

# An Analysis of Buildable Land in Lexington, MA

# Tufts

Data retrieved from MassGIS website, <http://www.mass.gov/mgis/database.htm> Accessed 11/10/08, and detailed in report entitled, "Identifying Buildable Land Using GIS".

Coordinate System: Massachusetts State Plane Mainland, NAD 1983, meters

Cartographer: Tammy Zborel  
December 12, 2008

## Purpose:

City planning departments conduct buildable lands analyses to identify and calculate the amount of land either available for, or at risk of, future development. Given the intense pressure for space and resources, especially along the urban fringe where suburbs and strip malls sprawl, inventorying every inch of undeveloped land is an important piece of long-term community and regional planning. Often as a result of these studies planners are forced to confront realities that may greatly impact their vision for the future.

In this study I have examined land use in the Town of Lexington, MA to identify the amount and location of buildable land according to pre-determined criteria. I chose Lexington given its location to growing communities such as Arlington and Winchester which contain high residential density and commercial establishments close to the Lexington border. As these densely populated areas expand in the coming years the town of Lexington may soon be targeted for similar development. The purpose of this analysis was to determine if buildable land is available in Lexington, and identify areas of with greatest growth potential. Though most planning agencies conduct buildable lands analyses in order to locate parcels for development, I will use the same tools to try to determine where land may be vulnerable to development and should therefore be protected. The purpose of this poster is to present a summary and visual display of how planners use GIS to identifying unconstrained, buildable lands.

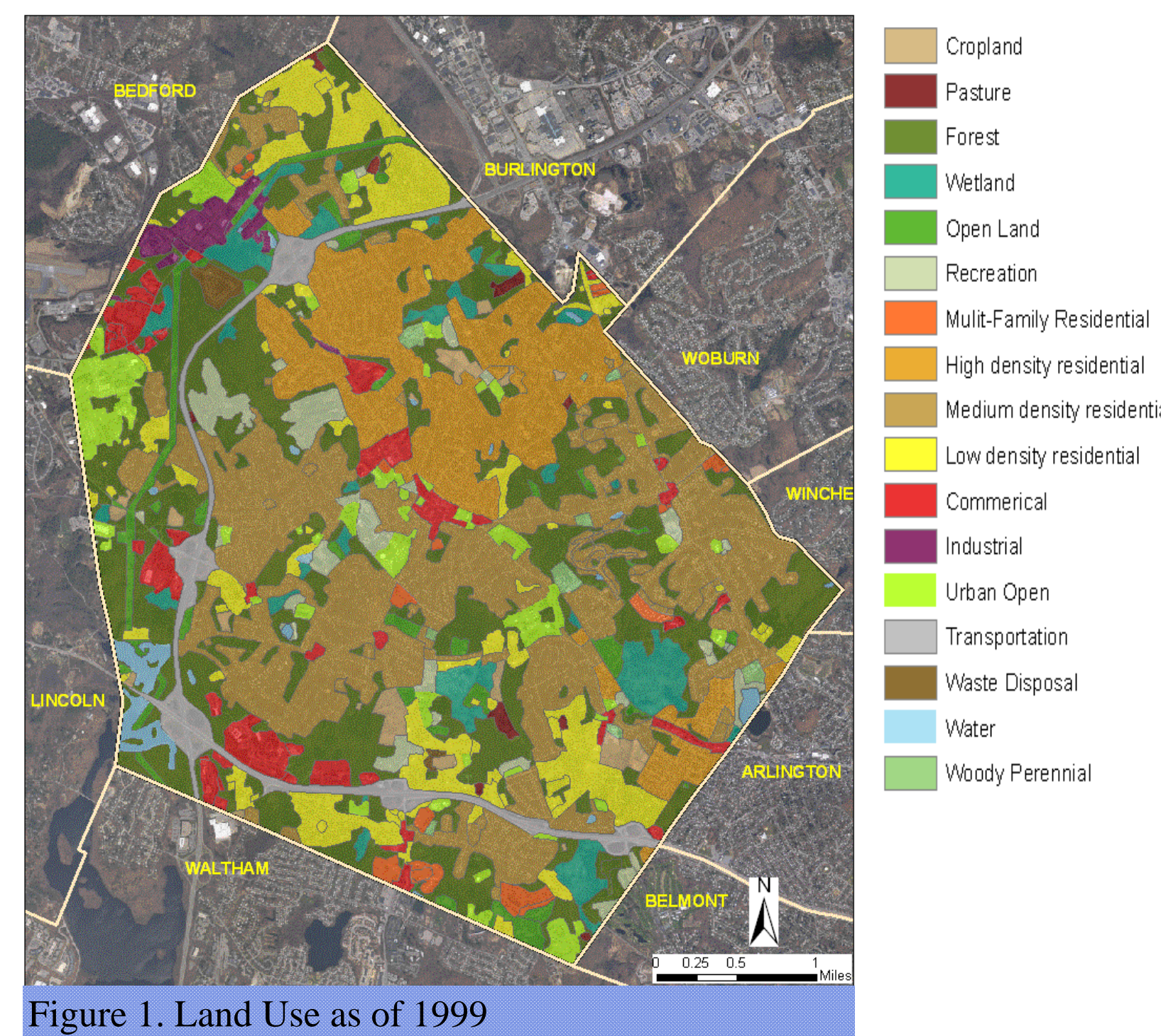


Figure 1. Land Use as of 1999

## Analysis

Approximately 63% of land in Lexington is privately owned, and 10% is permanently set aside for conservation either through easements or designated as open space in perpetuity. Land uses, presented in Figure 1, show a considerable amount of open spaces (including forests, recreation, open land, and wetland), perhaps leading prospective developers to believe that there is potential for significant growth in the area.

After removing constrained open spaces (see Table 1) from the zoning layer the viewer will notice that much of this perceived "open" land is actually either

protected or considered unsuitable or undesirable for development (Figure 2a). The protection of open space in Lexington is especially important in the southeast portion of the town as the growing residential and commercial land uses of neighboring Arlington and Winchester could present the potential (or risk) for increased development along this border.

As the series of maps below (Figures 2-2c) demonstrate, the Town of Lexington does not have much land available for future economic (commercial or industrial) growth. The remaining parcels of land that are considered "buildable" are zoned for residential use and make up approximately 83% of buildable land (see Table 2). By placing this map over an orthophoto of the town (Figure 3), a planner will be able make an initial assessment of actions (if any) that may be pursued to ensure the long-term viability and health of the community, including re-zoning as appropriate. In a full buildable lands analysis much more information will need to be collected in order to make informed decisions, such information may include land deeds, an assessment of the capacity of physical infrastructure to support growth (roads, sewers, or schools among important areas to consider), and another assessment of the current land uses surrounding the 'buildable' areas.

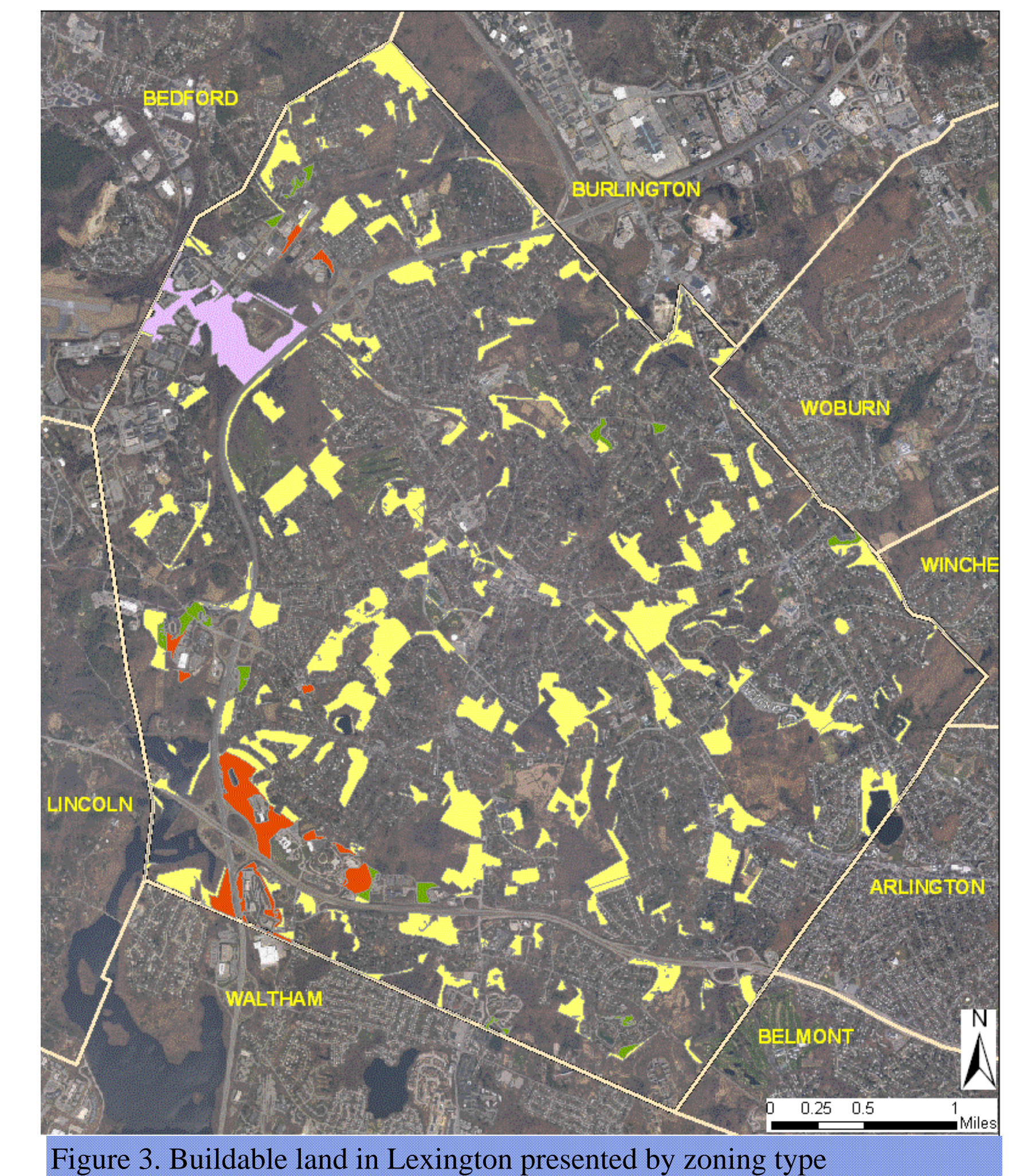


Figure 3. Buildable land in Lexington presented by zoning type

— Roads Other Industrial Commercial Residential

Table 1. List of pre-determined constraints and criteria used to define "unbuildable" land

Type of Constraint and Data Layer	Attributes selected out of zoning map as "unbuildable"
<b>Open Space</b> Mass GIS Protected and Recreational Open Space layer "OPENSACE_POLY", <a href="http://www.mass.gov/mgis/osp.htm">http://www.mass.gov/mgis/osp.htm</a>	"habitat", "historical/cultural", "water supply", "flood control", "underwater", "conservation", "agricultural", "Federal", "DCRS", "DFG", "DCRU", "DCRW", "DAW", "COM", "public/ non-profit", "land trust", "conservation organization", "non-profit", "private", "in perpetuity", "unknown", "limited"
<b>Land Use</b> Mass GIS Land Use layer, "LANDUSE_POLY" <a href="http://www.mass.gov/mgis/lus.htm">http://www.mass.gov/mgis/lus.htm</a>	"wetland", "water", "water disposal", "transportation", "residential", "commercial", "industrial"
<b>Additional constraints</b> The following data was collected using these layers:	Steep slopes <25%, Land area >1 acre, and parcels with development as of 2005 Orthophotos

Table 2. Available Buildable Land in Lexington by Use (in acres)

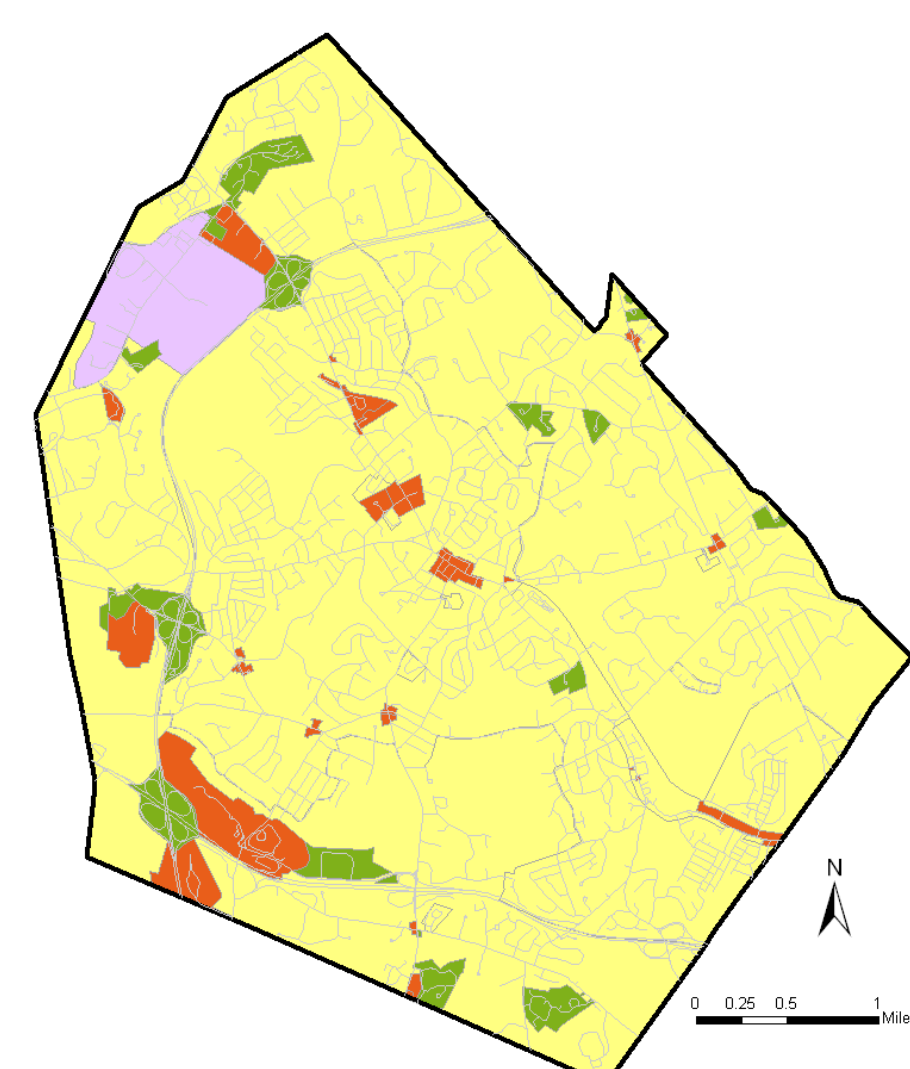
Zoning	Number of Parcels	Average Acreage	Total Acreage
Residential	177	7.1	1255
Commercial	13	8.1	105.4
Industrial	3	35	104.3
Other	14	3.5	49
<b>Totals</b>	<b>207</b>	<b>53.7</b>	<b>1513.7</b>

## Zoning Layer with Selected Building Constraints Removed

The process for conducting a buildable lands analysis can be summarized through a simple equation:  
 Entire land area - Existing Development - Physical barriers (i.e. water, slopes) - Pre-determined constraints to development = Amount of land available for development

— Roads Other Industrial Commercial Residential

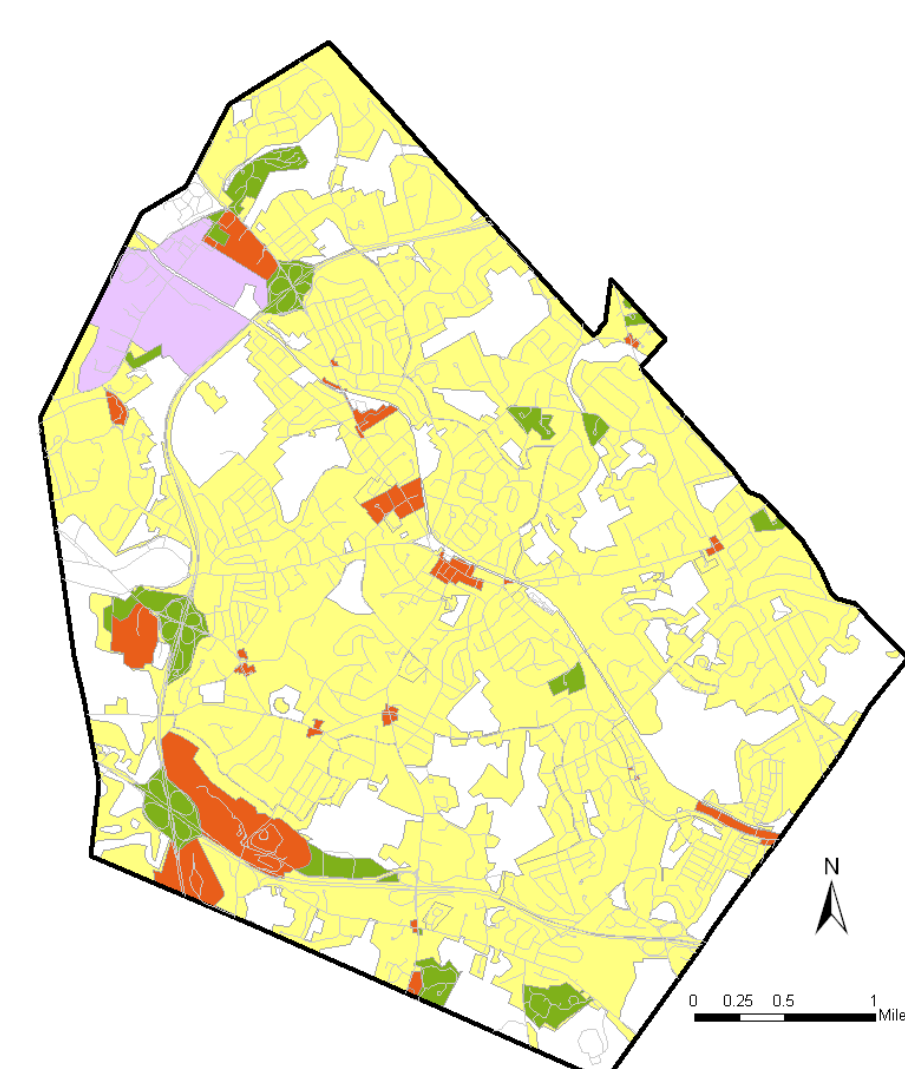
Figure 2. General Use Zoning



**Step 1** – I created baselayer maps to show current land uses (Figure 1) and zoning (Figure 2). By understanding how land is being used, compared to how that land is zoned (the planners vision) I was able to identify and remove entire sections of the Lexington zoning map which contained an "unbuildable" land use (according to my pre-determined list of constraints presented in Table 1).

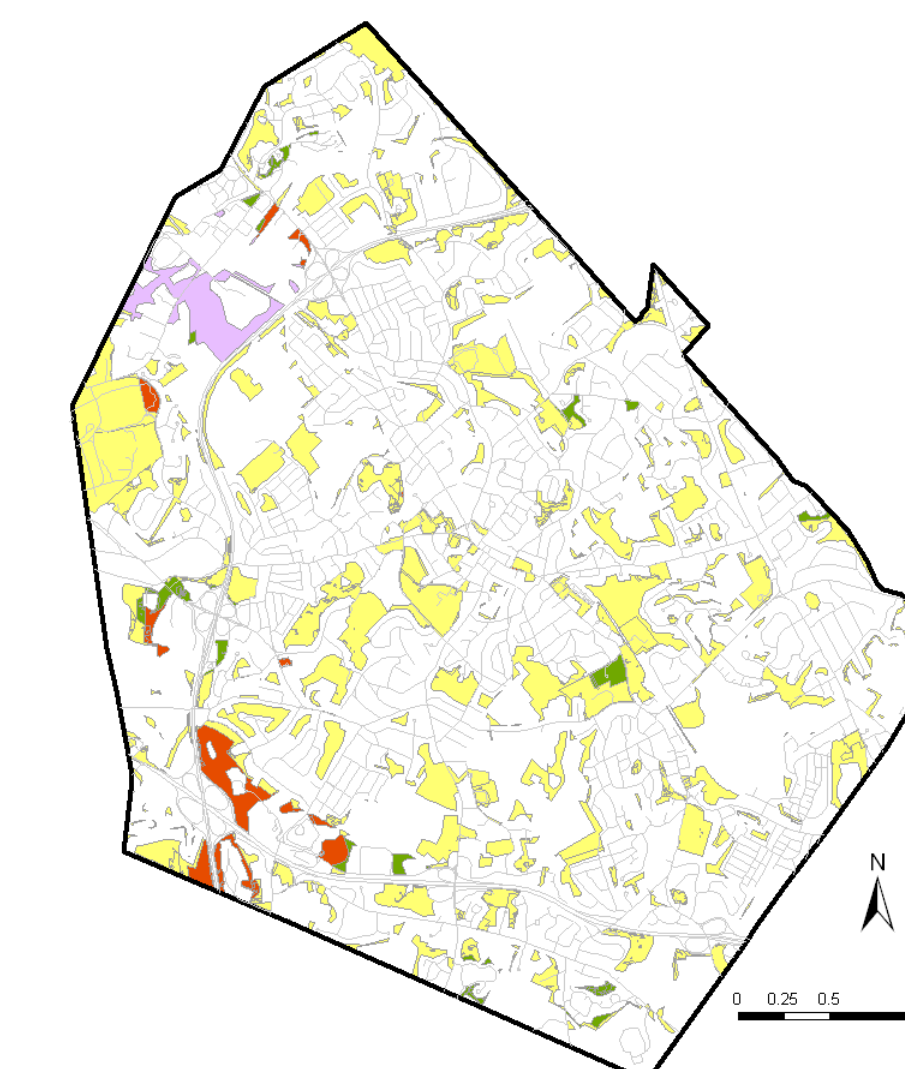
**Step 2a.**  
 After developing a criteria of building constraints I could begin to erase these "unbuildable" attributes from the whole. The first land uses I selected to remove were Open Space. Figure 2a (right) shows the result—a general zoning map of Lexington with constrained open spaces removed.

Figure 2a. Constrained Open Space Removed from Zoning



**Step 2b.**  
 Remove constrained land uses from the resulting map in Figure 2a. Land uses that I identified as unbuildable were selected using the 'select by attribute' tool and made into a new layer file. Using this new layer of "constrained"/ unbuildable land, I used the 'erase' function of the 'overlay' tool in ArcToolbox to erase all land contained in this layer from the zoning map showing parcels already removed due to open space constraints. The result, Figure 2b (right) shows the zoning layer of Lexington with all open space and unbuildable land uses removed.

Figure 2b. Constrained Open Space and Land Uses Removed from Zoning



**Step 2c.**  
 The final map (Figure 2c) shown in this regressive analysis of available land is the result of removing the remaining constraints shown in Table 1 (steep slopes, land less than 1 acre, and land identified as being already developed) from Figure 2b.

The addition of "already developed 'buildable' land" to the list of constraints was added after comparing Figure 2b to 2005 orthophotos showing development on land that was undeveloped in 1999 (the year the land use data was collected). Developed parcels were visually identified and removed.

Figure 2c. All Pre-determined Constraints Removed

