

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_{ALLO}= Population allocated for the growth period, 2015 to 2040

DU_{ALLO} = 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_{ALLO} = 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_DU₂₀₁₅₋₂₀₄₀ = Single-family dwelling units anticipated for the growth period, 2015 to 2040 (county-level control totals)

MF_DU₂₀₁₅₋₂₀₄₀ = 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 Measures Summary Document, v. 1.0

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_{ALLO (PT 1...n)} = Square miles of each place type category represented in the region where growth was allocated for the planning horizon

LOOKUP_{REV_GEN (PT 1...n)} = development lookup table with assumed revenues by place type category

LOOKUP_{COS_GEN (PT 1...n)} = 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_{ALLO} = 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_{ALLO} = 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_{COVER} = 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_{ALLO} = Population allocated for the growth period, 2015 to 2040

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

AREA_{TRANSIT} = Area within ½-mile of a bus rapid transit or regional bus transit corridor

AREA_{DEV ALLO} = 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_{ALLO} = Population allocated for the growth period, 2015 to 2040

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

AREA_{DEV ALLO} = 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_{DU (PT 1...n)} = The number of dwelling units (by place type category) for the growth period, 2015-2040

DEV_{SF (PT 1...n)} = The amount of square feet (by place type category) for the growth period, 2015-2040

LOOKUP_{TRIP_GEN (PT 1...n)} = 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_{DU (PT 1...n)} = The number of dwelling units (by place type category) for the growth period, 2015-2040

DEV_{SF (PT 1...n)} = 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, 9th 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

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

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

$AREA_{DEVALLO}$ = 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

$AREA_{DEVALLO}$ = 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_{AREA (PT 1...n)} = The area of land (in square miles) by place type allocated growth in the period, 2015-2040

LOOKUP_{% IMPERVIOUS (PT 1...n)} = 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_{AREA (PT 1...n)} = 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_(DC 1...n) = Total area (in square miles) for each place type category assigned to the same development context category

ACRES_{GEOGRAPHY} = Total area (in square miles) in the region

SHAPEFILES (ATTRIBUTE FIELDS)

Graduated Grid Cells (AREA, PT_CAT)

NESTED INDICATORS

ACRES_(DC 1...n) = Total area (in square miles) for each place type category assigned to the same development context category

ACRES_{GEOGRAPHY} = 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_{DEV ALLO} = Number of square miles in the region assigned growth for the period, 2015-2040

Area_{DEV} = Area (in square miles) assigned new growth for the period, 2015-2040

Area_{EMP} = Area (in square miles) allocated with employees for the growth period, 2015-2040

Area_{POP} = 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.