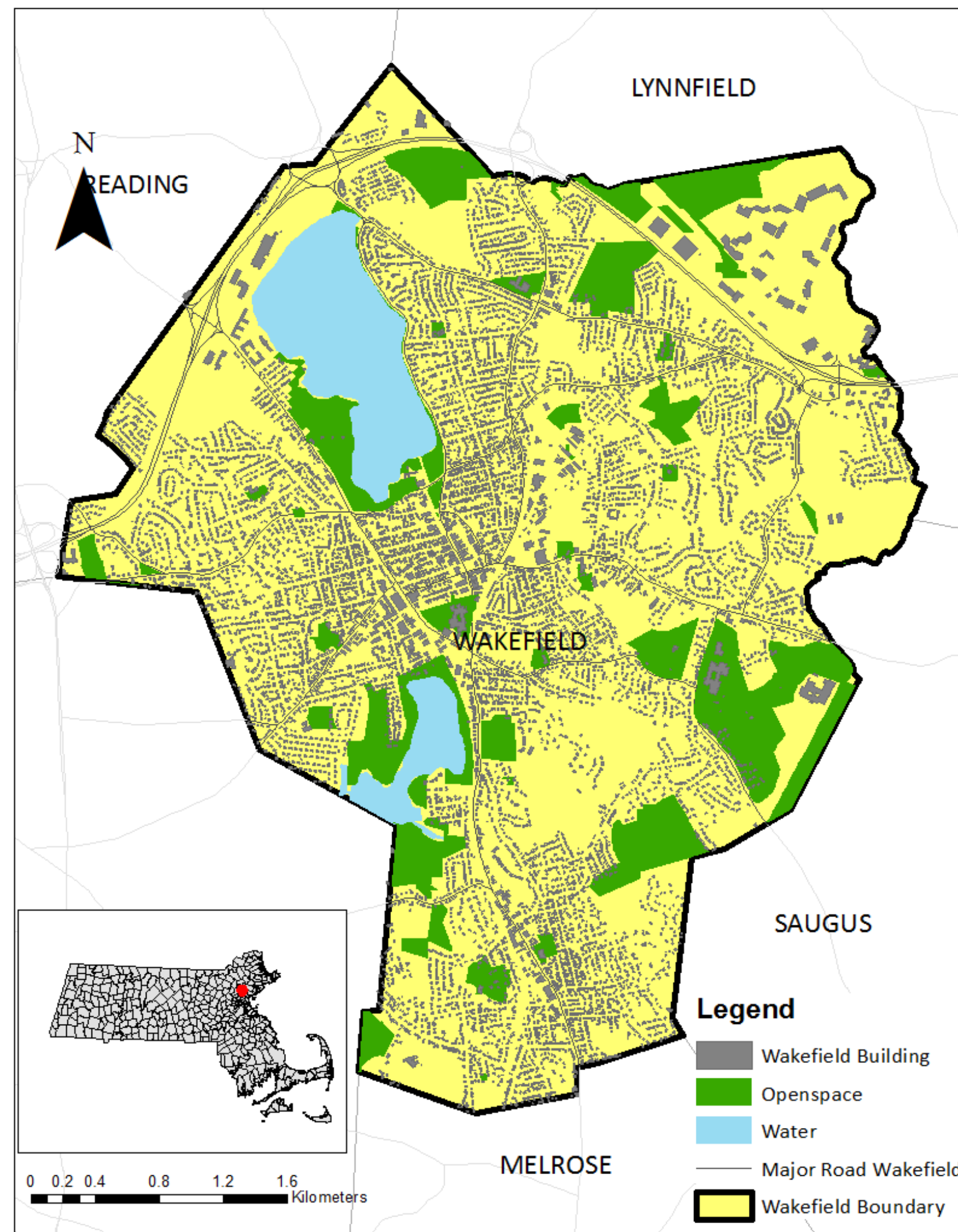


City Buildout Analysis— Wakefield, MA

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 Department: Civil & Environmental Engineering
 Source: MassGIS, USGS
 Date: Dec.13, 2013



Location Map of Wakefield

Project Description

Wakefield is a town in Middlesex County, Massachusetts in the Greater Boston area. It's located about 12.5 miles northwest of downtown Boston.

The project aims to do a buildout analysis of the town Wakefield to estimate the possible location for future development. The possible potential buildable lands will be mapped out using GIS.

A parcel-based analysis examines each parcel to determine its maximum feasible future development. The potential impact of developing those buildable lands will be analyzed using land use and zoning districts. Impacts can be expressed in terms of the number and location of new housing units, the amount and location of new commercial or industrial square footage, the size of the new population. The population may be influenced by the development of those areas will be examined.

Buildout analysis is a useful tool for planners and emergency managers who wish to anticipate the impacts of future development.

Methodology

Data Process

First make sure all the layers are in the same coordinate system and have the same unit. Then select out the Wakefield town boundary and create a Wakefield town boundary layer. Use the boundary layer to clip the wetlands, open spaces, roads zoning and DEM in order to speed up the processing time and make it more convenient to analyze the town information.

Removing the developed areas

Use intersect tool to add all the attributes in the zoning and land use layer onto the city boundary to build a base map. Then use erase tool (or select by attribute tool) to erase the limited factors including the water body, protected and recreational open space, major roads, wetlands, current build features and the slope which is too big.

Use erase tool to remove the water body and open space. Use select by attribute tool to remove the transportation. Since the building layer provided by MassGIS only includes part of the buildings in Wake-

field, so used the building structure data layer for Wakefield to do the analysis. Use select by location tool to select parcel intersect with buildings to eliminate all the parcels that have buildings. Then I used selection attributes to select the land type that can be developed.

Last I used slope tool to create a slope raster file from the DEM raster file. Then reclassified the slope value into three catalog: "1" represents the slope from 0% to 10% which is perfect for construction; "2" represents the slope from 10% to 25% which is proper sites for construction; "3" represents the slope from 25% to 50% which is inappropriate for construction. Then I converted the base map which has already eliminated the development constraints to raster file. After Combining this file with the slope raster file, I convert the raster file to polygon and delete the polygon with slope rank in "3".

Check the remaining parcels and eliminate the too smaller parcels.

Quantitative analysis

Calculate the number of buildable parcels and area of land by different zoning types. Examine the number of buildable parcels and the area of the buildable lands by land use.

Results

Results are shown in the table.

Notes for the table:

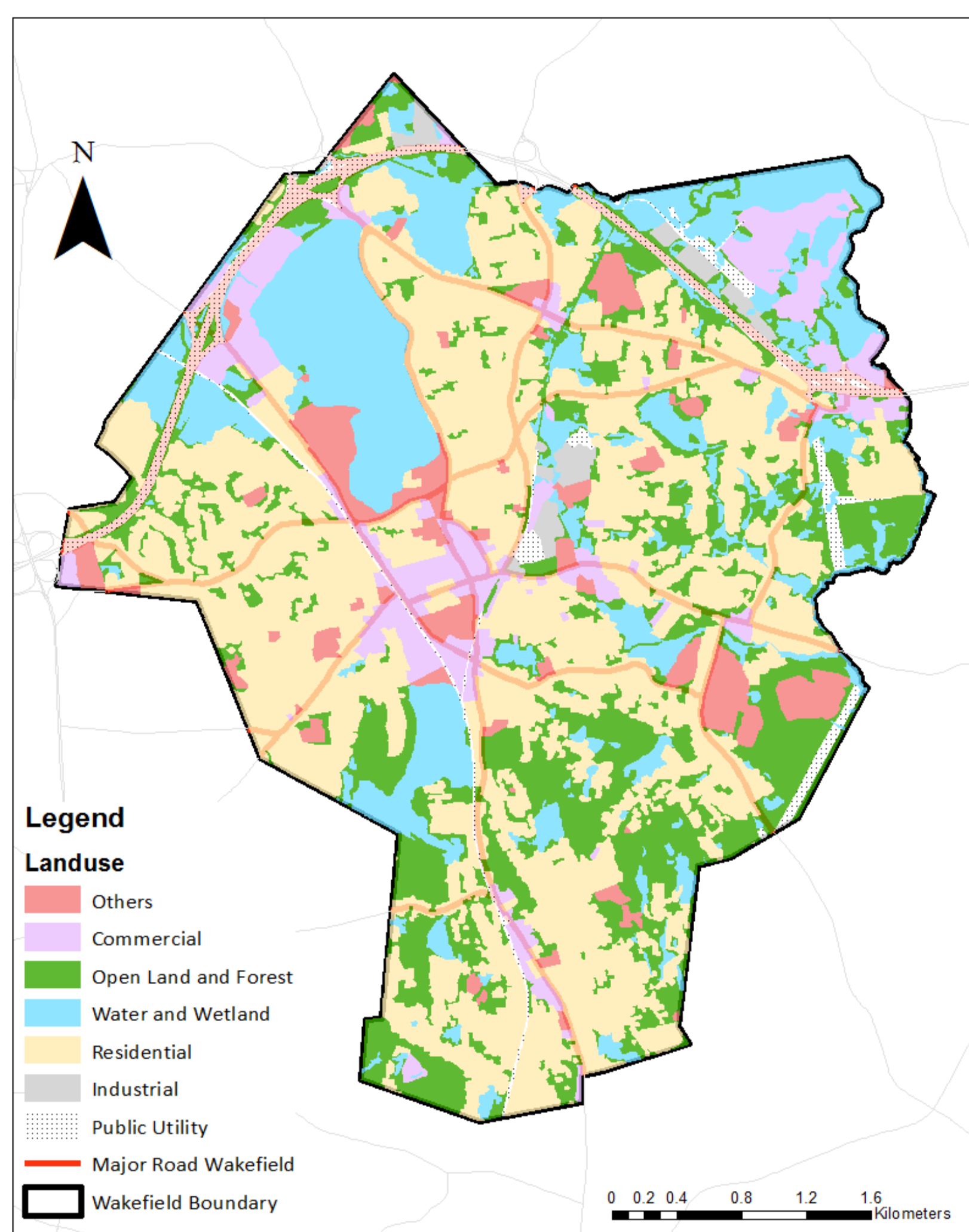
(1) Lower boundary for the buildable area is estimated by deleting 25% of the total area in order to get rid of the place for sidewalk, parking etc.

(2) Upper boundary is estimated by the same way but deleting 5% of the total area.

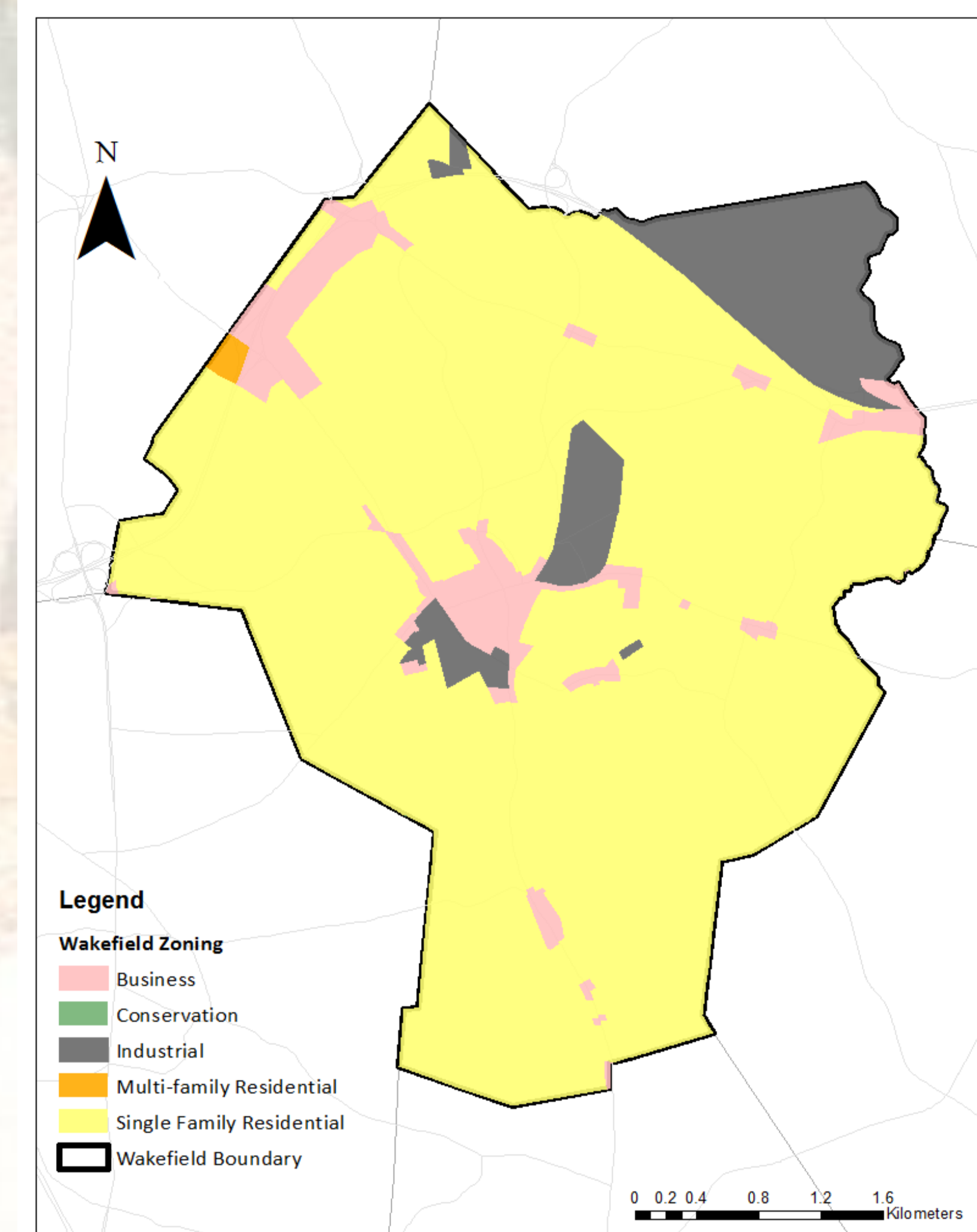
Zoning Type	Area (10 ³ m ²)	No. of Parcels	Lower boundary m ² Estimate ⁽²⁾	Upper boundary m ² Estimate ⁽³⁾	% Total Buildable Area
Central Business	14.4	26	10,800	13,680	1.9
Limited Business	23.6	11	17,700	22,420	3.2
Light Industrial	26	42	19,500	24,700	3.5
Multi-Family Residential (2 units)	0.3	1	0.188	0.238	0.3
Single-Family Residential	675	410	506,250	641,250	91.3
Total	739.3	490	554,390	702,228	100

Reference

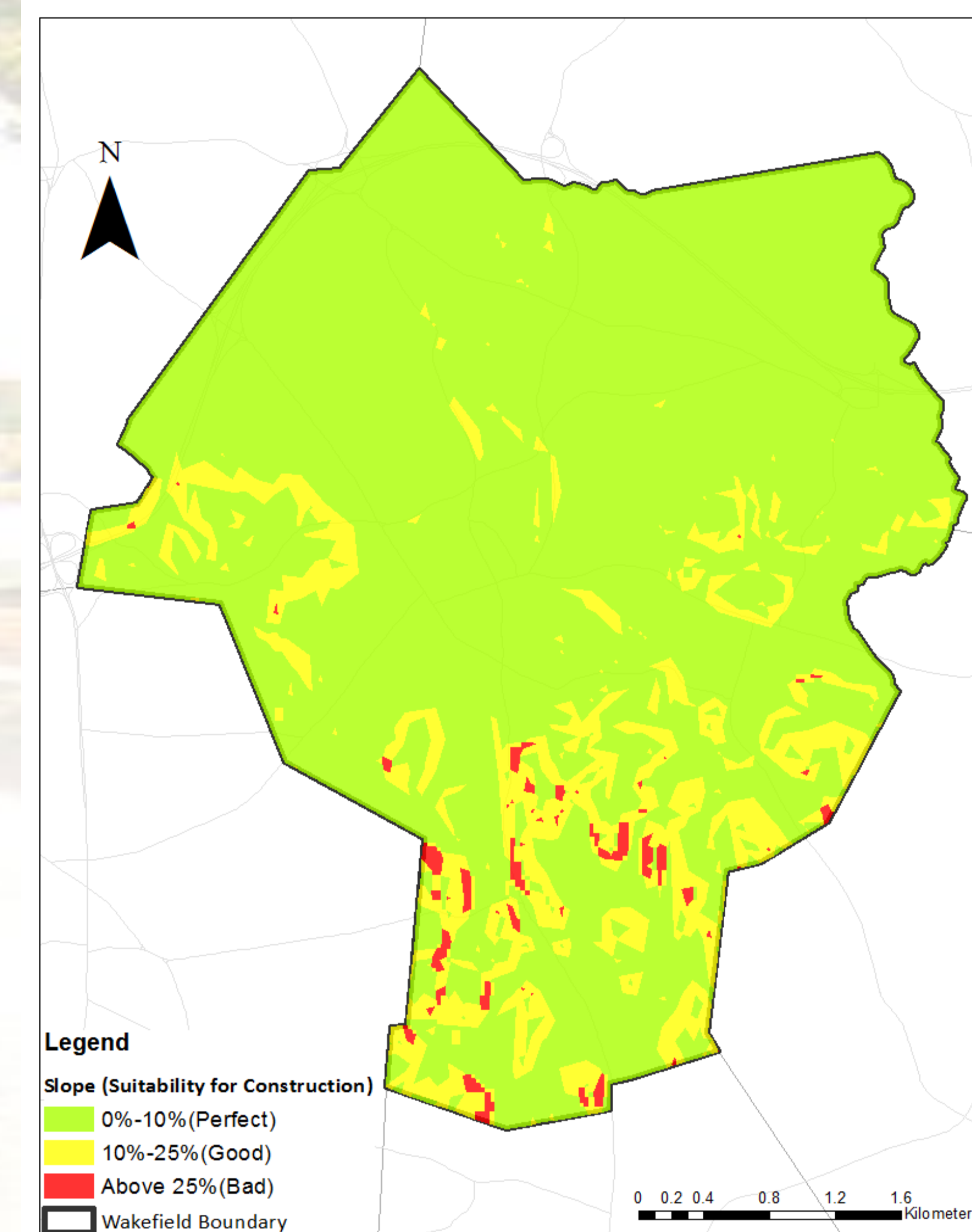
1. Applied Geographics, Inc. Boston, Massachusetts, Philip B. Herr & Associates Newton, Massachusetts (2002) *Build-Out Analysis and Future Growth Study*
2. Godschalk, David. (2006). "Build-Out Analysis: A Valuable Planning and Hazard Mitigation Tool". *Zoning Practice*. American Planning Association. Issue 3.
3. Montgomery County Planning Commission. (1996) *Shaping Future Development: The Role of Current Zoning*.
4. US Environmental Protection Agency. *How to Do a Build-Out Analysis*



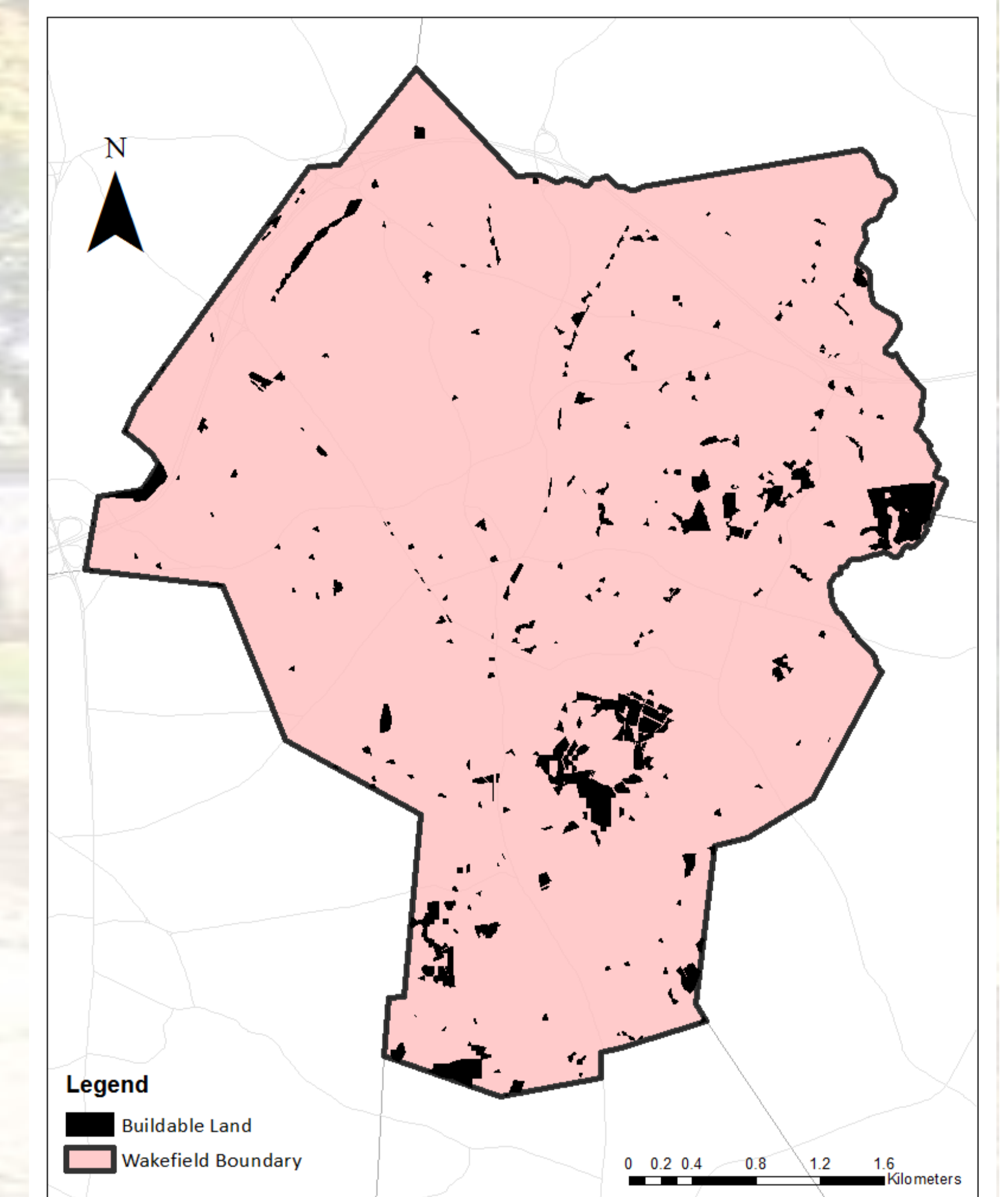
Landuse Map of Wakefield



Zoning Map of Wakefield



Slope Map of Wakefield



Buildable Land Map of Wakefield