

Statistical Analysis on Urban Land Use

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Statistical
Analysis in GIS



Land Use
Summary



Road Density



Land Use
Distribution



Statistical Analysis in GIS

Extract hidden information in spatial and non-spatial data by applying traditional and spatial statistical analysis methods.

Abundant Information in GIS

Location

Agriculture



Demographics

Natural Resources



Transportation

Property Management



Planning

Statistical Analysis Methods in GIS

Attribute Statistics



Ring



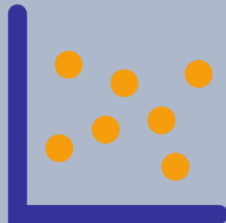
Histogram



Area



Line



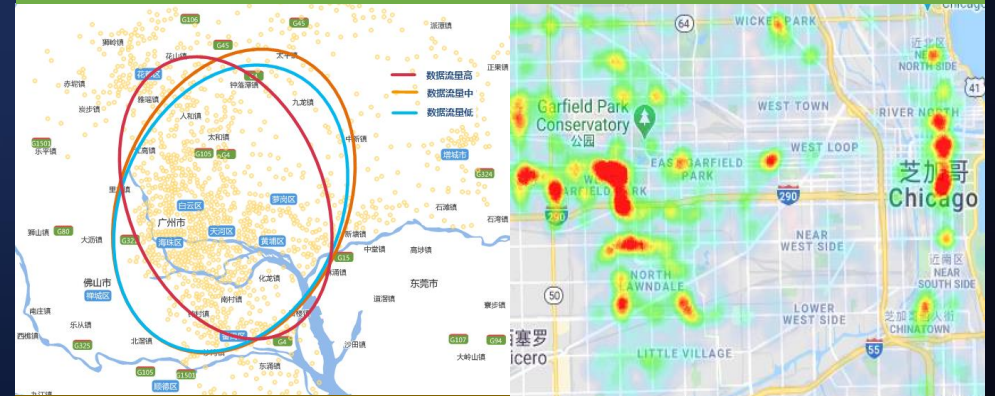
Scatter



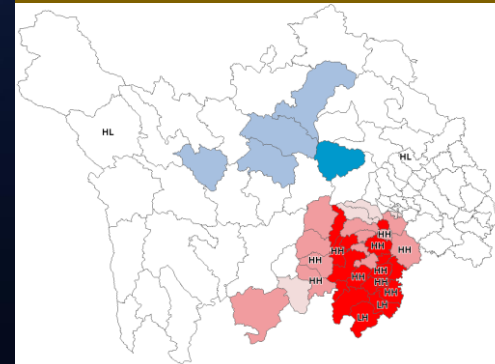
Bubble

.....

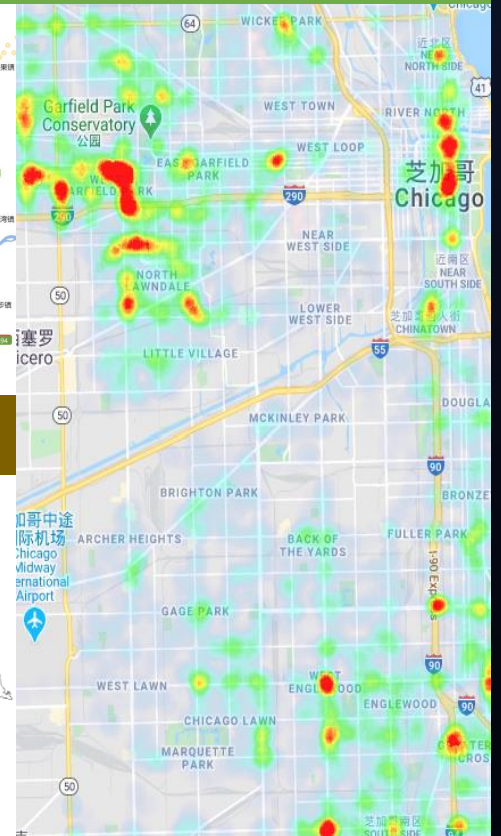
Spatial Statistics



Directional Distribution

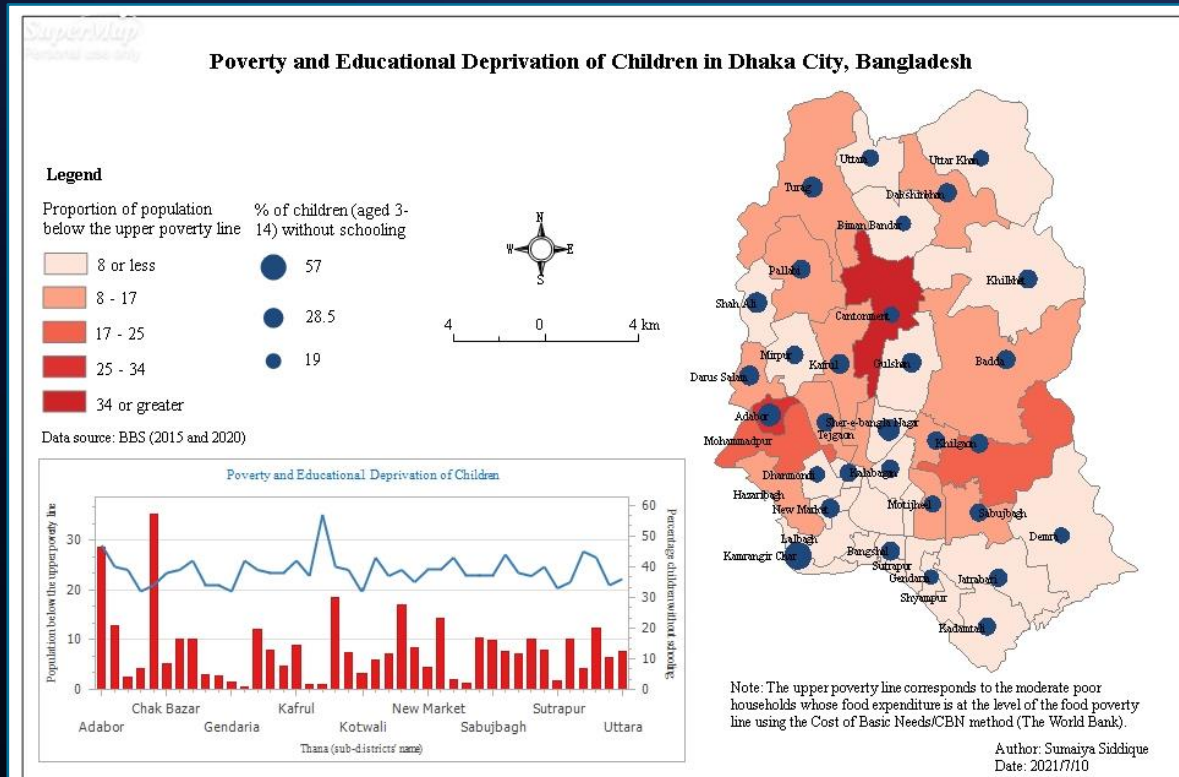


Cluster

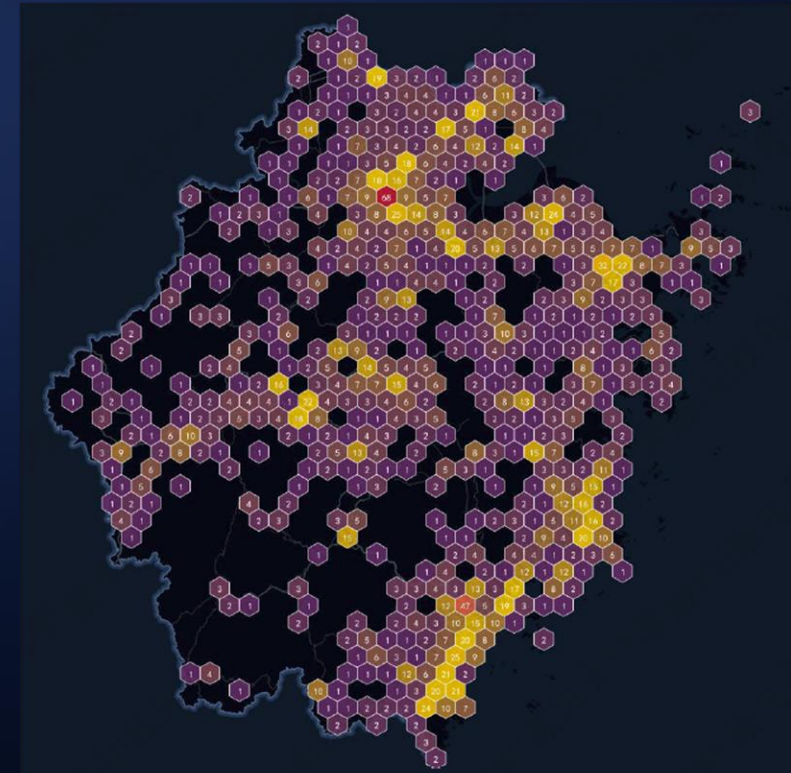


Heat Map

Application of GIS Statistics

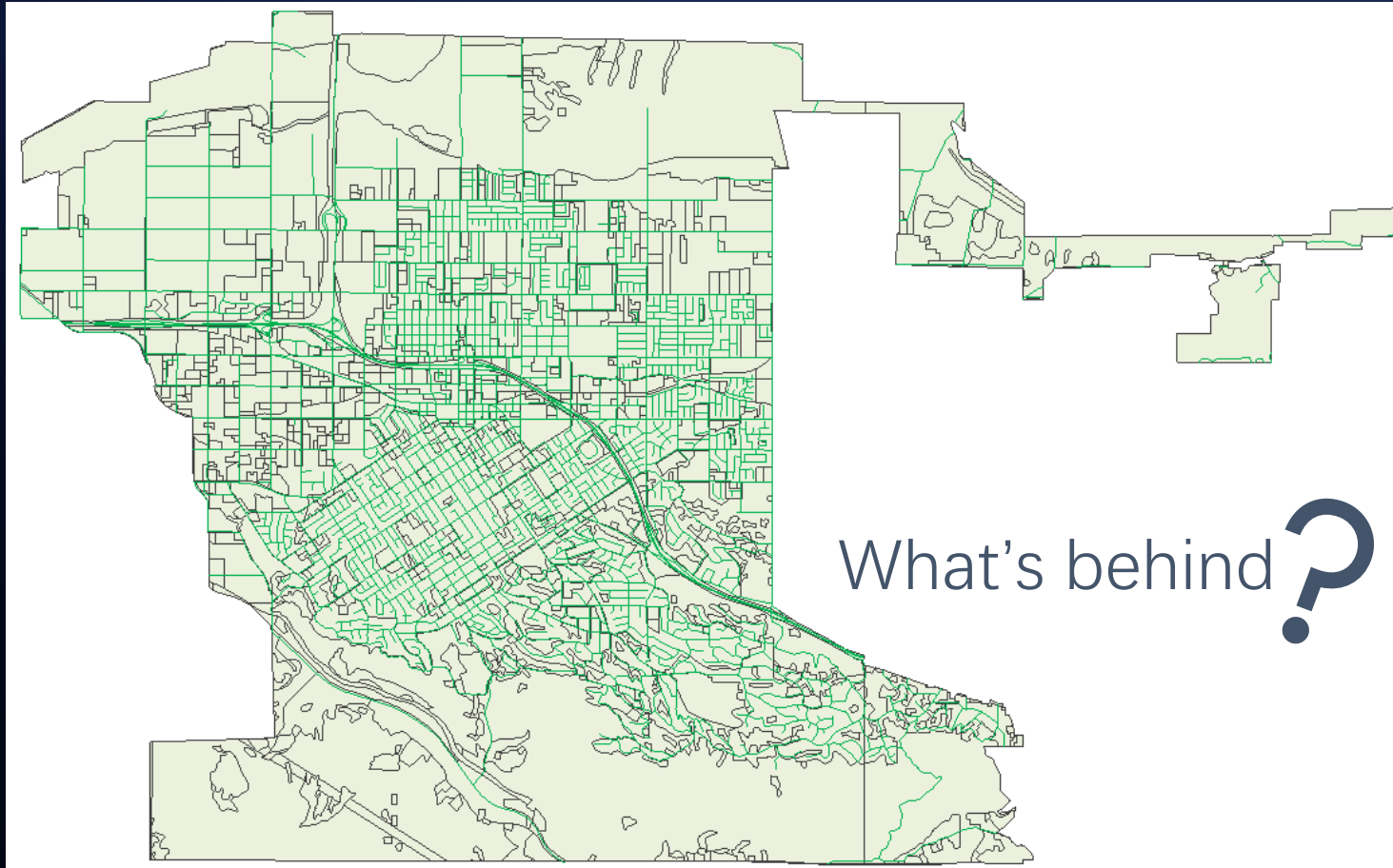


Relationship between Poverty and Education



Spatial Distribution of Clinics

Urban Planning Statistics in GIS



- Basic statistics
- Road density
- Directional distribution of land categories
- Relations between demographics and land use
-

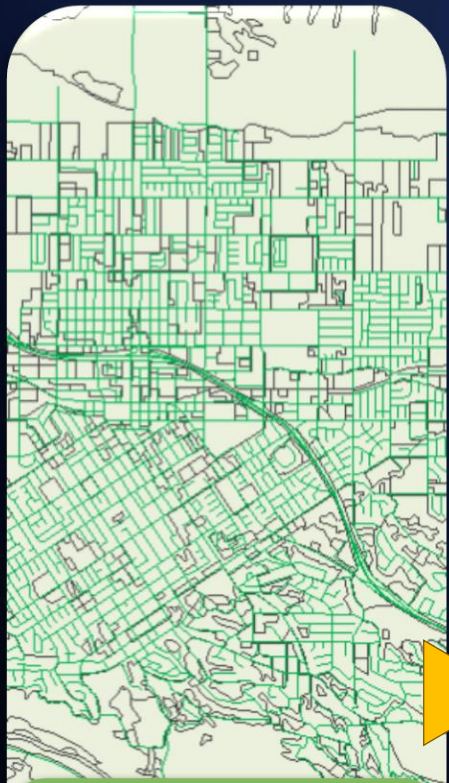




Land Use Summary

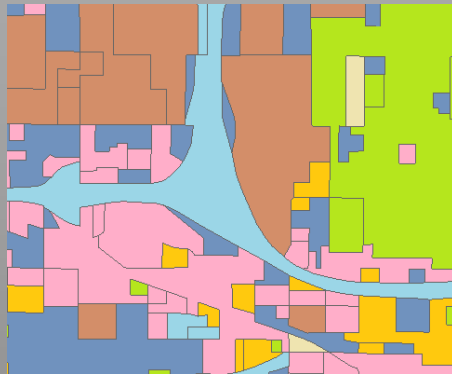
What's the land use type for each piece of land? Which is the category that takes the most area? Which is the category made by numerous small pieces of land?

Get to Know Your Data



Original

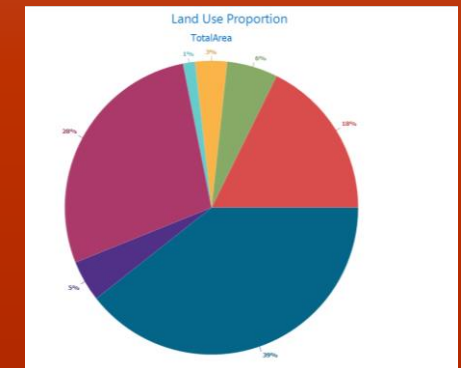
1 Visualize land use type



2 Summarize basic statistics

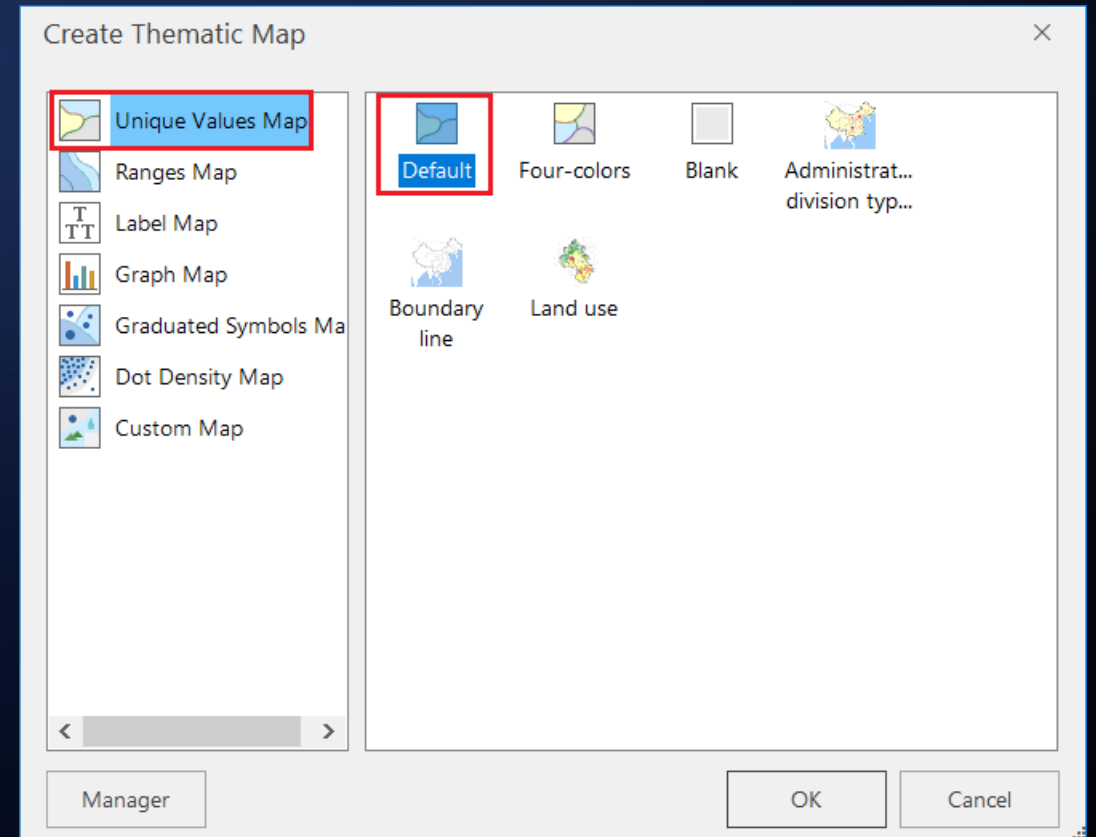
N_Land	TotalArea
117	17,366,060
163	5,516,028
46	3,437,436
21	1,313,744
273	27,457,810
64	4,447,780
197	38,685,100

3 Visualize statistic results

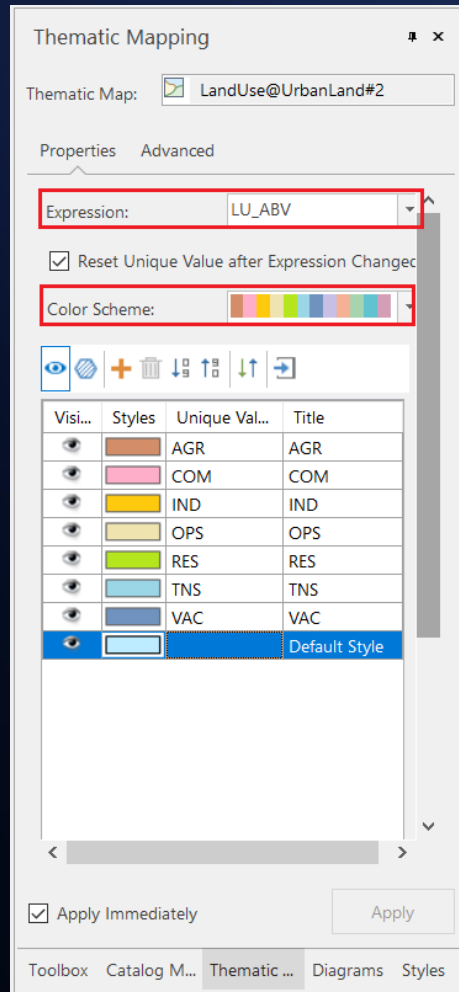


Create Thematic Map

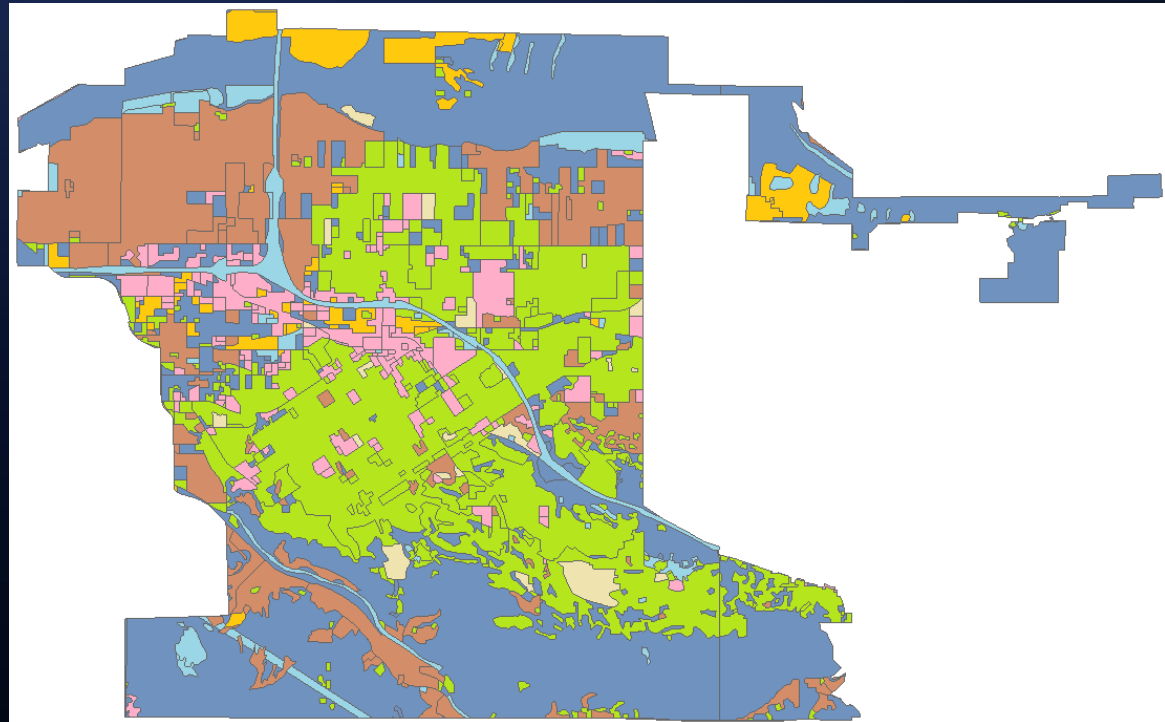
- Connect to data source UrbanLand.udbx
- Add dataset LandUse into map window
- Select LandUse layer in Layer Manager → right click → Create Thematic Map
- Unique Value Map → Default



Create Thematic Map



- Expression: LU_ABV
- Select a proper color scheme



Statistical Summary: SQL Query

- Spatial Analysis → SQL Query
- Select:
LandUse.LU_ABV,Count(Land Use.LU_ABV) as N_Land,Sum(LandUse.AREA) as TotalArea,Avg(LandUse.AREA) as AvgArea
- Group By: LandUse.LU_ABV

SQL Query

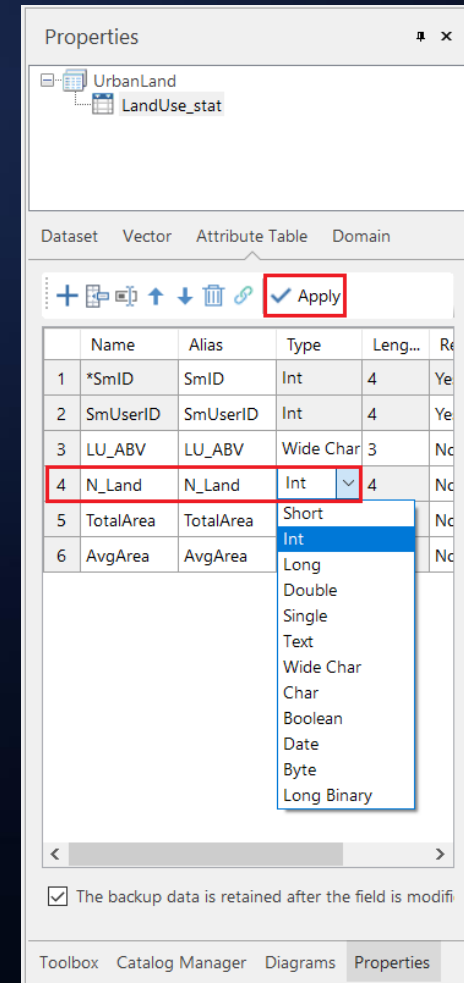
Select Dataset:

- Untitled Workspace
 - Datasources
 - UrbanLand
 - LandUse
 - Road

Statistical Summary: Change Attribute Type

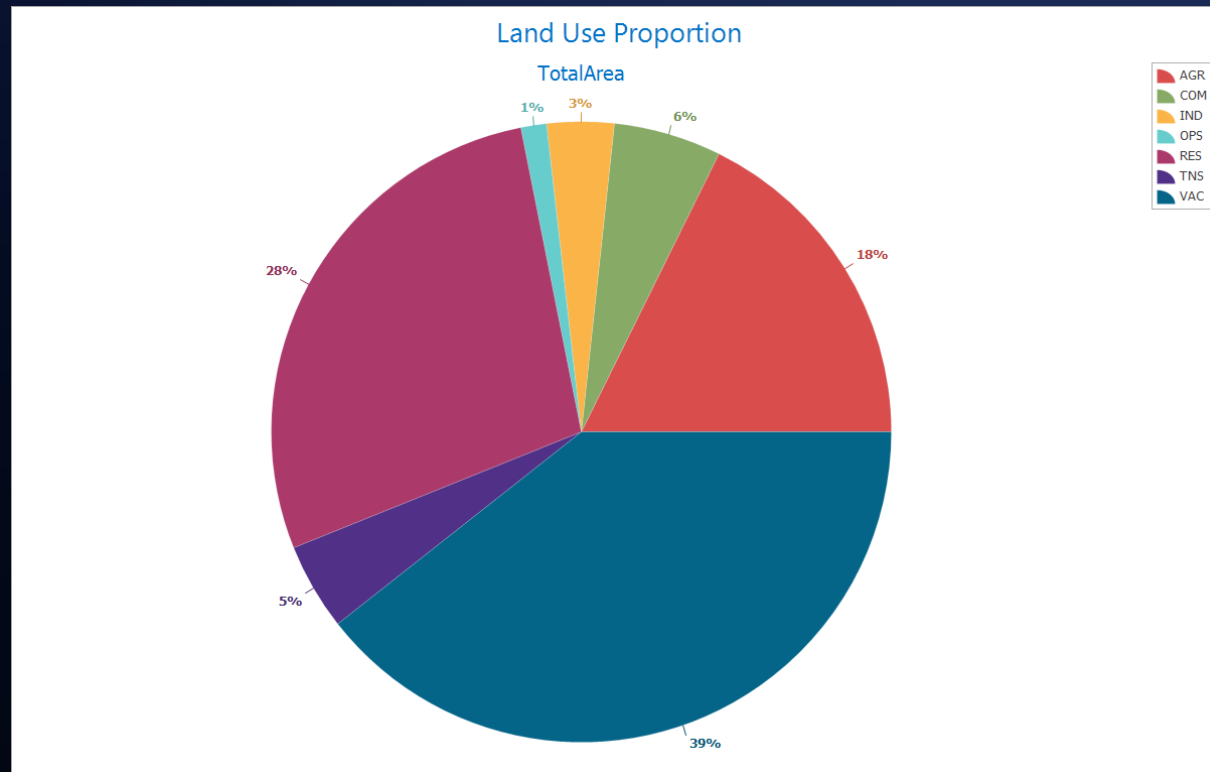
- The type of statistic result field is the same as the original field
- Select LandUse_stat in Workspace Manager → right click → Properties
- N_Land Type: Wide Char → Int, **click Apply**

No	LU_ABV	N_Land	TotalArea	AvgArea
1	AGR	117	17,366,060	148,427.9
2	COM	163	5,516,028	33,840.66
3	IND	46	3,437,436	74,726.88
4	OPS	21	1,313,744	62,559.22
5	RES	273	27,457,810	100,578.1
6	TNS	64	4,447,780	69,496.55
7	VAC	197	38,685,100	196,371.1



Statistics Visualization: Diagrams

- Start → Diagrams → Pie



Diagrams

Parameter Settings Style Settings

Data Settings

Datasource: UrbanLand

Dataset: LandUse_stat

Filter: [] ...

Statistic Field

Item	Alias
TotalArea	TotalArea

Aggregation T... Sum

Group Field

Group Field 1: LU_ABV

Group Field 2: []

Toolbox Catalog Manager Diagrams Properties

Diagrams

Parameter Settings Style Settings

View: Pie

Style: Default

Title Settings

Caption: Land Use Proportion

Font: Segoe UI

Font Size: 16

Pie Settings

Display Subtitle

As Percent

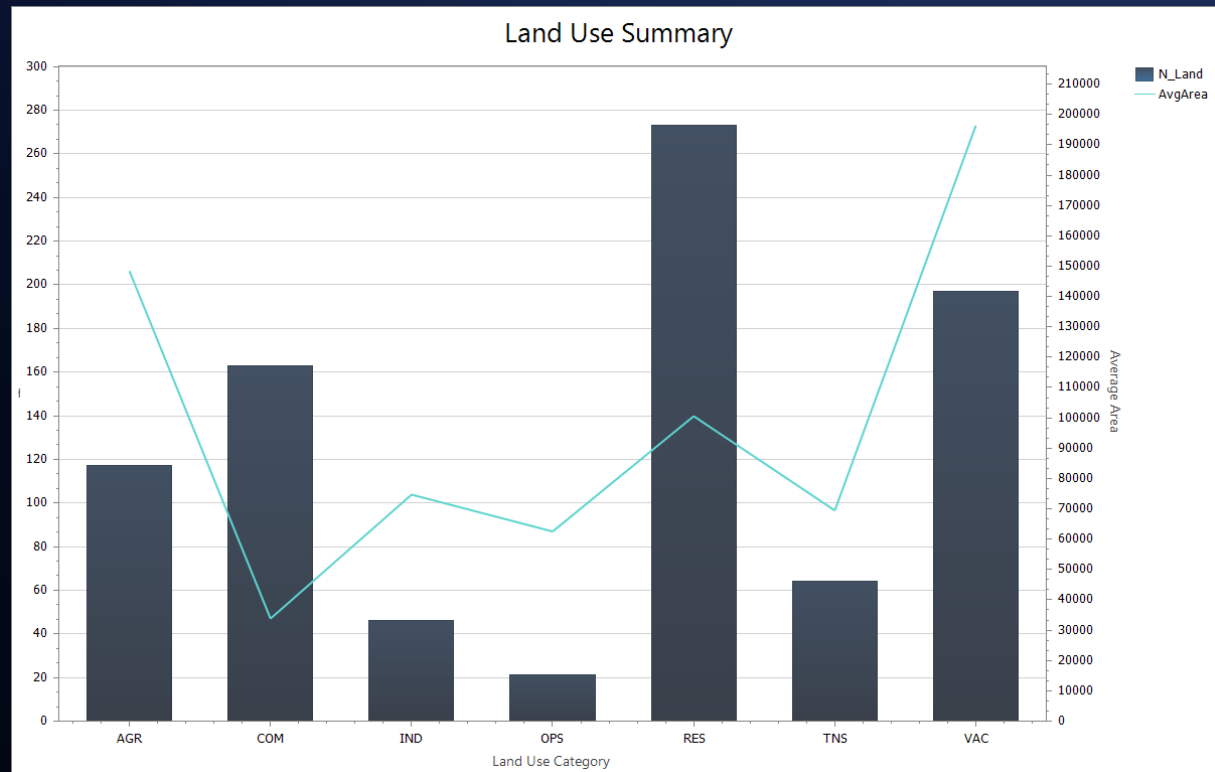
Show Label

Label Position: Outside of Diagram

Toolbox Catalog Manager Diagrams Properties

Statistics Visualization: Diagrams

- Start → Diagrams → Combo



The Diagrams Parameter Settings window is shown with the following configurations:

- Data Settings:**
 - Datasource: UrbanLand
 - Dataset: LandUse_stat
 - Group Field: LU_ABV
 - Filter: (empty)
- Y Axis 1:**
 - Statistic Field: N_Land
 - View: Column
- Y Axis 2:**
 - Statistic Field: AvgArea
 - View: Line
- Color Scheme:** (Default)
- Display Legend

The Diagrams Style Settings window is shown with the following configurations:

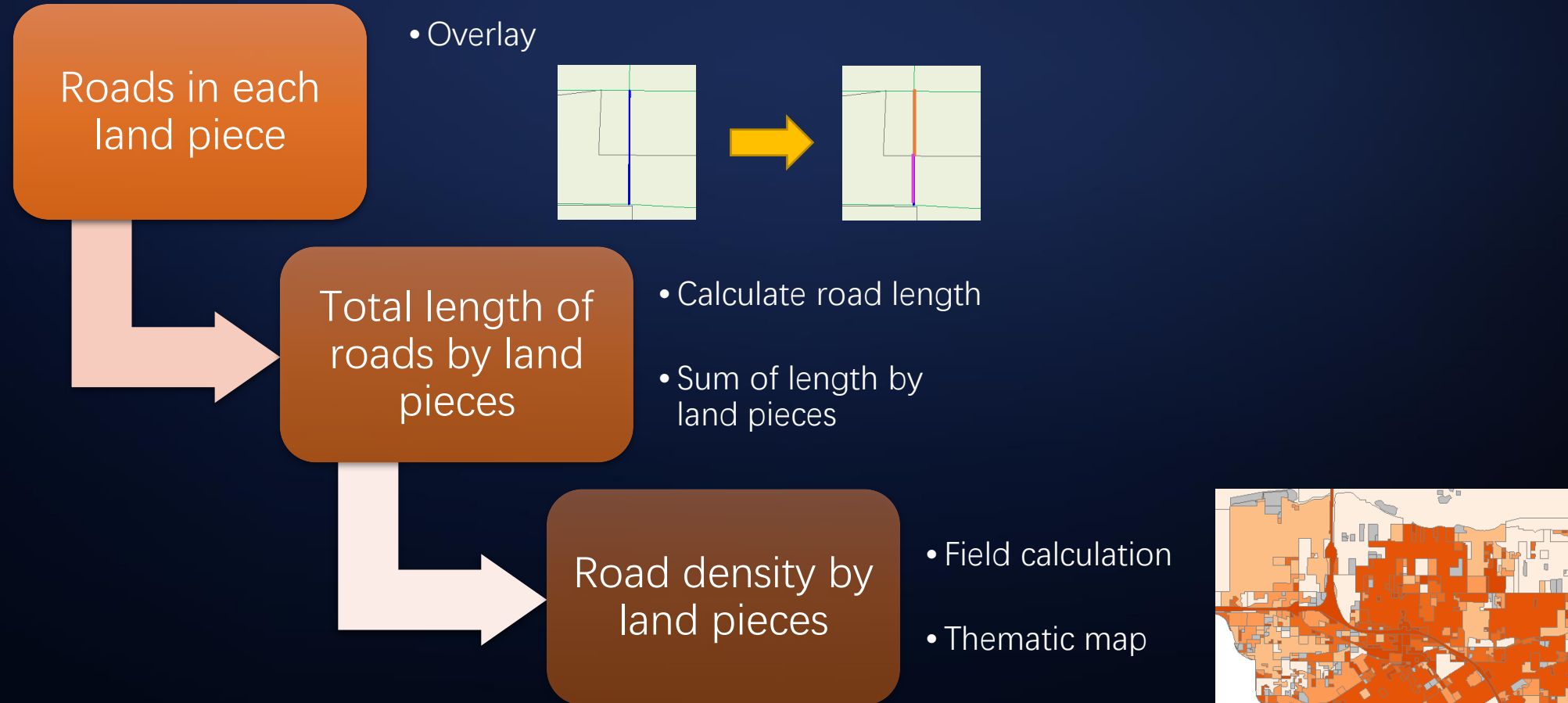
- View:** Combo
- Style:** Light
- Title Settings:**
 - Caption: Land Use Summary
 - Font: Segoe UI
 - Font Size: 16
- X Axis Settings:**
 - Caption: Land Use Category
 - Font: Segoe UI
 - Font Size: 8.25
- Y Axis 1 Settings:**
 - Caption: Land Pieces
 - Font: Segoe UI
 - Font Size: 8.25
 - Custom Extremum
 - Min: 0



Road Density

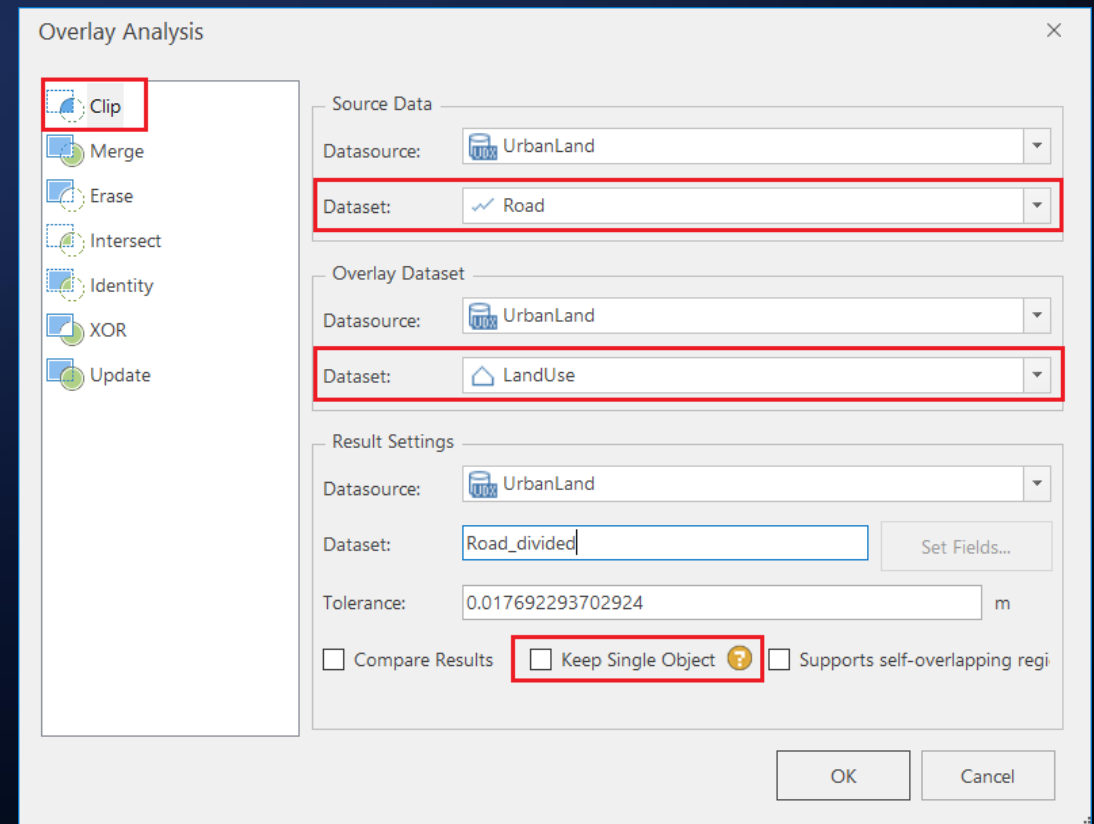
Traditional statistics based on spatial relationship.

Spatial Relationship between Roads and Land Piece



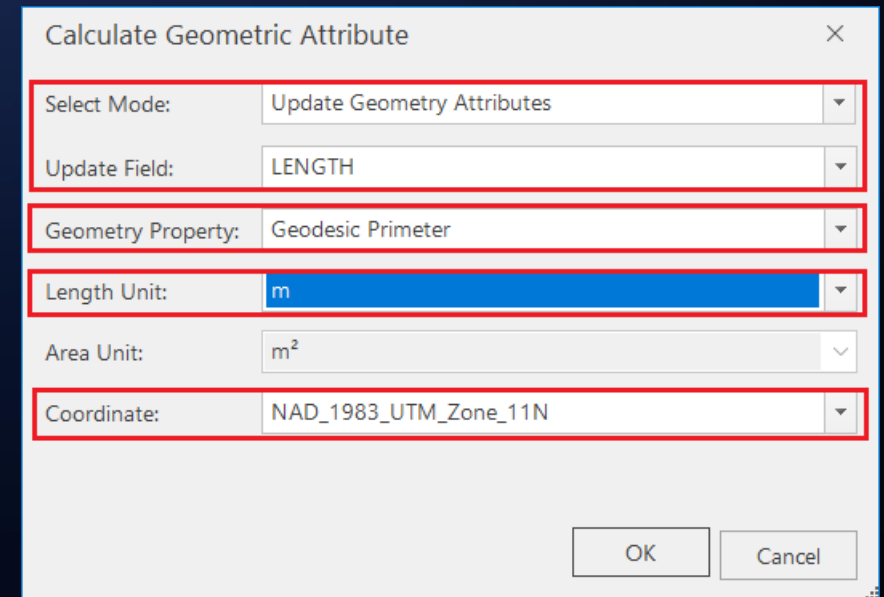
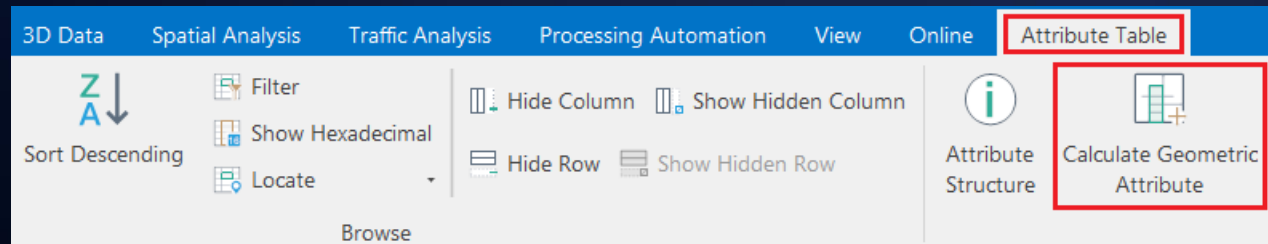
Divide Roads by Land Boundaries: Overlay

- Spatial Analysis → Overlay Analysis
- Uncheck “Keep Single Object”



Feature Length: Attribute Calculation

- Browse attribute table of Road_divided
- Attribute Table → Calculate Geometric Attribute



Total Length of Roads by Land Piece: Dataset Attribute Update

- Data → Dataset Attribute Update

Dataset Attributes Update

Data with attributes offered

Datasource: UrbanLand

Dataset: Road_divided

Target Data

Target Datasource: UrbanLand

Target Dataset: LandUse

Save Statistic Info LU_GEN

Filter: ...

Update Attributes of Selected Objects

Parameter Settings

Spatial Relation: Within

Boundary Processing: Contain Border

Get Value: Sum

Field Settings

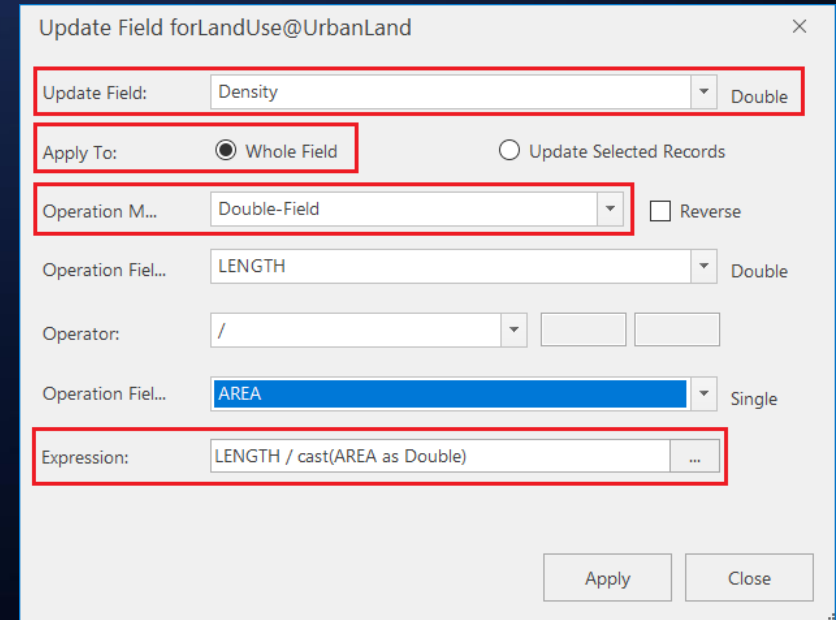
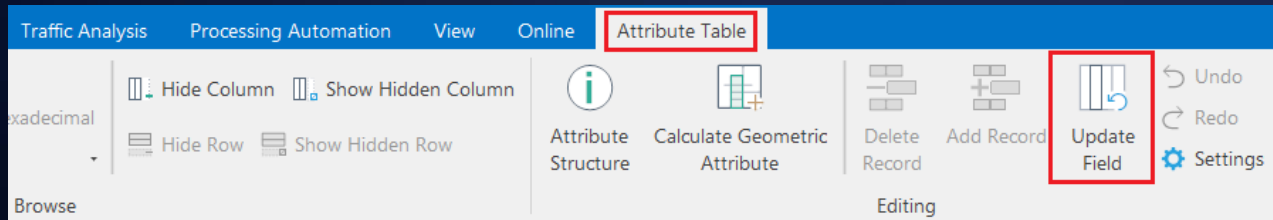
<input type="checkbox"/>	Source field	Field Type	Target Field	Field Type
<input type="checkbox"/>	4 CLASS	Short		
<input type="checkbox"/>	5 CLASS_DESC	Wide Char		
<input type="checkbox"/>	6 BUS_RT	Double		
<input type="checkbox"/>	7 L_ADD_FR	Int		
<input type="checkbox"/>	8 L_ADD_TO	Int		
<input type="checkbox"/>	9 R_ADD_FR	Int		
<input type="checkbox"/>	... R_ADD_TO	Int		
<input type="checkbox"/>	... PRE_DIR	Wide Char		
<input type="checkbox"/>	... STR_NAME	Wide Char		
<input type="checkbox"/>	... STR_TYPE	Wide Char		
<input type="checkbox"/>	... SUF_DIR	Wide Char		
<input checked="" type="checkbox"/>	... LENGTH	Double	LENGTH	Double

Ignore system field

OK Cancel

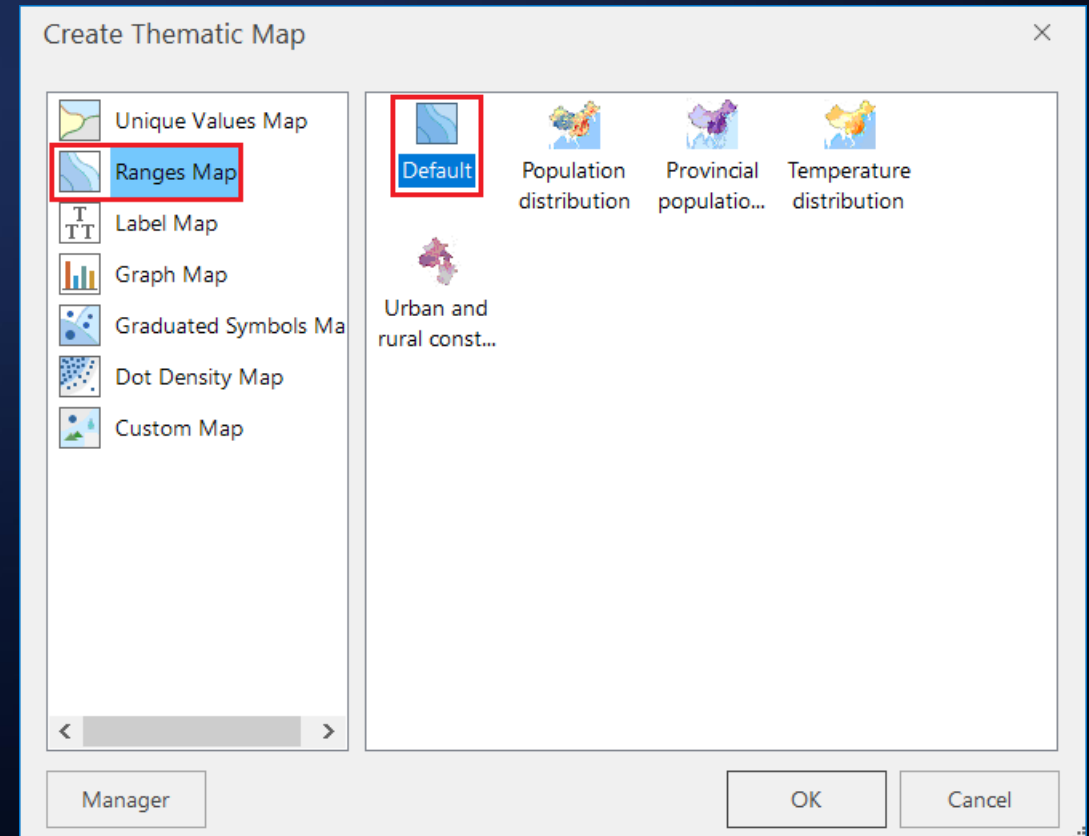
Road Density: Update Field

- Attribute Table → Update Field

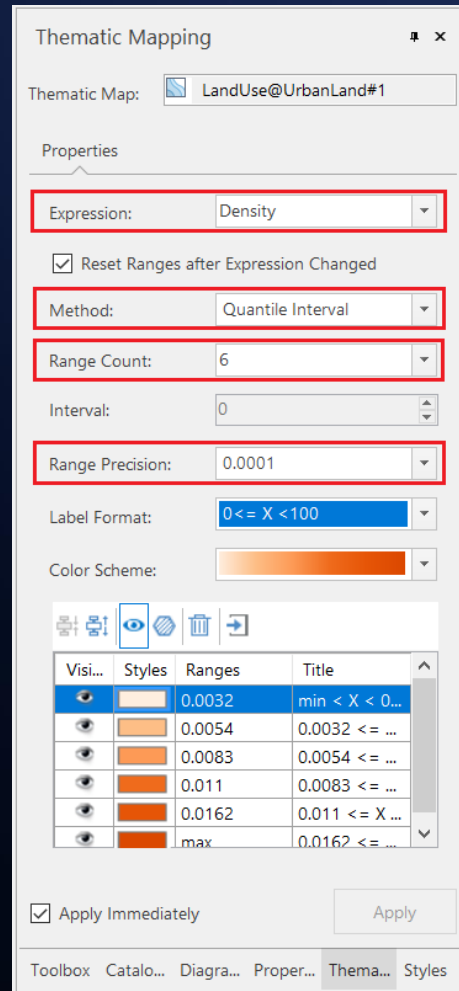


Statistics Visualization: Thematic Map

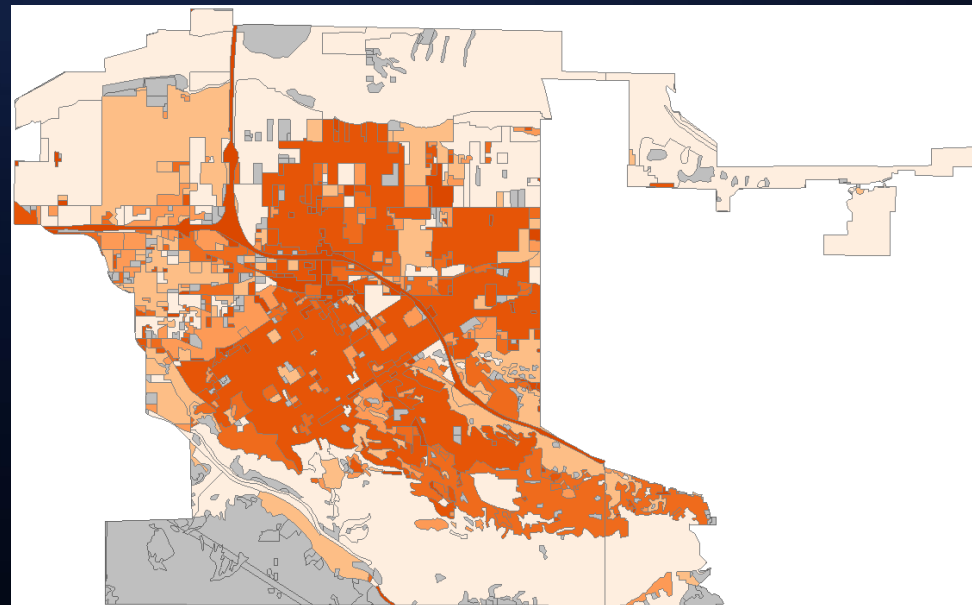
- Add dataset LandUse into map window
- Select LandUse layer in Layer Manager → right click → Create Thematic Map
- Ranges Map → Default



Statistics Visualization: Thematic Map



- Expression: Density
- Method: Quantile Interval
- Range Precision: 0.0001

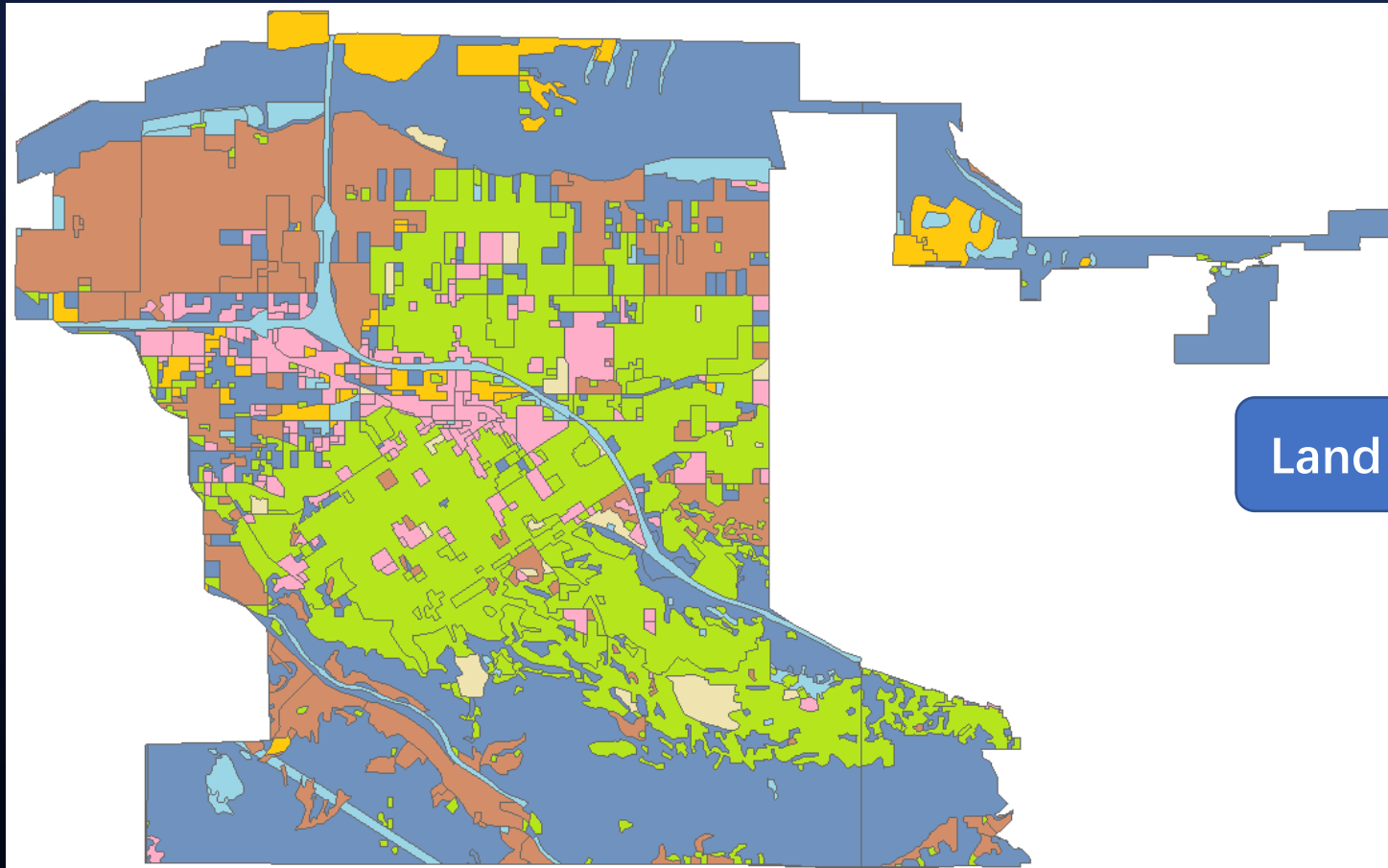




Land Use Distribution

Where is the mean center of each land use category? What are the spatial distribution features for varied land use category?

Geographic Distribution of Land Pieces



Land Pieces by Categories

Distribution Center

Spread Trend

Proper Visualization

Geographic Distribution: Directional Distribution

- Spatial Analysis → Spatial Statistical Analysis → Measuring Geographic Distributions → Directional Distribution

- Group By: LU_ABV
- Weight Field: AREA

Directional Distribution

Source Data

Datasource: UrbanLand

Dataset: LandUse

Parameter Settings

Group By: LU_ABV

Weight Field: AREA

Ellipse Size: One Standard Deviation

Result Data

Datasource: UrbanLand

Dataset: ResultDirectional

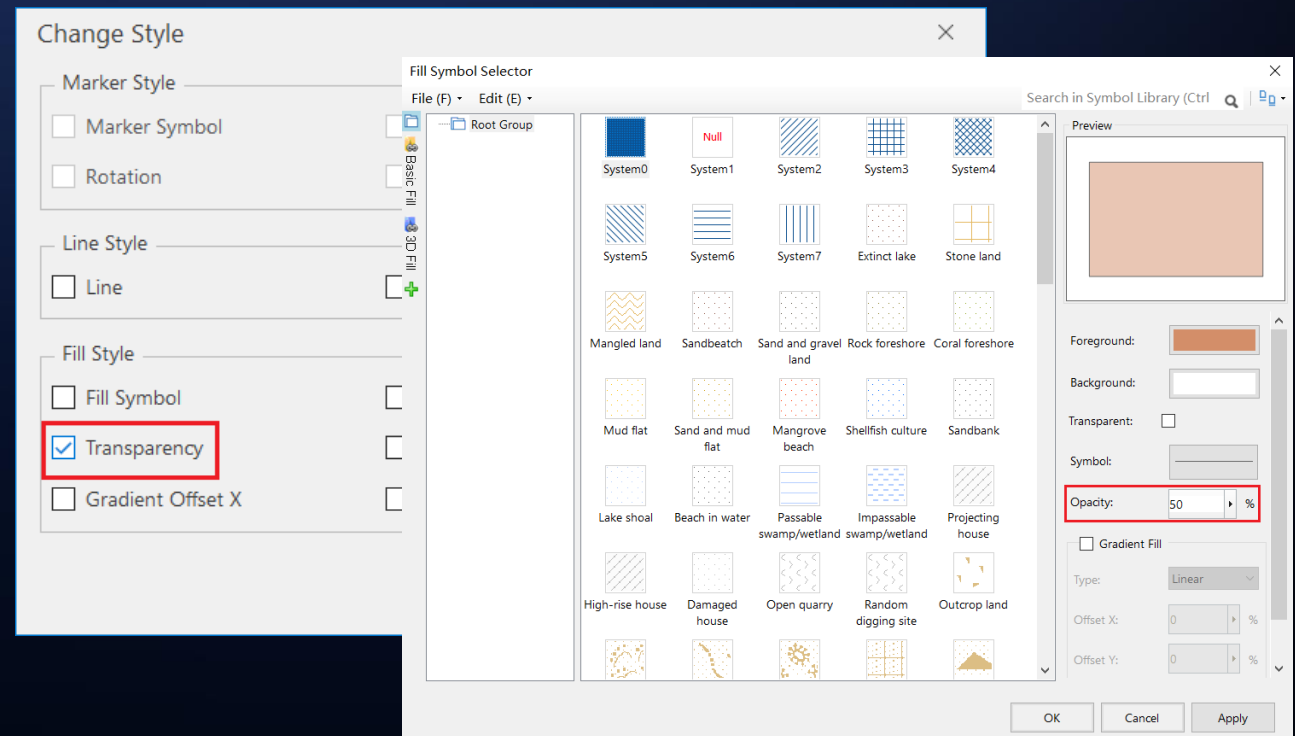
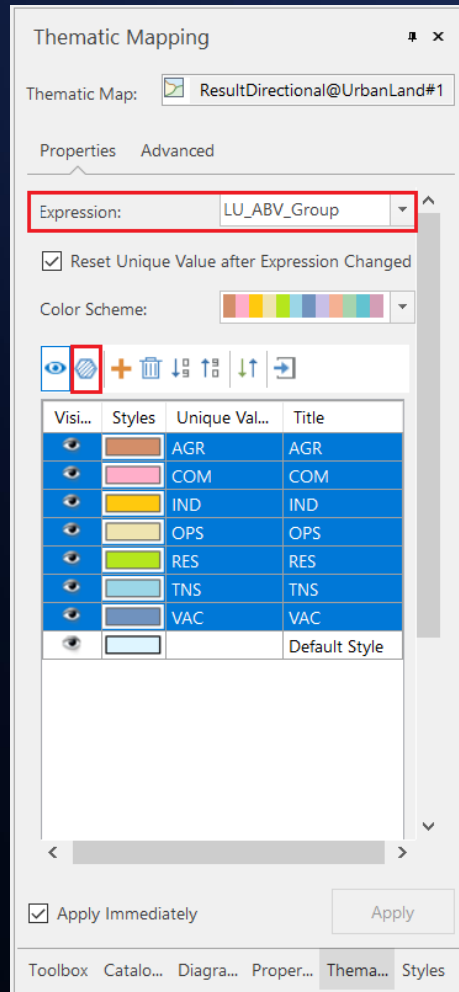
Mean Center

<input type="checkbox"/>	Field Name	Field Type	Statistics Type
<input checked="" type="checkbox"/>	SmUserID	Int	Max
<input type="checkbox"/>	AREA	Single	Max
<input type="checkbox"/>	PERIMETER	Single	Max
<input type="checkbox"/>	LANDUSECOV	Int	Max
<input type="checkbox"/>	LU_GEN	Short	Max
<input type="checkbox"/>	LU_ABV	Wide Char	First Object
<input type="checkbox"/>	LU_CODE	Single	Max
<input type="checkbox"/>	LENGTH	Double	Max
<input type="checkbox"/>	Density	Double	Max

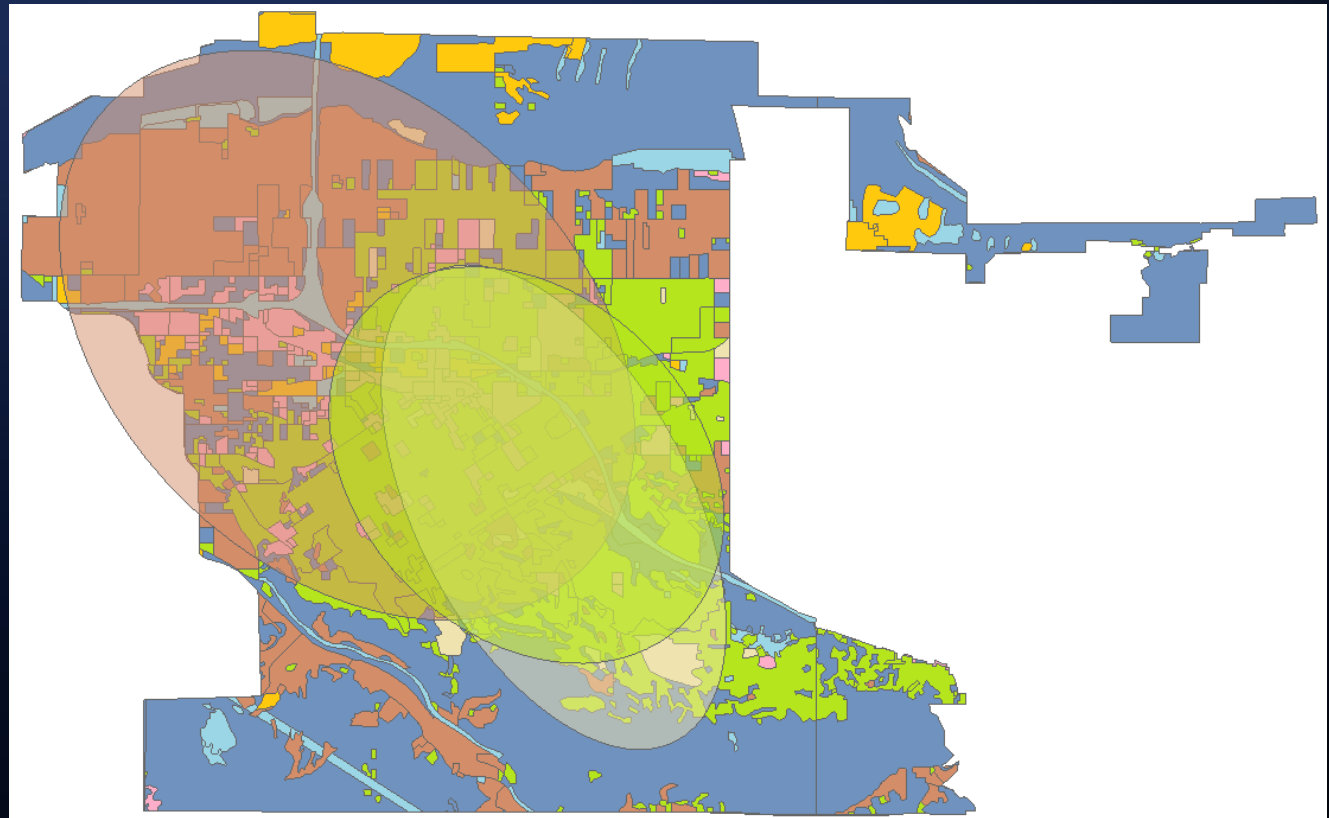
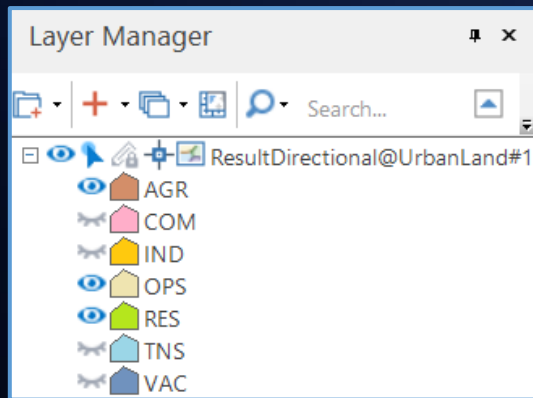
OK Cancel

Data Visualization: Create Thematic Map

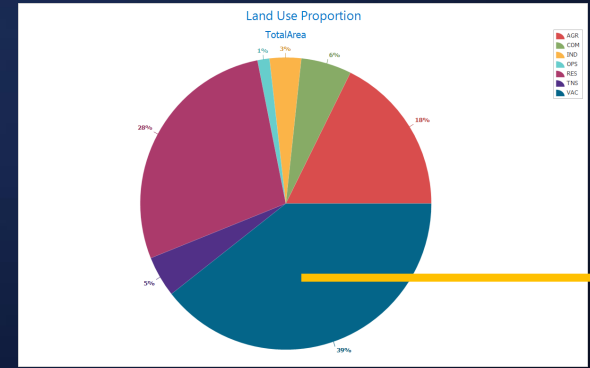
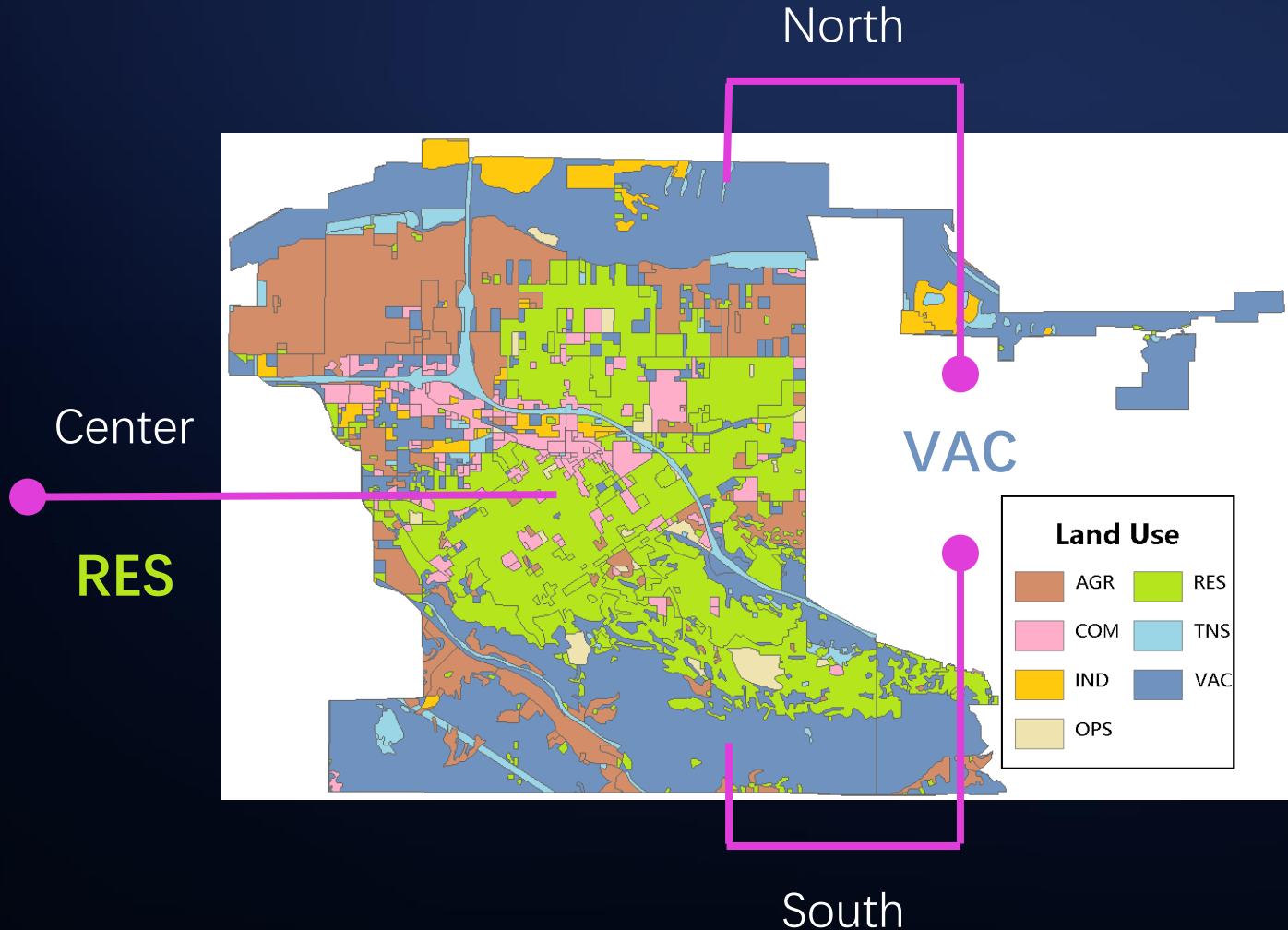
- Expression: LU_ABV_Group
- Change Style: opacity 50%



Data Visualization: Category Visibility in Thematic Map

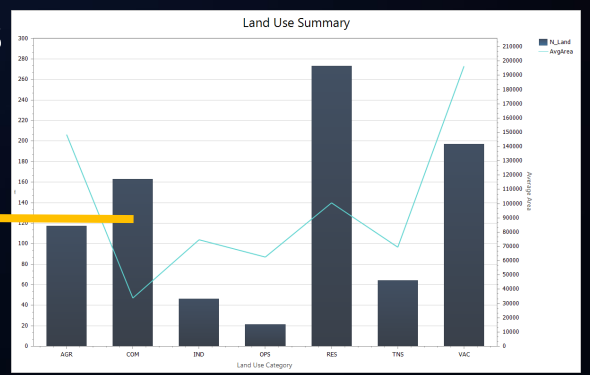


Retrospect: Unique Thematic & Traditional Statistics

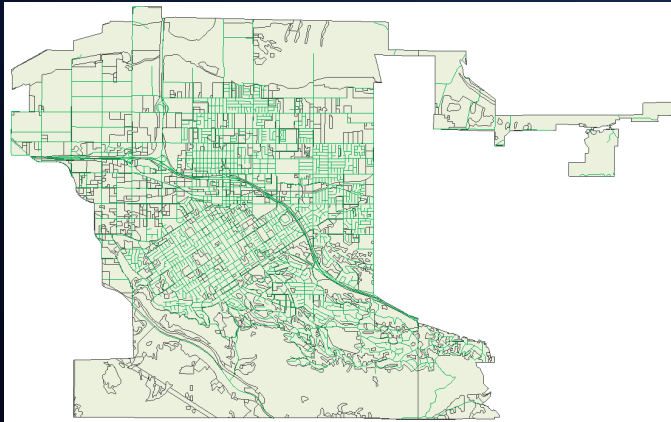


Top 1
RES

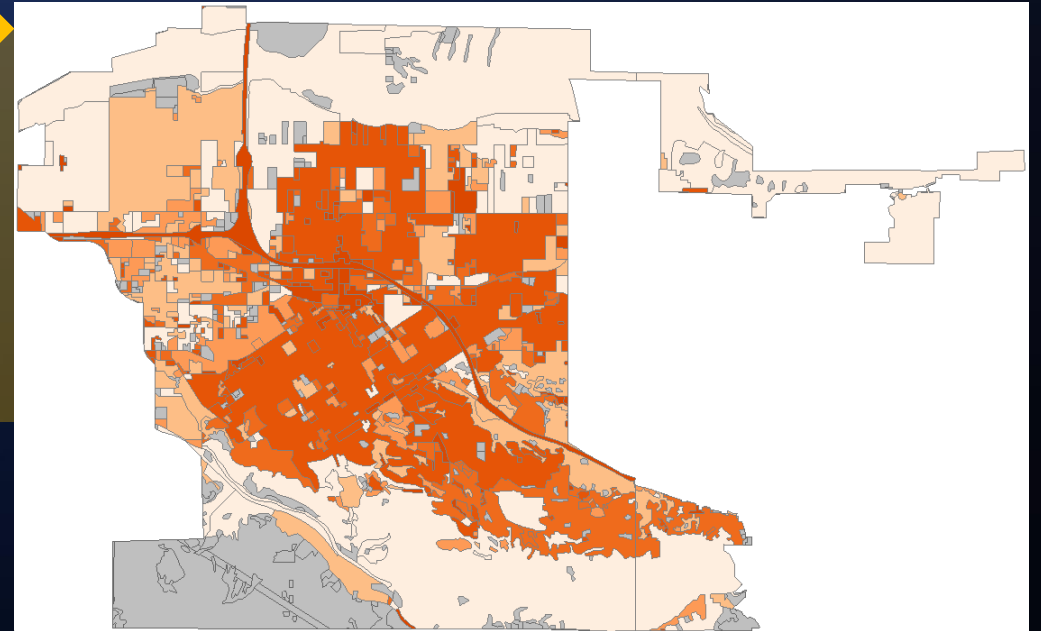
Numerous
Small
Pieces
COM



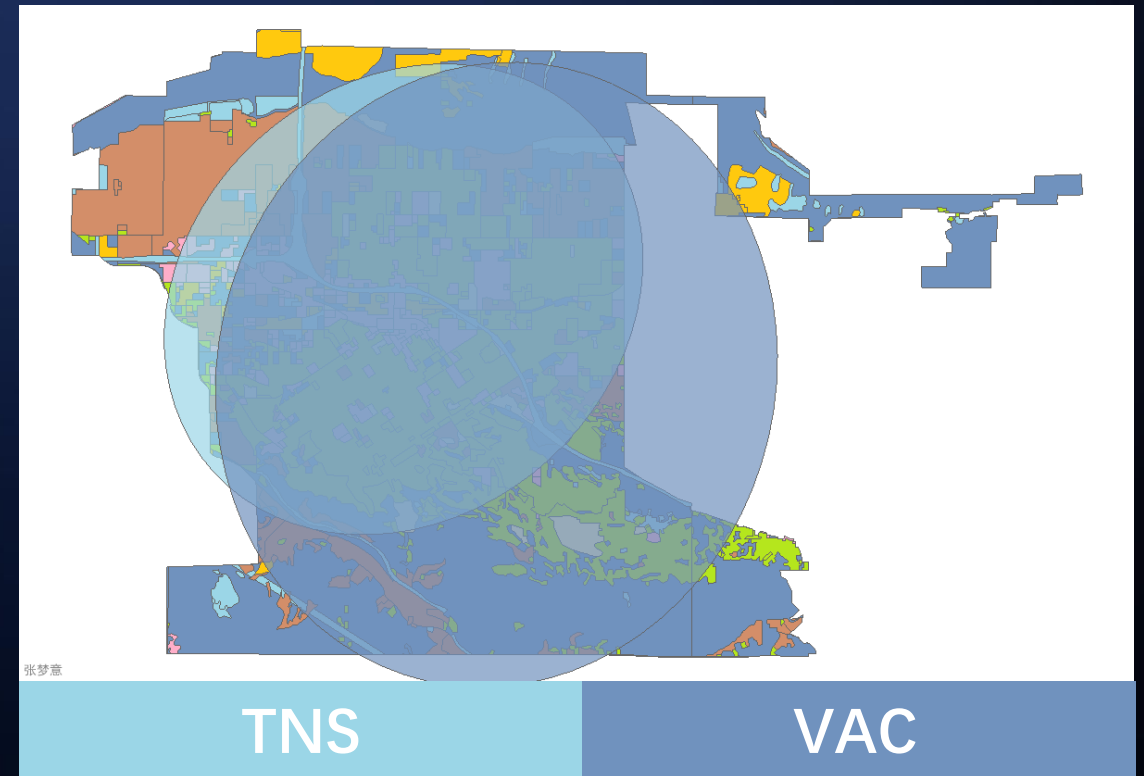
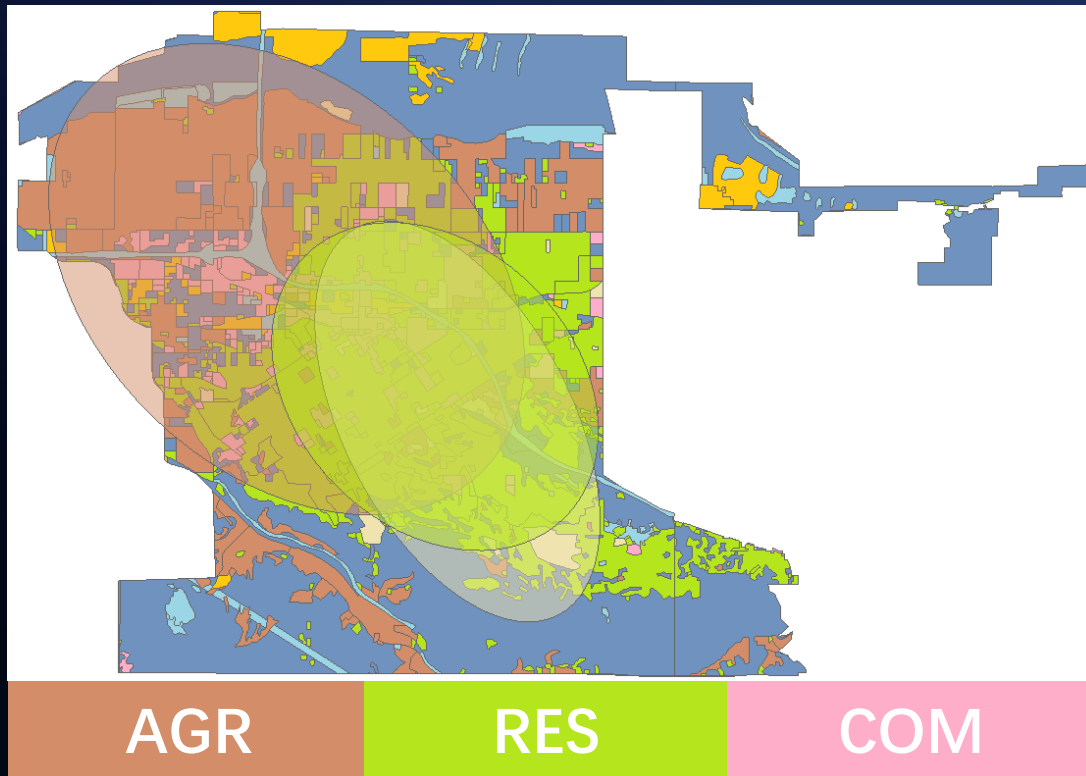
Retrospect: Relationship between Roads and Land Pieces



Overlay
Attribute Calculation
Update Field



Retrospect: Categories with Similar Distribution Pattern



A glowing blue molecular or network structure forming a sphere, with the text "THANK YOU" centered in white.

THANK YOU