

Delineating Regional Sectors as Basis for Future Development Scenarios

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*Chattanooga-Hamilton County
Regional Planning Agency*

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Chattanooga-Hamilton County Regional Planning Agency



- Joint agency of City of Chattanooga and Hamilton County
- Provides recommendations to the Planning Commission
- Develops land use plans
- Develops transportation plans
- Administers zoning
- Proposes development polices
- Reviews new subdivisions & other developments





“Chattanooga, TN”

By geraldford / CC BY-SA 2.0

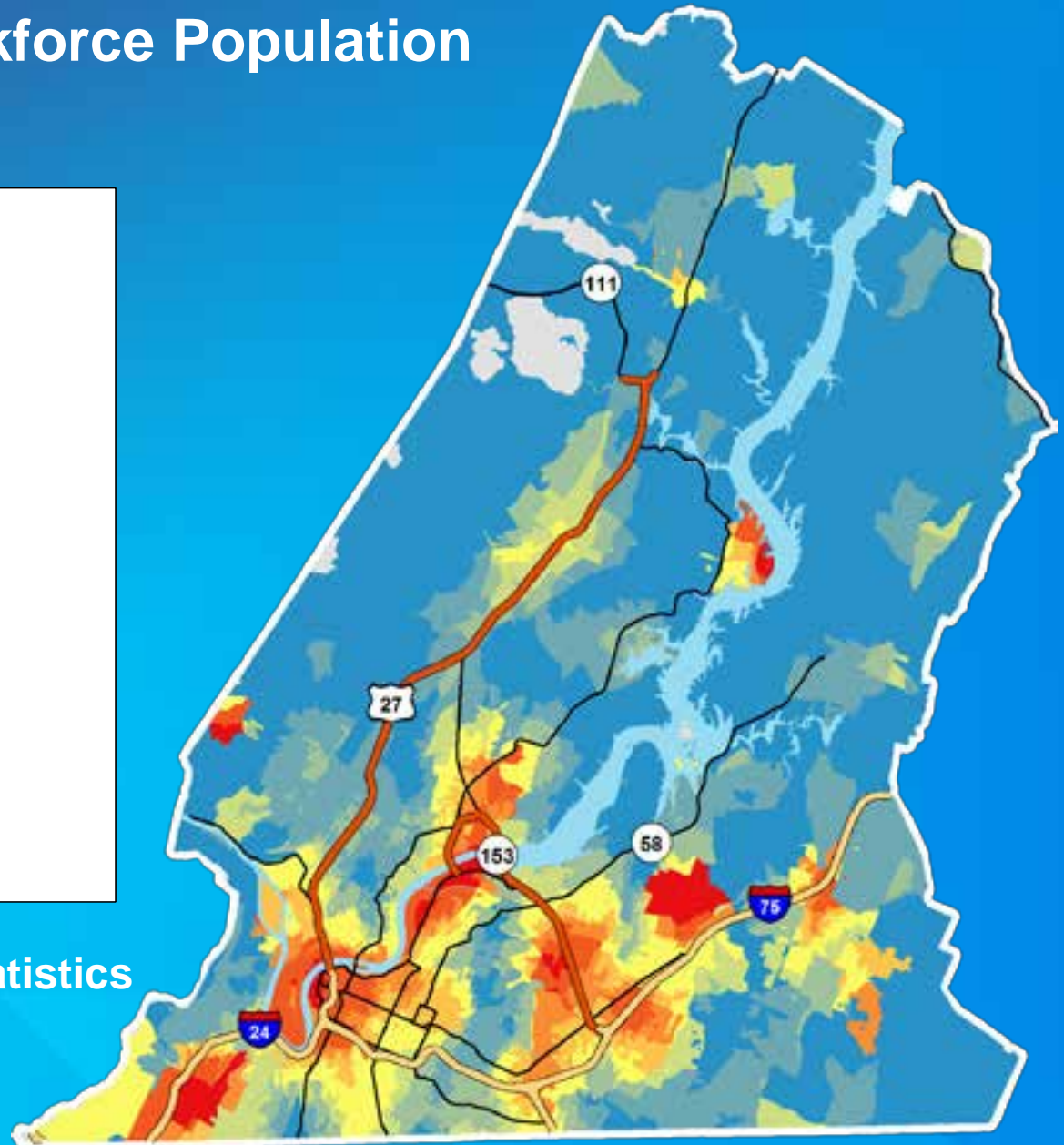
Modified

Land Cover Hamilton County, Tennessee



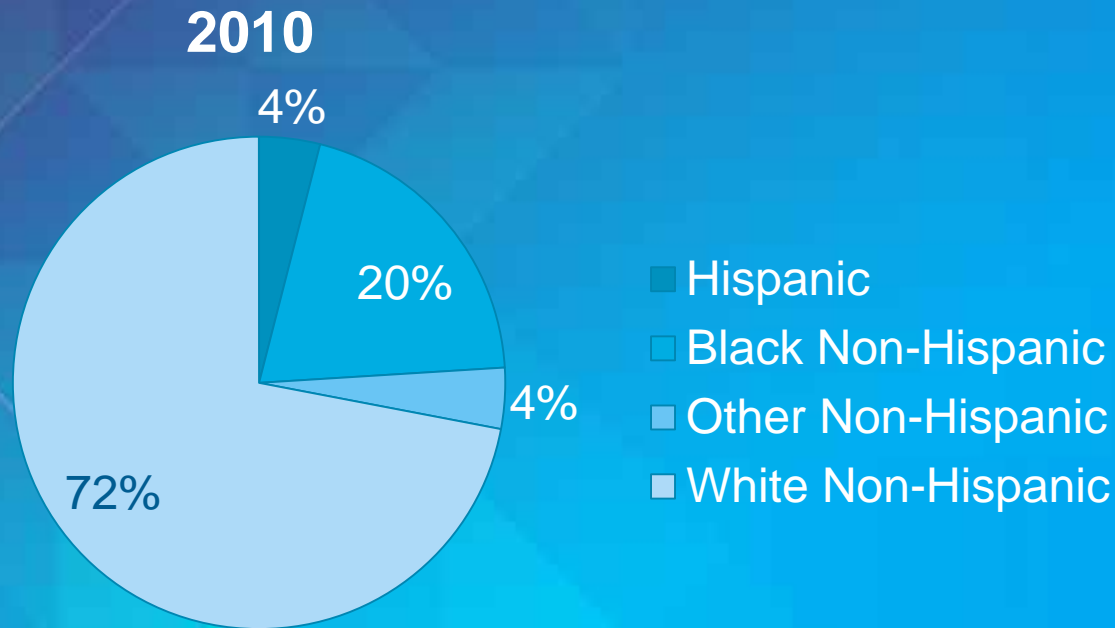
USGS 2011
Nat'l Land Cover Database

Employment-Workforce Population Balance 2010

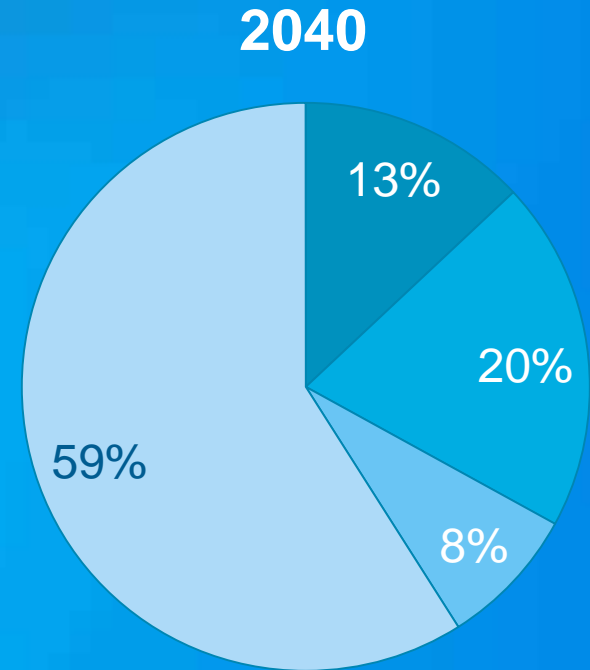


US Bureau of Labor Statistics
US Census Bureau

Expected Demographic Changes for Hamilton Co.



**337,000
population**



**412,000
population**

Based on Woods and Poole,
Center for Economic and Business Research,
and the RPA

Find a Perspective

- TransectMap published by Criterion Planners
- Informed by SmartCode
- Rural to urban continuum

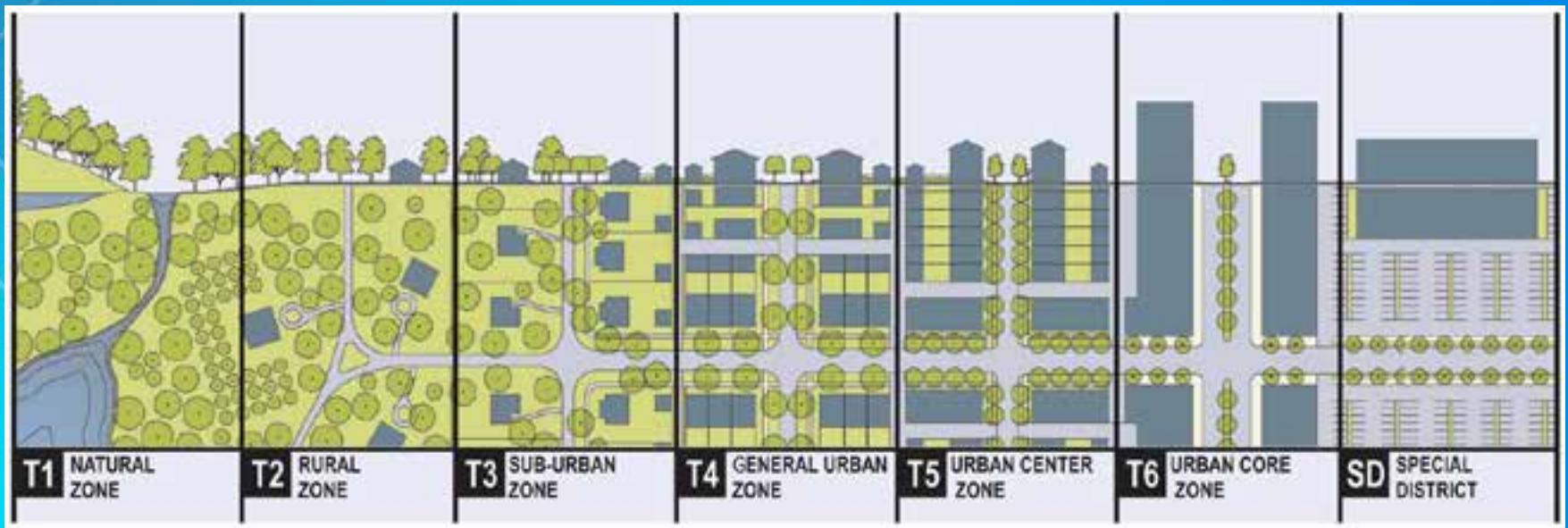


Image: Duany Plater-Zyberk & Company

TransectMap Regional Sectors

O1 – Preserved Open Space

O2 – Reserved Open Space

G1 – Restricted Growth

G2 – Controlled Growth

G3 – Intended Growth

G4 – Infill/Redevelopment

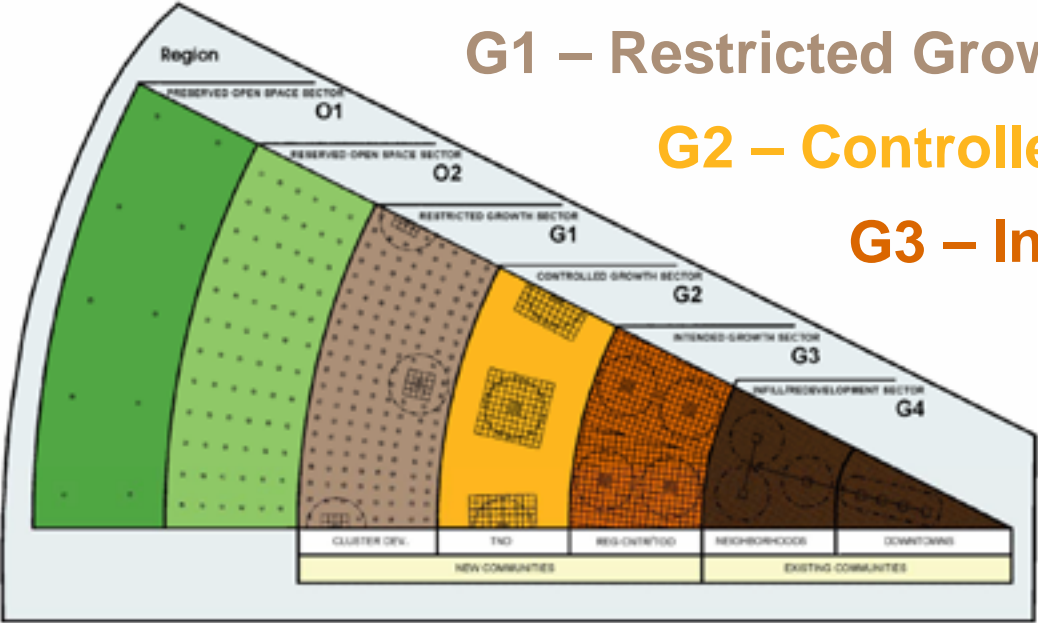


Image: Criterion Planners

Goal

Establish an appropriate and balanced scale of development within Hamilton County. Development should be encouraged in or near areas with existing or planned infrastructure and discouraged in or near areas with sensitive natural resources.

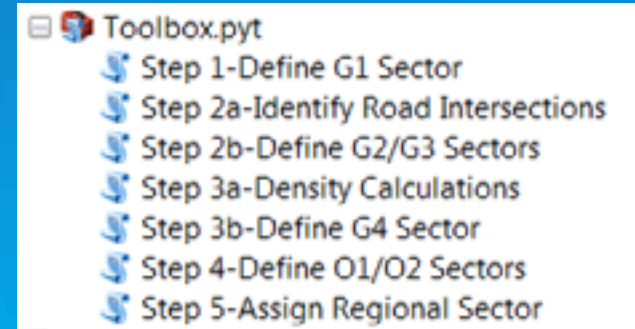
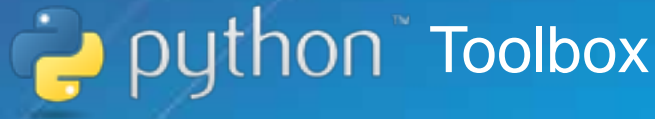
[F E E D B A C K]

Planners discovered that changing the terminology resulted in better communication with the public and elected officials.

| | | |
|-------------------------|---|-----------------|
| O1 Preserved Open Space | à | Protected Lands |
| O2 Reserved Open Space | à | Level 1 |
| G1 Restricted Growth | à | Level 2 |
| G2 Controlled Growth | à | Level 3 |
| G3 Intended Growth | à | Level 4 |
| G4 Infill/Redevelopment | à | Level 5 |

Implementation

ModelBuilder? Script? Add-In?



Toolbox Pros

- It's all in one place:
 - Parameters
 - Validation
- Very user-end friendly

Toolbox Cons

- Slightly different syntax
- One error takes out the entire toolbox
- Add .pyt to list of recognized Python extensions
- Long file, hard to navigate

Protected Lands

- Lands that have some type of tangible habitat protection.

Inputs

30-Yr Conservation Easements

Permanent Conservation Easements

Floodways

Wetlands

National/State/Military Parks

Wildlife Refuges/Management Areas/Sanctuaries

Trusts

State Natural Areas

HAMCO Trails Properties

Slope Exceeding 100%

Sources

NRCS Conservation Easements

FEMA DFIRM

NWI Wetlands

USGS Protected Areas

HCGIS

Cumberland Trails

NCED

Level 1

- Low development potential
- Low potential for future public services and facilities
- High potential for resource protection

Inputs

100-Year Flood

Priority Forest Blocks

Pasture/Farm Land

Slopes between 25-100%

Sources

FEMA DFIRM

Open Space Institute

USGS NLCD

HCGIS

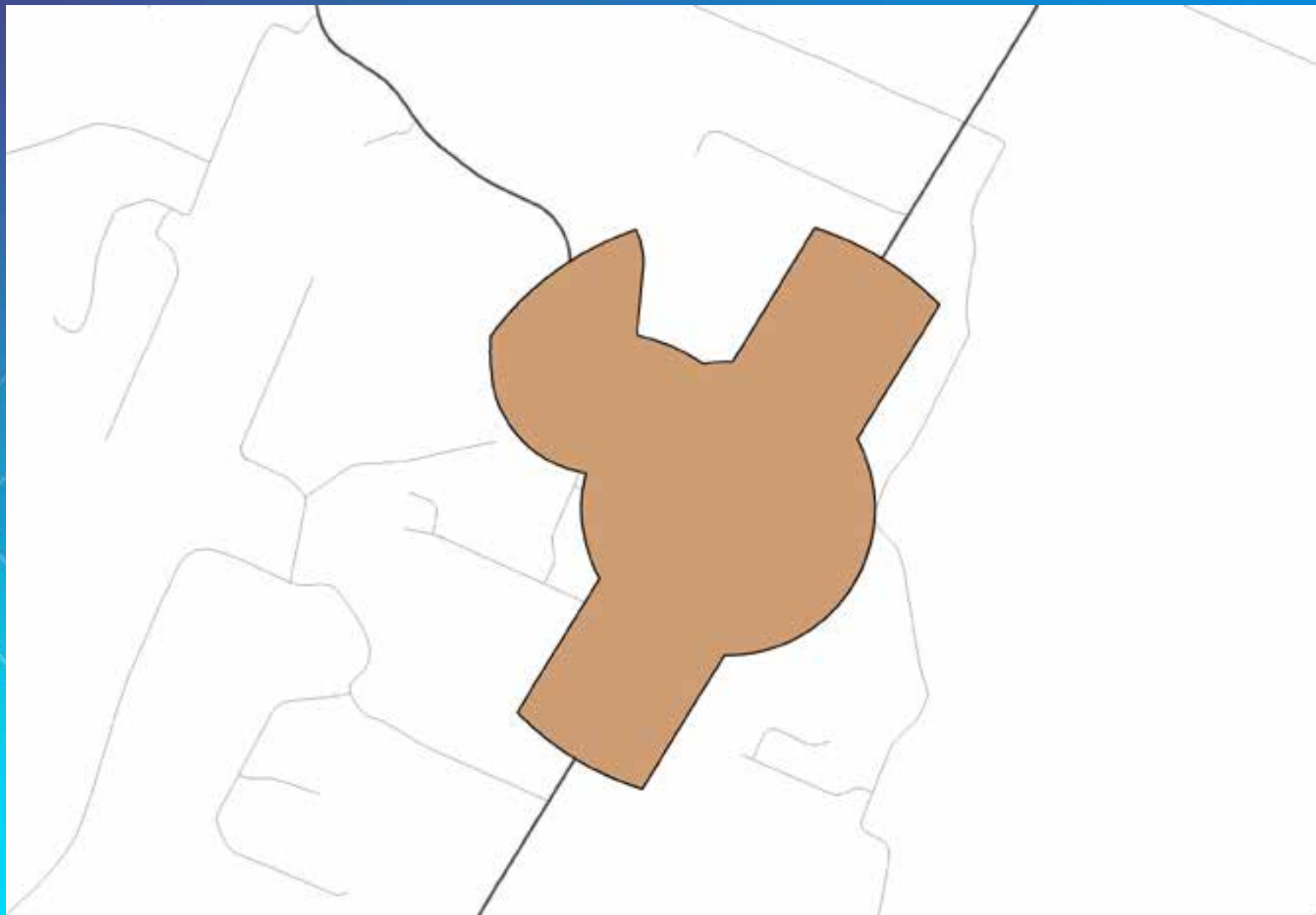
Road Intersections

- Basis of analysis in Levels 3, 4, and 5
- Roads classified as either Major or Minor based upon TDOT functional classification. Upon review, the Minor class was further refined to be Minor Urban or Minor Rural.
- The type of intersection determines how it is processed:
 - Major-Major, Major-Minor Urban (Level 4)
 - Any Minor-Minor, Major-Minor Rural (Level 3)
- *How to identify a valid intersection?*
 - A valid intersection contains two or more unique street names.

```
fc = 'vertices_featureclass' # Start/end points of road line featcls
flds = ['Name', 'X_Coord', 'Y_Coord'] # XY fields are long integers
rds = [(r[0], (r[1], r[2])) for r in arcpy.da.SearchCursor(fc, flds)]
unqXY = list(set([r[1] for r in rds]))
for xy in unqXY:
    numUnqSt = len(set([r[0] for r in rds if r[1] == xy]))
```

Level 3

- Buffers around any type of Minor-Minor intersection and, later, also Major-Minor Rural intersections.
- Uses a $\frac{1}{4}$ mile radial buffer about the intersection
- Uses an $\frac{1}{8}$ mile buffer of the minor roads extending $\frac{1}{2}$ mile from the intersection



Level 4

- Implemented the same as Level 3 except around Major-Major and, later, Major-Minor Urban intersections with larger buffer distances.
- Uses a $\frac{1}{2}$ mile radial buffer about the intersection
- Uses an $\frac{1}{4}$ mile buffer of the minor roads extending 1 mile from the intersection

Level 5

- **Identifiable when the density of the road network (includes all TDOT functional classes) exceeds a critical value. In our case, 13 centerline miles per square mile.**
- **Initially calculated on a 1/2 mile grid cell basis covering the entire county. After extensive feedback, reworked to be only the radial buffer portions of Level 3 and Level 4 meeting the threshold density.**

The Overlapping Features Problem

- Dissolving is not an option as information is required for each specific buffer.
- Processing each buffer individually is not efficient.
- On StackExchange, users whuber and giswump laid out a methodology and Python script, respectively, that groups features together such that within each group the features do not overlap. Not optimized, but very functional.

<http://stackoverflow.com/questions/32217/>

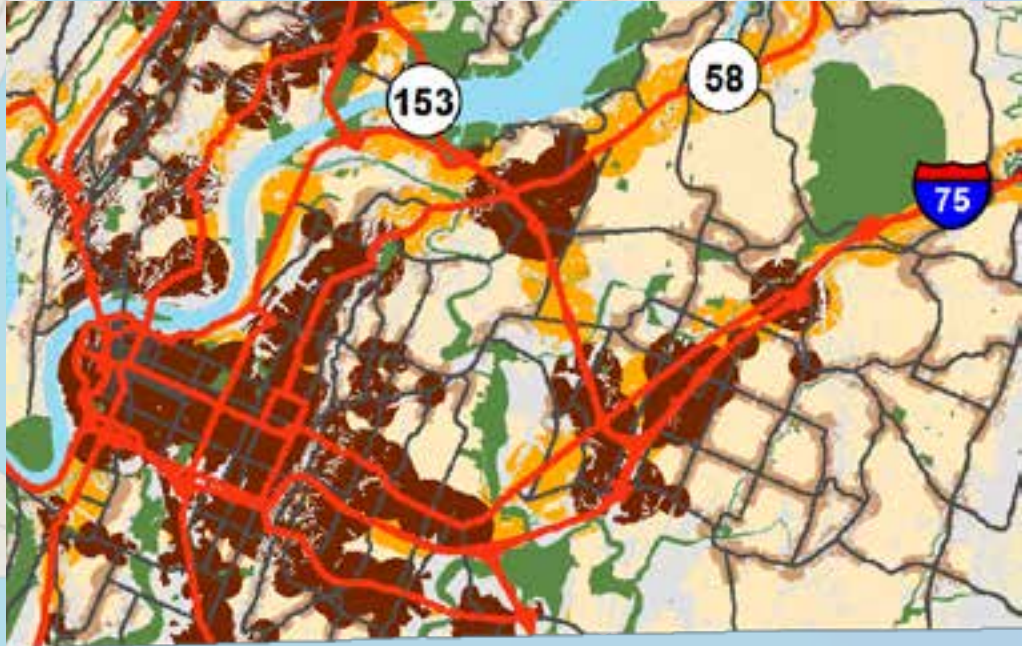
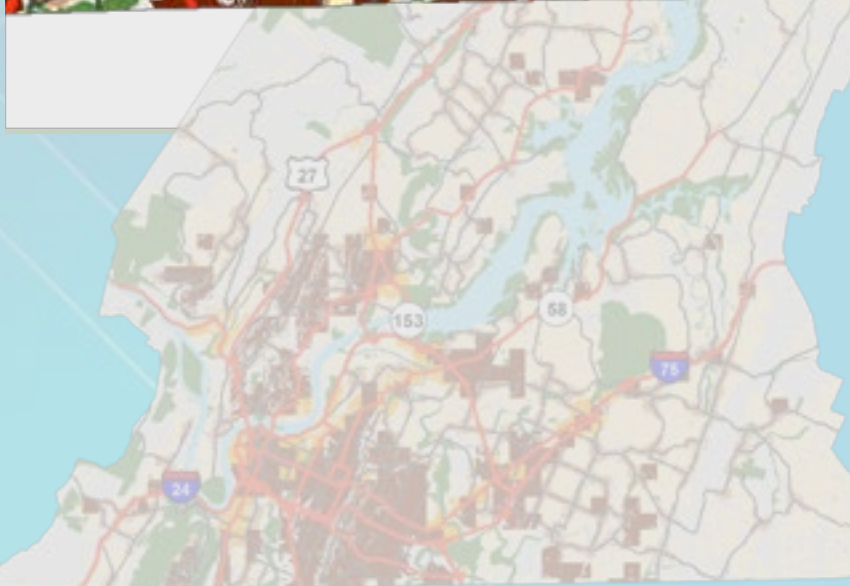
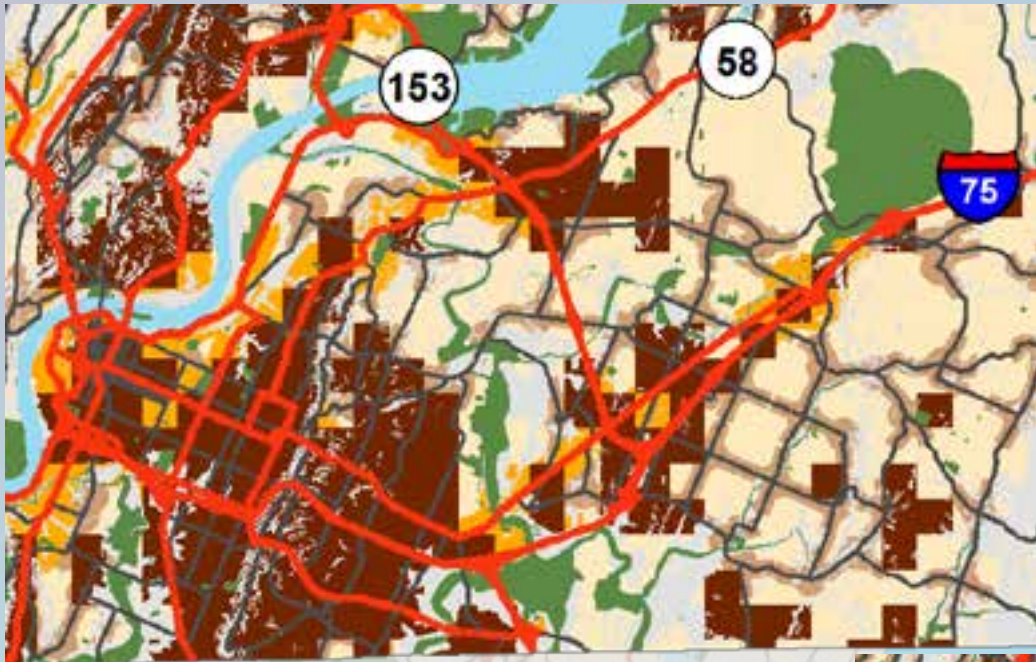
[Expanding overlapping to new non-overlapping polygons](#)

- Result: 377 minor int. buffer features à 21 groups
284 major int. buffer features à 57 groups

• So, 661 iterations vs 78...

Hierarchy of Assignment

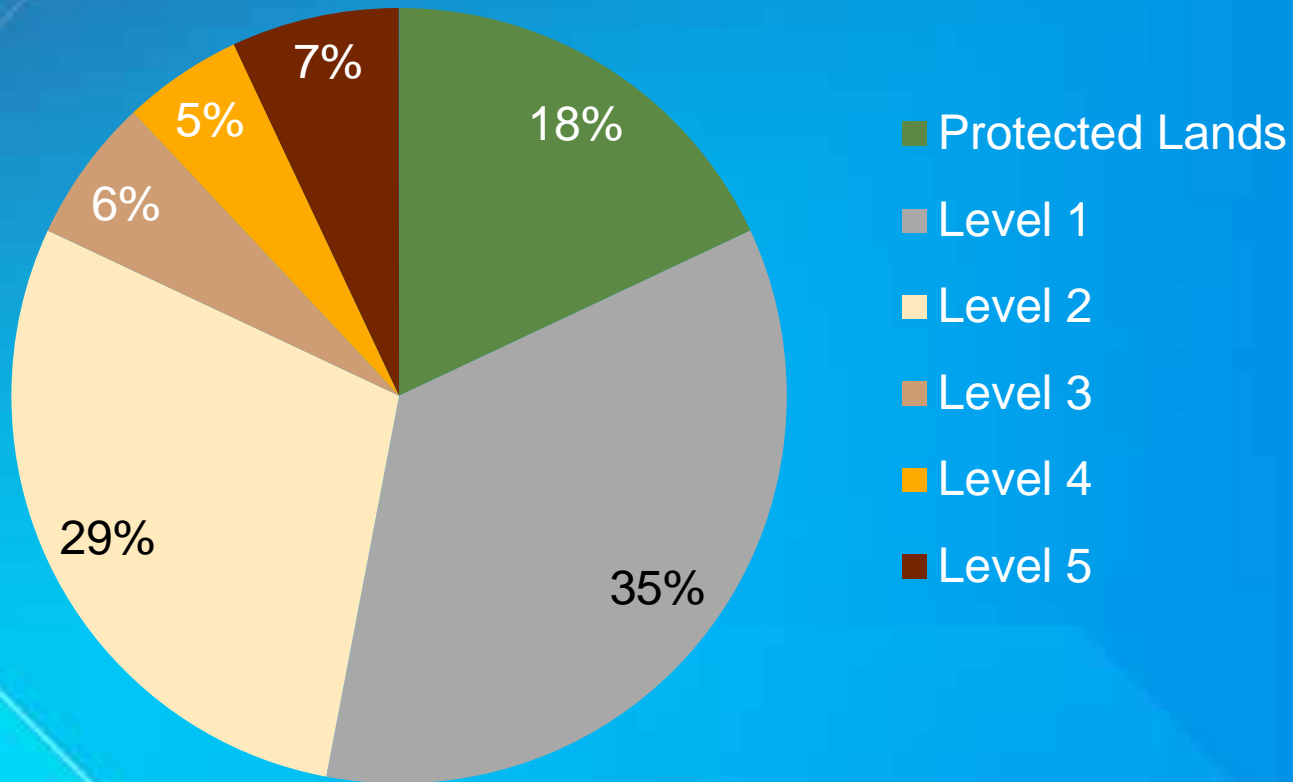
- Since levels are developed rather independently there is significant overlap.
- Assigning an area to only one of the levels is done following the hierarchy below:
 1. Level 0
 2. Level 1
 3. Level 5
 4. Level 4
 5. Level 3
 6. Level 2



First Pass

Regional Development Intensity Infographics

Hamilton County: 369,199 acres



Zoning Categories by Development Intensity Level

Protected Lands



Level 1



Level 2



Agricultural **Residential** **Commercial** **Manufacturing**

Level 3



Level 4



Level 5



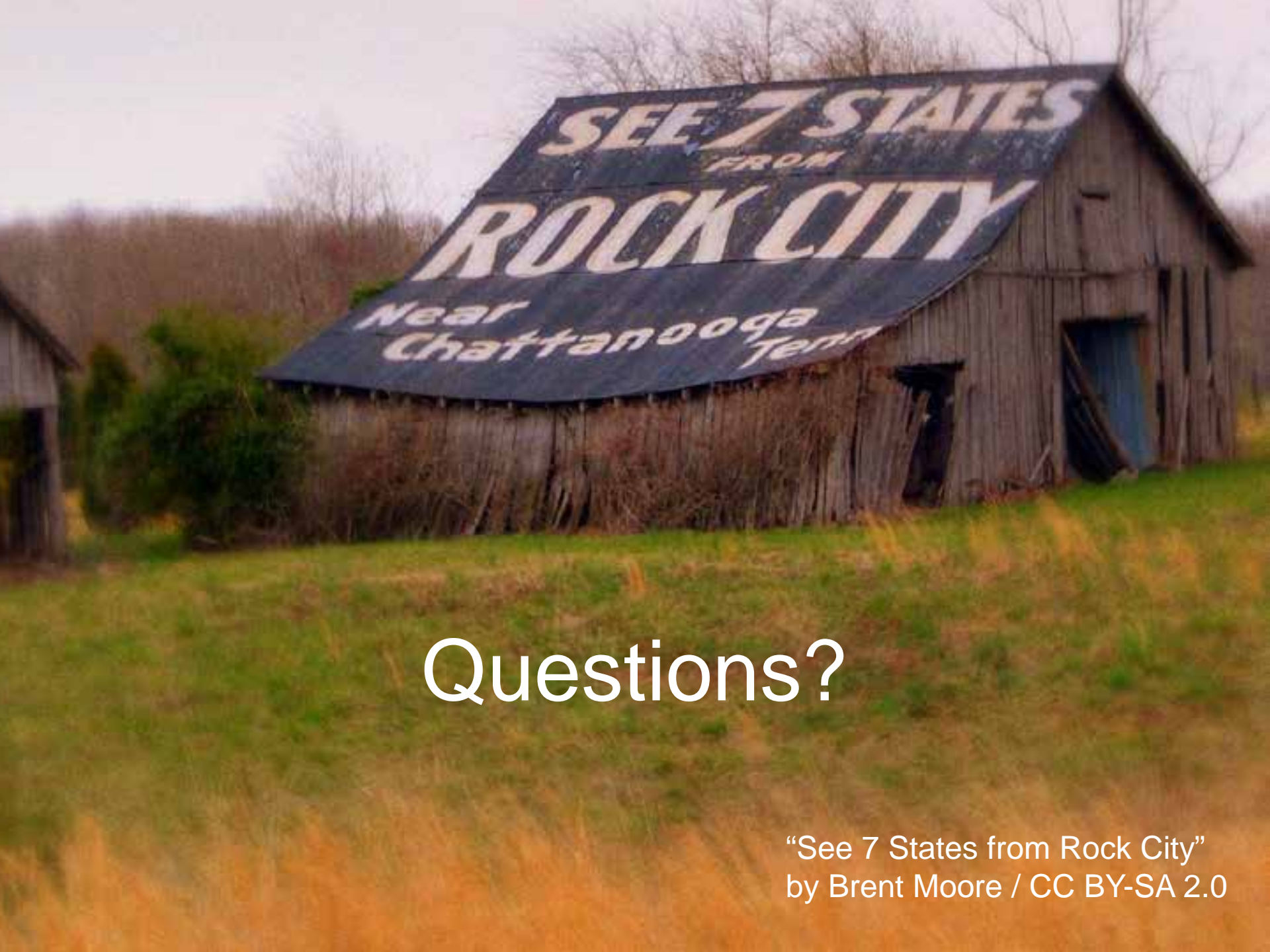


Thanks to:

Yuen Lee & Research & Analysis

Tim Moreland

Strategic Long Range Planning



Questions?

“See 7 States from Rock City”
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