

# Shaping Our Future Growth Alternatives Analysis

Performance Measures Summary Document, v. 1.0

Nested Model Indicators  
in CommunityViz



## INDICATOR: POPULATION

### DEFINITION AND UNITS

The number of people expected to live in various cities, towns and counties in the region through the planning horizon (2040).

### FORMULA

$$POP_{ALLO} = \sum DU_{ALLO} \times ppHH$$

Where:

POP<sub>ALLO</sub>= Population allocated for the growth period, 2015 to 2040

DU<sub>ALLO</sub> = Dwelling units allocated for the growth period, 2015 to 2040

ppHH= persons per household assumed for various counties in the study area

### SHAPEFILES (ATTRIBUTE FIELDS)

Graduated Grid Cells (SCRO\_SF\_DU and SCRO\_MF\_DU)

### NESTED INDICATORS

DU<sub>ALLO</sub> = Dwelling units allocated for the growth period, 2015 to 2040

### USER DEFINED PARAMETERS

Persons per household statistics for single-family and multifamily housing types (ppHH)

### REPORTING GEORGRAPHY

Statistics will be reported for the region, ten counties and cities and towns within each county.

## INDICATOR: EMPLOYEES

### DEFINITION AND UNITS

The number of employees expected to work in various cities, towns and counties in the region through the planning horizon (2040).

### FORMULA

$$EMP_{ALLO} = \sum NON\ RES\ SF_{ALLO} \times EMP\ SF$$

Where:

$EMP_{ALLO}$  = Employees allocated for the growth period, 2015 to 2040

$NON\ RES\ SF_{ALLO}$  = Non-residential square footage allocated for the growth period, 2015 to 2040

$EMP\ SF$  = Employees per square foot estimates for retail, office and industrial (employee space ratios)

### SHAPEFILES (ATTRIBUTE FIELDS)

Graduated Grid Cells ( $ALLO\_RET\_SF$ ,  $ALLO\_OFF\_SF$  and  $ALLO\_IND\_SF$ )

### NESTED INDICATORS

$NON\ RES\ SF_{ALLO}$  = Dwelling units allocated for the growth period, 2015 to 2040

### USER DEFINED PARAMETERS

Employee space ratios for retail, office and industrial development categories ( $EMP\ SF$ )

### REPORTING GEORGRAPHY

Statistics will be reported for the region, ten counties and cities and towns within each county.

## INDICATOR: DWELLING UNITS

### DEFINITION AND UNITS

The number of dwelling units expected in various cities, towns and counties in the region through the planning horizon (2040).

### FORMULA

$$DU_{ALLO} = \sum DU_{ALLO (CT 1...n)}$$

Where:

$DU_{ALLO}$  = The number of dwelling units allocated by housing type (single-family detached, single-family attached, multifamily and mixed-use)

### SHAPEFILES (ATTRIBUTE FIELDS)

Graduated Grid Cells (SF\_DU\_ALLO and MF\_DU\_ALLO)

### NESTED INDICATORS

SF\_DU<sub>2015-2040</sub> = Single-family dwelling units anticipated for the growth period, 2015 to 2040 (county-level control totals)

MF\_DU<sub>2015-2040</sub> = Multifamily dwelling units anticipated for the growth period, 2015 to 2040 (county-level control totals)

### USER DEFINED PARAMETERS

- Dwelling unit categories (single-family detached, single-family attached, multifamily and mixed use)
- General development characteristics (e.g., max density, minimum lot size, etc.)

### REPORTING GEOGRAPHY

Statistics will be reported for the region, ten counties and cities and towns within each county.

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Performance Measure Indicators  
in CommunityViz



## INDICATOR: PROTECTED OPEN SPACE

### DEFINITION AND UNITS

The amount of land protected as “open space” in the region for each growth scenario (generally comprised of parks, greenways, natural areas, farmland, etc.) reported as a percentage of total land area.

### FORMULA

$$OPEN\ SPACE_{PRO} = \frac{\sum AREA_{POS}}{\sum AREA_{TOT}}$$

Where:

$OPEN\ SPACE_{PRO}$  = The percentage of land designated open space under the growth scenario

$AREA_{POS}$  = The area (in square miles) designated as open space in the region

$AREA_{TOT}$  = Total area (in square miles) in the region

### SHAPEFILES (ATTRIBUTE FIELDS)

Graduated Grid Cells (AREA, PT\_CAT)

### NESTED INDICATORS

$AREA_{POS}$  = The area (in square miles) identified as open space in the growth scenario

$AREA_{TOT}$  = Total area (in square miles) in the region

### USER DEFINED PARAMETERS

N/A

### REPORTING GEOGRAPHY

Statistics will be reported for the region, ten counties and cities and towns within each county.

## INDICATOR: HOME CHOICES PROFILE

### DEFINITION AND UNITS

The type and number of dwelling units expected in the region for each growth scenario (matching the reporting categories used for the “dwelling units” indicator: single-family detached, single-family attached, multifamily and mixed-use).

### FORMULA

$$DU_{PERCENT} = \frac{\sum DU_{ALLO (DU 1...n)}}{\sum DU_{ALLO}}$$

Where:

$DU_{PERCENT}$  = The number of dwelling units allocated by generalized housing type divided by the total number of dwelling units.

$DU_{ALLO (DU 1...n)}$  = The number of dwelling units allocated by housing type (single-family detached, single-family attached, multifamily and mixed-use)

$DU_{ALLO}$  = The total number of dwelling units allocated by housing type (single-family detached, single-family attached, multifamily and mixed-use)

### SHAPEFILES (ATTRIBUTE FIELDS)

Graduated Grid Cells (SF\_DU\_ALLO and MF\_DU\_ALLO)

### NESTED INDICATORS

N/A

### USER DEFINED PARAMETERS

- Place types
- General development characteristics (e.g., max density, minimum lot size, etc.)

### REPORTING GEOGRAPHY

Statistics will be reported for the region, ten counties and cities and towns within each county.

## INDICATOR: RETURN ON INVESTMENT

### DEFINITION AND UNITS

The ratio of expected revenue to expected cost of services (calculated by place type category) through the planning horizon (2040). Net revenue (return-on-investment) is calculated as expected revenue minus expected cost of services.

### FORMULA

$$ROI\_ALLO = \sum AREA_{ALLO (PT 1...n)} \times LOOKUP_{REV\_GEN (PT 1...n)} - \sum AREA_{ALLO (PT 1...n)} \times LOOKUP_{COST\_GEN (PT 1...n)}$$

Where:

ROI\_ALLO = Anticipated net revenue for the planning horizon (assumed revenue minus costs for the study area)

AREA<sub>ALLO (PT 1...n)</sub> = Square miles of each place type category represented in the region where growth was allocated for the planning horizon

LOOKUP<sub>REV\_GEN (PT 1...n)</sub> = development lookup table with assumed revenues by place type category

LOOKUP<sub>COS\_GEN (PT 1...n)</sub> = development lookup table with assumed costs by place type category

### SHAPEFILES (ATTRIBUTE FIELDS)

Graduated Grid Cells (SF\_DU\_ALLO, MF\_DU\_ALLO, RET\_SF\_ALLO, OFF\_SF\_ALLO and IND\_SF\_ALLO)

### NESTED INDICATORS

N/A

### USER DEFINED PARAMETERS

Table of assumed revenue and cost by place type category

### REPORTING GEOGRAPHY

Statistics will be reported for the region and ten counties.

## INDICATOR: NUMBER OF NEW STUDENTS

### DEFINITION AND UNITS

Demand for new schools generated by different development types, patterns and intensities assumed for each of the growth scenarios. Information is reported as new students.

### FORMULA

$$NEW\ STUDENT\ DEMAND = \sum DU_{ALLO} \times spHH$$

Where:

NEW STUDENT DEMAND = Number of new students expected from new development in the region

DU<sub>ALLO</sub> = Dwelling units allocated for the growth period, 2015 to 2040

spHH= number of new students estimated per household (varies by county and housing type – single family vs. multifamily)

### SHAPEFILES (ATTRIBUTE FIELDS)

Graduated Grid Cells (PT\_CAT, DU ALLO)

School District Boundaries

### NESTED INDICATORS

DU<sub>ALLO</sub> = Dwelling units allocated for the growth period, 2015 to 2040

### USER DEFINED PARAMETERS

- Student generation rates by household (spHH)

### REPORTING GEOGRAPHY

Statistics will be reported for the region and ten counties.

## INDICATOR: TRANSIT COVERAGE AREA

### DEFINITION AND UNITS

The percentage increase or decrease in people or employees (a combined statistic) within ½-mile of a bus rapid transit station or regional bus route through the planning horizon year.

### FORMULA

$$TRANSIT_{COVER} = \frac{\sum POP_{ALLO}(\cap_{Area_{TRANSIT}} Area_{DEV_{ALLO}}) + \sum EMP_{ALLO}(\cap_{Area_{TRANSIT}} Area_{DEV_{ALLO}})}{\sum POP_{ALLO} + \sum EMP_{ALLO}}$$

Where:

TRANSIT<sub>COVER</sub> = The percentage increase or decrease in people or employees with ½-mile of a bus rapid transit station or regional bus route through the planning horizon.

POP<sub>ALLO</sub>= Population allocated for the growth period, 2015 to 2040

EMP<sub>ALLO</sub>= Employees allocated for the growth period, 2015 to 2040

AREA<sub>TRANSIT</sub> = Area within ½-mile of a bus rapid transit or regional bus transit corridor

AREA<sub>DEV ALLO</sub>= Area allocated with new growth for the period, 2015-2040

∩= Intersection function (selects grid cells with allocated development that are with ½-mile of a bus rapid transit station or regional bus route)

### SHAPEFILES (ATTRIBUTE FIELDS)

Graduated Grid Cells (SF\_POP\_ALLO, MF\_POP\_ALLO, RET\_EMP\_ALLO, OFF\_EMP\_ALLO, IND\_EMP\_ALLO and AREA)

Transit Service Area (1/2-mile of a bus rapid transit station or regional bus route)

### NESTED INDICATORS

POP<sub>ALLO</sub>= Population allocated for the growth period, 2015 to 2040

EMP<sub>ALLO</sub>= Employees allocated for the growth period, 2015 to 2040

AREA<sub>DEV ALLO</sub>= Area allocated with new growth for the period, 2015-2040

### USER DEFINED PARAMETERS

N/A

### REPORTING GEOGRAPHY

Statistics will be reported for the region and ten counties.

## INDICATOR: TRIP GENERATION

### DEFINITION AND UNITS

New trips generated by various development types, patterns and intensities assumed for each growth scenario.

### FORMULA

$$TRIPS\_ALLO = \sum DEV_{DU (PT 1...n)} \times LOOKUP_{TRIP\_GEN (PT 1...n)} + \sum DEV_{SF (PT 1...n)} \times LOOKUP_{TRIP\_GEN (PT 1...n)}$$

Where:

TRIPS\_ALLO = The number of new trips generated for the growth period, 2015-2040

DEV<sub>DU (PT 1...n)</sub> = The number of dwelling units (by place type category) for the growth period, 2015-2040

DEV<sub>SF (PT 1...n)</sub> = The amount of square feet (by place type category) for the growth period, 2015-2040

LOOKUP<sub>TRIP\_GEN (PT 1...n)</sub> = ITE trip generation rates for place types included in the General Development Lookup Table

### SHAPEFILES (ATTRIBUTE FIELDS)

Graduated Grid Cells (SF\_DU\_ALLO, MF\_DU\_ALLO, RET\_SF\_ALLO, OFF\_SF\_ALLO and IND\_SF\_ALLO)

### NESTED INDICATORS

DEV<sub>DU (PT 1...n)</sub> = The number of dwelling units (by place type category) for the growth period, 2015-2040

DEV<sub>SF (PT 1...n)</sub> = The amount of square feet (by place type category) for the growth period, 2015-2040

### USER DEFINED PARAMETERS

Trip generation and internal capture rates by place type category summarized in ITE's Trip Generation Manual, 9<sup>th</sup> Edition

### REPORTING GEOGRAPHY

Statistics will be reported for the region and ten counties.

## INDICATOR: TRAFFIC CONGESTION, VOLUME-TO-CAPACITY RATIO (PENDING)

### DEFINITION AND UNITS

The percentage increase or decrease in volume-to-capacity ratios for major roads in the region anticipated through the planning horizon.

### FORMULA

Formula will be developed based on available data and information gathered from the regional travel demand models used by GPATS, SPATS and ANTS.

### SHAPEFILES (ATTRIBUTE FIELDS)

Key shapefiles to be determined based on available data.

### NESTED INDICATORS

Nested indicators to be determined based on available data.

### USER DEFINED PARAMETERS

User defined parameters to be determined based on available data.

### REPORTING GEOGRAPHY

Statistics will be reported by major road corridor in the three regional travel demand models.

## INDICATOR: DEVELOPMENT INSIDE MUNICIPAL LIMITS

### DEFINITION AND UNITS

The percentage of land allocated new growth (either residential or non-residential) that falls inside current city or town limits compared to the amount of land in each growth scenario's urban footprint.

### FORMULA

$$CITY_{EXISTING} = \frac{\sum(\cap_{Area_{EXLIMITS}} Area_{DEV ALLO})}{\sum SQMI}$$

Where:

$CITY_{EXISTING}$  = The percentage of land allocated new growth (either residential or non-residential) inside current city or town limits

$AREA_{EXLIMITS}$  = Area (in square miles) represented inside current city or town limits

$AREA_{DEV ALLO}$  = Area (in square miles) allocated with new growth, 2015-2040

$\cap$  = Intersection function (selects grid cells with allocated growth that are inside current city or town limits)

### SHAPEFILES (ATTRIBUTE FIELDS)

Graduated Grid Cells (SF\_DU\_ALLO, MF\_DU\_ALLO, RET\_SF\_ALLO, OFF\_SF\_ALLO and IND\_SF\_ALLO and AREA)

Current City and Town Limits

### NESTED INDICATORS

$DU_{ALLO}$  = Dwelling units allocated for the growth period, 2015 to 2040

$NON RES SF_{ALLO}$  = Non-residential square footage allocated for the growth period, 2015-2040

$AREA_{DEV ALLO}$  = Area (in square miles) allocated with new growth, 2015-2040

### USER DEFINED PARAMETERS

Current City and Town Limits

### REPORTING GEOGRAPHY

Statistics will be reported for the region, ten counties and cities and towns within each county.

## INDICATOR: ESTIMATE OF NEW IMPERVIOUS SURFACE

### DEFINITION AND UNITS

The amount of new impervious surface expected in the region through for the growth period, 2015-2040.

### FORMULA

$$IMPERVIOUS = \sum DEV_{AREA (PT 1...n)} \times LOOKUP_{\% IMPERVIOUS (PT 1...n)}$$

Where:

**IMPERVIOUS** = The amount of new impervious surface expected in the region through the planning horizon.

**DEV<sub>AREA (PT 1...n)</sub>** = The area of land (in square miles) by place type allocated growth in the period, 2015-2040

**LOOKUP<sub>% IMPERVIOUS (PT 1...n)</sub>** = Percentage of impervious surface area assumed for each place type category in the General Development Lookup Table

### SHAPEFILES (ATTRIBUTE FIELDS)

Graduated Grid Cells (PT\_CAT, AREA, JURIS\_CD)

### NESTED INDICATORS

**DEV<sub>AREA (PT 1...n)</sub>** = The area of land (in square miles) by place type allocated growth in the period, 2015-2040

### USER DEFINED PARAMETERS

Percentage of impervious surface area assumed for each place type

### REPORTING GEOGRAPHY

Statistics will be reported for the region and ten counties.

## INDICATOR: GENERAL DEVELOPMENT CONTEXT

### DEFINITION AND UNITS

A profile of the square miles assigned by place type category (reported as a percentage of total square miles) collapsed into one of six general development context categories: open space, standalone residential, standalone destinations, walkable residential, walkable destinations, and mixed use.

### FORMULA

$$DEV\ CONTEXT = \frac{\sum ACRES_{(DC\ 1..n)}}{\sum ACRES_{GEOGRAPHY}}$$

Where:

DEV CONTEXT = The presence of one development context category compared to all others in the analysis (reported as a percentage of total land area).

ACRES<sub>(DC 1..n)</sub> = Total area (in square miles) for each place type category assigned to the same development context category

ACRES<sub>GEOGRAPHY</sub> = Total area (in square miles) in the region

### SHAPEFILES (ATTRIBUTE FIELDS)

Graduated Grid Cells (AREA, PT\_CAT)

### NESTED INDICATORS

ACRES<sub>(DC 1..n)</sub> = Total area (in square miles) for each place type category assigned to the same development context category

ACRES<sub>GEOGRAPHY</sub> = Total area (in square miles) in the region

### USER DEFINED PARAMETERS

Development context categories

Place type category to development context classification matrix

### REPORTING GEOGRAPHY

Statistics will be reported for the region and ten counties.

## INDICATOR: LAND CONSUMPTION

### DEFINITION AND UNITS

The percentage of land allocated new growth (either residential or non-residential) compared to the size of the region as a whole.

### FORMULA

$$Area_{DEV\ ALLO} = \sum Area_{DEV} (U_{AREA\ EMP\ OR} U_{AREA\ POP})$$

Where:

Area<sub>DEV ALLO</sub> = Number of square miles in the region assigned growth for the period, 2015-2040

Area<sub>DEV</sub> = Area (in square miles) assigned new growth for the period, 2015-2040

Area<sub>EMP</sub> = Area (in square miles) allocated with employees for the growth period, 2015-2040

Area<sub>POP</sub> = Area (in square miles) allocated with population for the growth period, 2015-2040

U = Union function (avoids double counting for mixed-use parcels)

### SHAPEFILES (ATTRIBUTE FIELDS)

Graduated Grid Cells (SF\_DU\_ALLO, MF\_DU\_ALLO, RET\_SF\_ALLO, OFF\_SF\_ALLO, IND\_SF\_ALLO and AREA)

### NESTED INDICATORS

N/A

### USER DEFINED PARAMETERS

N/A

### REPORTING GEOGRAPHY

Statistics will be reported for the region and ten counties.