Appendix C: Growth and Development Allocation and Evaluation Process for the Regional Growth Scenarios

As described in Chapter 6, Imagine Central Arkansas includes a scenario planning process used to explore alternatives for growth, development and transportation investment. Two scenarios were developed that represent hypothetical situations for how the region could develop by the year 2040: Emerging Trend scenario and the Regional Vision scenario.

CommunityViz, a geographic information system (GIS) based scenario planning tool, is the primary tool used to develop and evaluate the scenarios. CommunityViz estimates the development potential for land and the impacts of that development potential across a wide range of indicators. In addition to CommunityViz, a spreadsheet –based tool was developed to overcome the inability of CommunityViz to allocate multiple control totals.

1. PRE-ALLOCATION

Metroplan previously allocated projected regional socioeconomic data to TELUM Zones. These zones correspond closely with Census Tracts, but in about ten cases tracts were split into two or three smaller zones. This revised small-area geography was originally intended for use within the TELUM land use forecasting system. TELUM zone geography was retained to maintain consistency with previous data work, as well as to simplify allocations to the TAZ level.

The system for forecasting employment and population/housing was based on analysis of two main factors within each zone: (1) existing land use and/or vacancy within the zone, and (2) transportation accessibility. Additional factors included redevelopment potential for areas that were already built-out, and local terrain and cultural factors. The overall control total was an important influence, determining not just total population but also households and group quarters population. The TELUM zone projections demanded a certain amount of personal judgment. Past efforts using similar methods have shown good results. Metroplan "trend" forecasts by census tract for the years 2000 and 2010 have proven fairly accurate. That said, the longer term is difficult to foresee with any method.

2. OVERVIEW OF EMERGING TREND SCENARIO ALLOCATION PROCESS

2.1 EMERGING TREND SCENARIO

Scenario planning often begins with a "trend" or "business as usual" scenario that extrapolates current and emerging policies and practices for development. The Imagine Central Arkansas Emerging Trend scenario will form the basis for socioeconomic data forecasts for the four-county region of Faulkner, Lonoke, Pulaski and Saline Counties.

Under the Emerging Trend scenario, growth is allocated in a pattern that both continues the emerging suburban development pattern of moderate-density residential subdivisions, low density rural development and highway oriented commercial, but that also includes a limited

amount of smaller scale mixed use centers surrounded by compact, walkable traditional neighborhoods, as well as redevelopment and some intensification in downtown core areas (such as in Little Rock and North Little Rock).

2.2 ALLOCATION TOOL

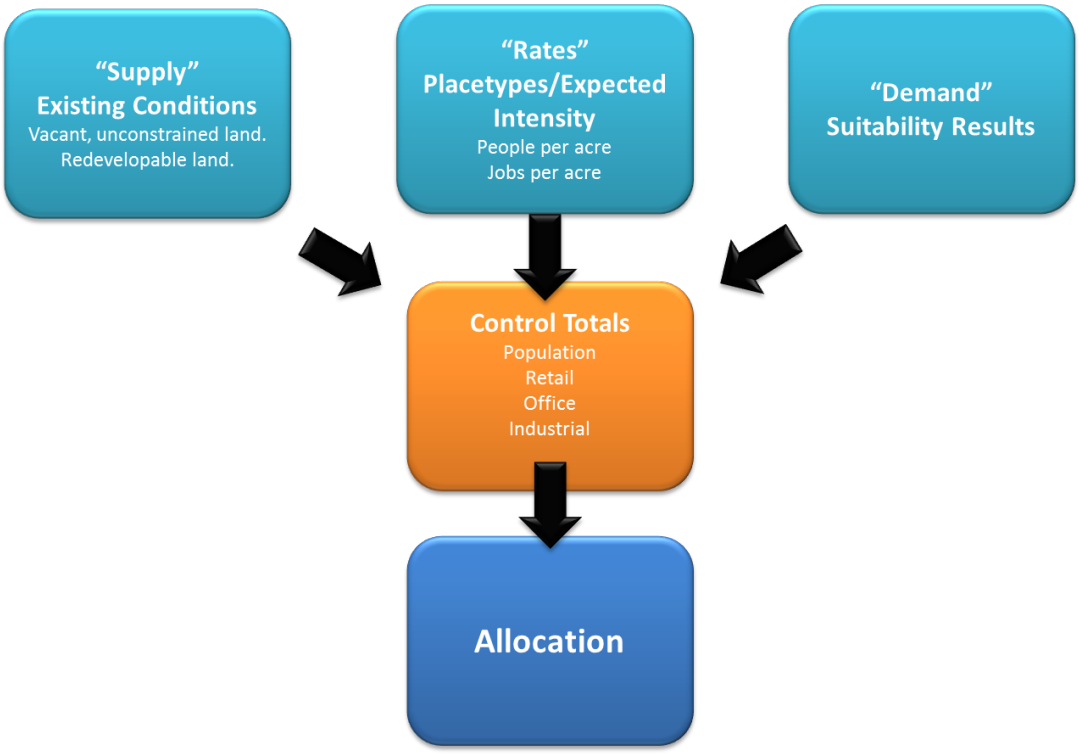
A "top-down" approach is used for socioeconomic data allocation, in which land use is allocated until prescribed control totals are met. Specifically, the allocation process includes control totals for four attributes (population, retail employment, office employment and basic employment), and a forecast year of 2040 for each of the TELUM zones in the region.

CommunityViz is configured to allocate one control total within any given study area. Thus, use of CommunityViz to allocate the Emerging Trend scenario would entail over 600 separate models (four separate attributes and over 150 TELUM zones). Obviously, this approach would not be practical. As a result, a spreadsheet-based method was developed to allocate the Emerging Trend scenario and estimate the socioeconomic data.

The process used to allocate socioeconomic data for the Emerging Trend scenario is a spreadsheet-based method that allocates control totals for each attribute and TELUM zone and. It relies on three basic inputs:

- "Supply" – Inventories of vacant and redevelopable land based on existing conditions.
- "Demand" – A spatial measure of demand; where growth is most likely to happen.
- "Rates" – The rates of consumption (dwelling units per acre, employees per acre, etc.).

How and where new growth is allocated depends almost exclusively on these three inputs. Each of these is explained in greater detail below.



2.3 DATA STRUCTURE

Land use is allocated to polygons that subdivide all four counties. The polygons are based on a grid of 40 acres cells, but are further subdivided to conform to census blocks, TAZs and TELUM zones so that they can be aggregated to any of these geographic units. In sum, there are 50,134 polygons in the allocation model.

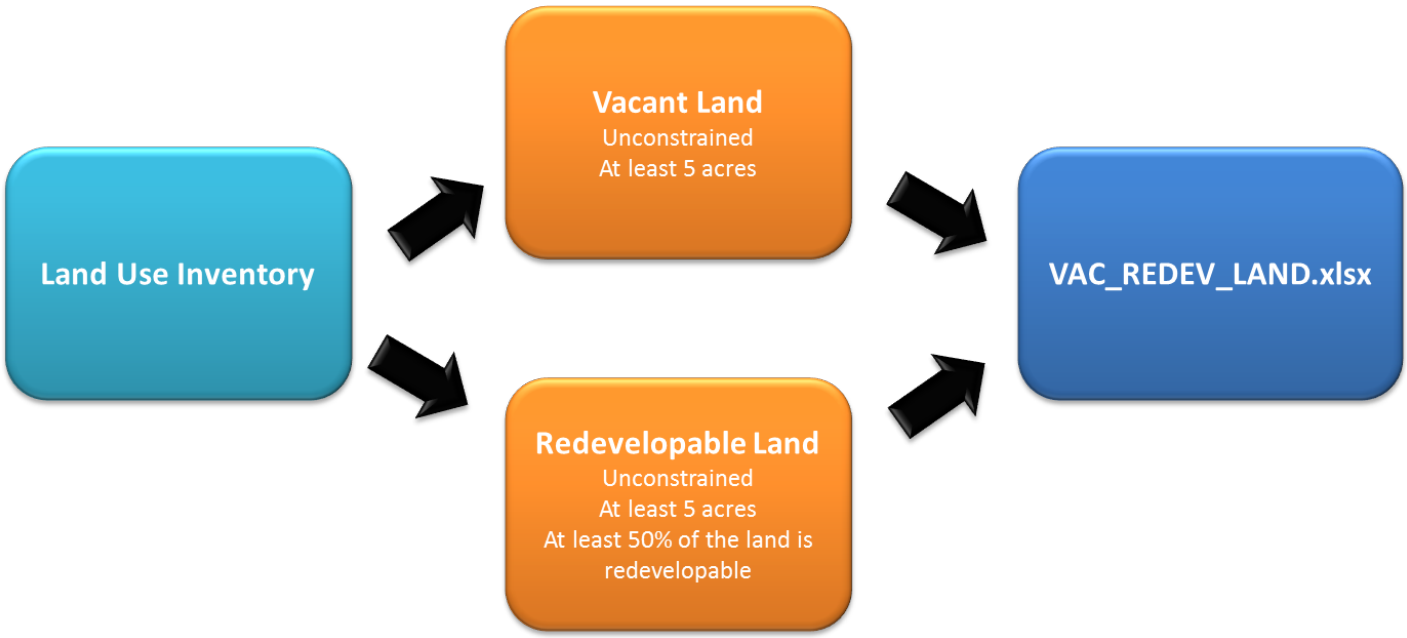
2.4 EXISTING CONDITIONS

In order to allocate future land use to polygons, it is necessary to have an understanding of existing conditions. Specifically, it is necessary to know the amount of vacant and redevelopable land within each polygon.

Land Use Inventory

Existing land use was developed from 2009 aerial photography and was manually digitized by Metroplan staff. Areas not falling into these categories are considered vacant. Land use classifications were standardized into seven broad categories:

- Single family residential
- Multi-family residential
- Commercial
- Institutional
- Industrial/transportation (including road and rail ROW)
- Parks or protected open space
- Vacant (includes agricultural and timberlands)



Vacant Land

Vacant land within each polygon was derived from the land use inventory. A given polygon is considered eligible for growth allocation if the vacant land meets the following criteria:

- Minimum of five acres for office and residential development.
- Minimum of ten acres for commercial and industrial development.

Redevelopable Land

In addition to vacant land, it is assumed that future growth will also occur through redevelopment. Existing development within a given parcel is considered eligible for redevelopment if it meets the following criteria:

- Non-residential land.
- Minimum of five acres in size.
- At least 50 percent of the non-residential land meets the other criteria for redevelopment.

Environmental Constraints

Environmental constraints were taken into account when determining vacant and redevelopable land. Specifically, vacant land that exists on wetlands or very steep (greater than 20 percent) is defined as "constrained" and is not eligible for new growth allocation.

2.5 SUITABILITY ANALYSIS

The "demand" portion of the allocation process was derived using the Suitability Analysis module within CommunityViz. The Suitability Analysis is based on an overlay of several factors that influence the location of new growth.

Suitability Factors and Weighting

The Suitability Analysis replicates demand for future growth by taking into account several factors that currently influence development within the region (i.e. emerging development trends). Each polygon receives a relative score from zero to 100 based how "suitable" it is for a given type of development.

Suitability factors are weighted on a scale of one to ten based on the amount of influence of that a given factor has on new growth. A score of ten indicates the greatest amount of influence.

Suitability Analysis Weighting Factors

Suitability Factor	Applicable to				Description	Scoring Strategy
	Residential	Commercial/Retail	Professional/Office	Industrial		
Natural Systems						
Topography	6.4	6.6	6.1	6.8	Average slope of the terrain with each polygon.	The higher the average slope, the lower the score.
Floodplains	7.9	7.5	7.3	6.8	Portion of polygon within the 100-year floodplain.	The higher % of floodplain coverage, the lower the score
Wetlands	8.1	7.7	7.3	7.4	Portion of polygon within wetlands.	The higher % of wetlands coverage, the lower the score
Infrastructure/Accessibility						
Proximity to major roads	7.8	8.7	7.5	7.4	Straightline distance to the nearest major surface road.	The closer the road, the higher the score.
Proximity to interchanges	6.5	8.2	6.9	7.6	Straightline distance to the nearest interchange.	The closer the interchange, the higher the score.
Regional accessibility	8	7.4	7.2	6.7	TAZ-level index of accessibility to all other TAZs in the travel demand model.	The higher the accessibility, the higher the score.
Proximity to rail lines				7.1	Straightline distance to the nearest railroad.	The closer the rail line, the higher the score.
Proximity to intermodal facilities				7	Straightline distance to the nearest intermodal facilities.	The closer the facility the higher the score.
Proximity to existing urban services	7.8	7.5	6.5	7.6	Straightline distance to the nearest municipal limits.	The closer the municipal limits, the higher the score.
Community Services						
Proximity to parks	7.7				Straightline distance to existing park and recreational areas	The closer the park, the higher the score
Proximity to schools	7.2				Straightline distance to existing schools	The closer the school, the higher

						the score.

Suitability Analysis Weighting Factors (cont.)

Suitability Factor	Applicable to				Description	Scoring Strategy
	Residential	Commercial/Retail	Professional/Office	Industrial		
Other						
Proximity to retail centers	7.1	7.2			Straightline distance to existing retail centers	The closer the retail center, the higher the score.
Accidental Potential Zone near Little Rock National Airport and the LRAFB	6.7	5.6	5.8		Penalizes a polygon if it is located within the Accidental Potential Zone	The higher the percentage of Accidental Potential Zone coverage, the lower the score.
Bus route access	4.4	5.2	4.5	3.8	Awards a polygon if it is located within a 1/4 mile buffer of CATA bus routes	Score higher for polygons located within walking distance to CATA bus routes.
Streetcar access	4.2	4.7	4.4		Awards a polygon if it is located within a 1/4 mile buffer of RiverRail routes	Score higher for polygons located within walking distance to RiverRail.

Normalization

The resulting suitability scores are calculated at the regional level, so that the most suitable polygon in the four-county region receives a score of 100. However, control total allocations are performed at the TELUM zone level. As a result, each suitability score (commercial, office, industrial, residential) is normalized at the TELUM zone level, so that the most suitable polygon within a given TELUM zone receives a score of 100.

2.6 EMERGING TREND SCENARIO PLACETYPES

The "rate" of allocation, such as persons per acre (for residential allocations) and employees per acre (for non-residential allocations) are determined through placetypes. Placetypes are defined at the polygon level and are used as the basic "building block" of growth.

Placetype Definitions

Placetypes are used to define the character and makeup of a place, in this case polygons developed for the four county region. At a minimum, placetypes define the types of land uses that occur within a given polygon and densities and intensities, but could also be used to describe a host of attributes, such as parking, water consumption, etc.

A series of "emerging trend" placetypes, representing current and emerging development practices, were developed by the consultant and Metroplan staff for the growth allocation. The placetypes are derived from observations of several actual developments across the region and include prescribed allocation rates. Detailed definitions for each of the placetypes can be found in Chapter 6 of this document.

	Persons/Employees per Gross Acre			
Placetype	**Retail**	**Residential**	**Office**	**Industrial**
Rural Residential	0.00	0.38	0.00	0.00
Suburban Residential	0.00	3.16	0.00	0.00
Traditional Neighborhood Residential	0.00	4.00	0.00	0.00
Suburban Apartment	0.00	8.88	0.00	0.00
Commercial	9.58	0.00	7.62	0.00
Commercial Single Use	13.07	0.00	0.00	0.00
Mixed Use Center/Corridor	12.02	7.00	95.29	0.00
Mixed Use Small Town Center	17.53	1.20	21.34	0.00
Office Park	0.00	0.00	26.68	0.00
Industrial / Business Park	0.00	0.00	3.05	14.41
Industrial	0.00	0.00	0.00	16.47

Placetype Designations

In order to determine which specific allocation rate (employees/persons per gross acre) applied to a given polygon, Metroplan staff gave each polygon a placetype designation. The designations were determined through a combination of factors, including existing zoning, recent development trends and existing development. Each polygon received a separate placetype designation for the commercial, office, industrial and residential allocations.

2.7 ALLOCATION PROCESS

The allocation process itself is a stepwise, iterative process that takes into account vacant and redevelopable land, the suitability score, the placetype designation and the TELUM zone control total. A separate allocation is performed for each control total (population, retail employment, office employment and basic employment) at the 2040 forecast year.

Briefly stated, the allocation begins with the retail employment category and the 2014 forecast year. The spreadsheet allocates growth based on the following logic:

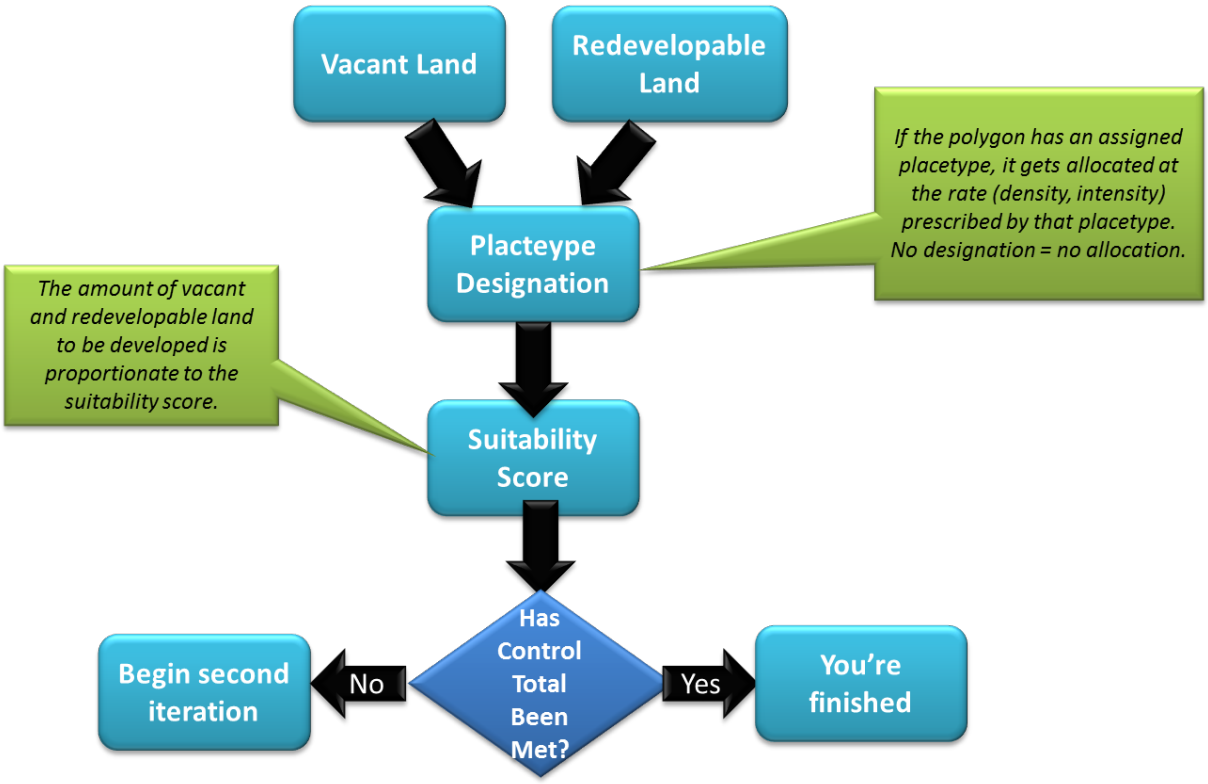
- Suitability score: Highest scoring polygons are allocated growth first. Growth is allocated in direct proportion to the score (i.e. a score of 80 means that 80 percent of the vacant/redevelopable land will be developed).
- Vacant/redevelopable land: If a given polygon has no vacant or redevelopable land, no growth will be allocated.
- Placetype designation: If eligible for growth allocation, the polygon will be allocated growth at a rate (employees/persons per gross acre) prescribed by its placetype designation. If a placetype is not oriented to the attributes of a given allocation, it will not be allocated (for example, an Industrial Park placetype designation will not be allocated growth for a retail employment allocation).
- Control total: If a control total for a given attribute and horizon year has already been met, that polygon will not be allocated growth.

Once a polygon has been allocated growth, the amount of land that has been developed will be subtracted from the vacant and redevelopable land inventory. The allocation occurs in the following order: retail, office, residential, industrial.

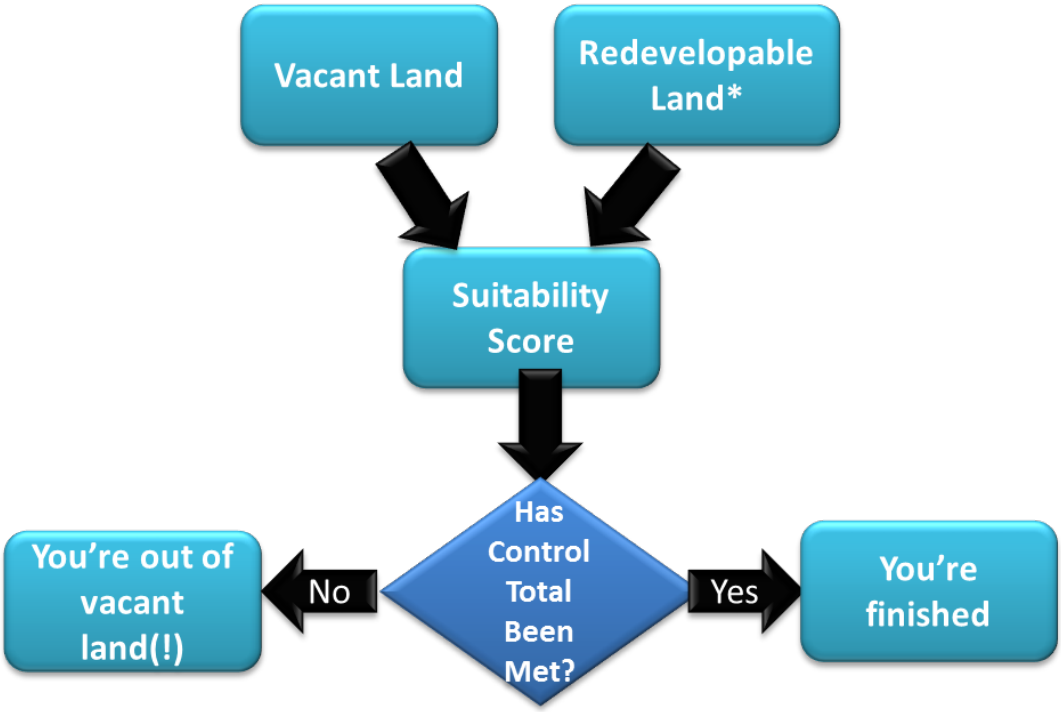
Once the allocation process has passed through all four categories for the 2040 forecast year, then if a given control total has not been fully allocated, a second iteration will occur. During

the second iteration, the highest scoring polygon is allocated additional growth in direct proportion to its score and the amount of remaining vacant and redevelopable land.

Allocation Process: 1st Iteration

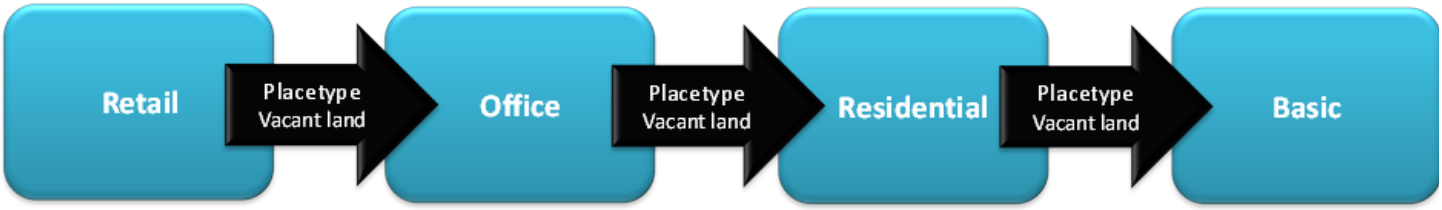


Allocation Process 2nd Iteration



2.8 TAZ AGGREGATION

Once the allocation is complete, data is aggregated from polygons to TAZs for use in the travel demand model. Aggregate-level data is provided for population and retail, office, and basic employment.



3.0 OVERVIEW OF THE REGIONAL VISION SCENARIO ALLOCATION PROCESS

3.1 REGIONAL VISION SCENARIO

The Regional Vision scenario is shaped by a robust regional transit network, along with bicycle and pedestrian networks that frame a more compact, mixed-use development pattern. It is characterized by a focus on compact, mixed use growth, with defined centers across the region that vary in scale and function, and a mix of compact, walkable neighborhoods and suburban/rural residential areas.

3.2 REGIONAL VISION SCENARIO PLACETYPES

Nine placetypes were developed by the consultant and Metroplan staff for the growth allocation for the Regional Vision sceanerio. Although some of the placetypes are rural and suburban in character, the Regional Vision placetypes borrow more heavily from urban, compact types, such as walkable and urban neighborhoods, mixed use centers and the urban core. Detailed definitions for each of the placetypes can be found in Chapter 6 of this document.

3.3 ALLOCATION TOOL

In contrast to the Emerging Trend Scenario, which uses an automated, spreadsheet-based allocation process, the Regional Vision scenario uses CommunityViz to manually "paint" placetypes to replicate the underlying growth concept. How and where new growth is allocated depends not only on the three basic inputs described in the Emerging Trend Scenario section above (i.e. supply of vacant and redevelopable land, suitability demand and placetype consumption rates), but also on the regional Vision for Imagine Central Arkansas that was detailed in the Mobility Section of Chapter 5 of this document. The regional Vision for Imagine Central Arkansas includes a regional growth framework that uses the regional transit networks a fundamental organizing principal. The guidance shown in the "Regional Vision Scenario Allocation Guidance" table summarizes the broad strategy for allocating placetypes in accordance with the Regional Growth Framework map shown in Chapter 5.

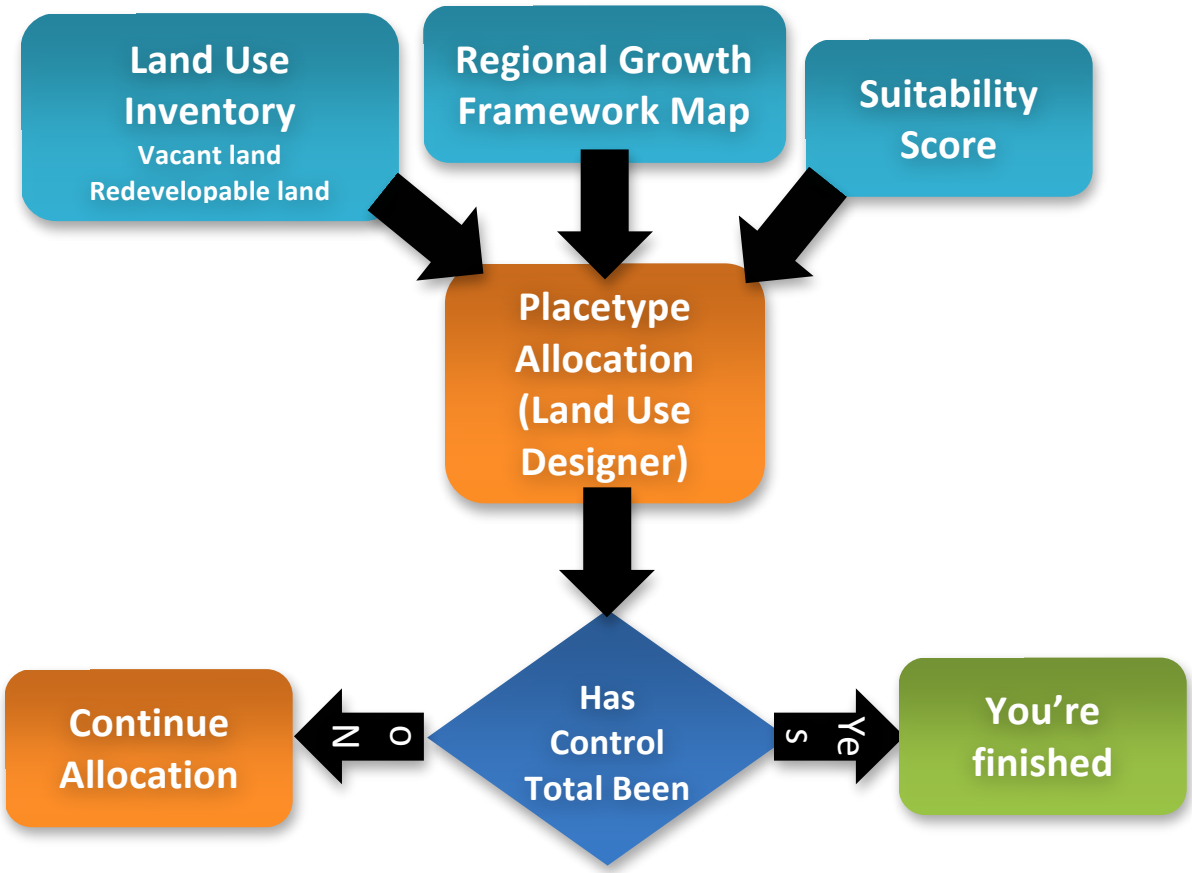
Land Use Designer is the specific tool within CommunityViz used to allocate the Regional Vision scenario placetypes. Each placetype is associated with land use, infrastructure and socioeconomic data in order to estimate its development potential.

For the Regional Vision scenario, the Land Use Designer application was customized to reflect each of the nine placetype used. Examples of characteristics used to define the placetypes in Land-Use Designer include:

- Land use
- Socioeconomic: people, jobs
- Community design: mix, density, intensity, footprint
- Housing: dwelling units by type/market
- Transportation: trips generated, mode split, parking
- Environment/stormwater: impervious surface, open space

- Potable water: gallons per day consumed

CommunityViz Allocation Process for the Regional Vision



- Wastewater: gallons per day produced
- Average intersection density