestrians, and transit
Decision Point 3C
Decision Point 3D
Decision Point 3E
Limited/Constrained R/W?
Decision Point 4A
Decision Point 4B
Decision Point 4C
Decision Point 4D
Decision Point 4E
Decision Point 4F
Warrant
Treatments
Sidewalks
Bicycle lanes
Reduce traffic lane width
On-Street Parking
Center Median Island
Bus Pullout (see standards)
Construct Roadway to City Standards