

# Finding Suitable Locations for Residential Development in Northern Massachusetts

## Background and Goals

When town planners choose sites for new residential developments, they must determine not only the sites that meet basic criteria, but also the areas that would make a new development successful. A potential site must be located in a residentially zoned area and in an area that is available for new growth. There are certain factors that make a site more appealing to a planner, such as land slope and distance from existing groundwater supplies.

A successful development, however, requires more than this to attract new residents. Potential residents would be concerned with distance from amenities such as roads and schools, which they would want at a minimum. They would also prefer greater distances from features such as landfills and major polluters, as they would likely not want to live near these locations.

The goal of this project was to look at characteristics of the environment and existing infrastructure that a town planner would consider when siting a new housing development, specifically in Middlesex County, Massachusetts. These characteristics were used to determine the "most suitable" areas for residential development, based on weighting of the factors examined.

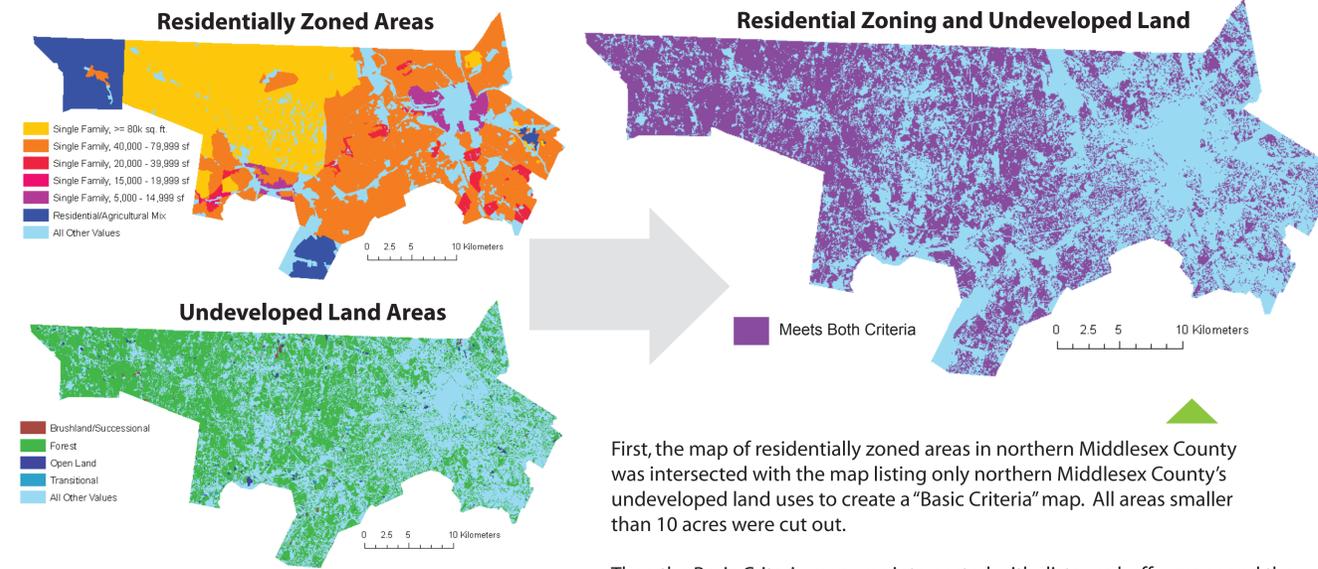
## Methodology

The data for this project was obtained via public GIS records on the Mass GIS website. First, a residential zoning map was created using the GIS "select by attributes" feature. Second, a map of "open" land uses was created in this way, using "Open Land", "Transitional", "Forest", and "Successional/Brushland" as the undeveloped land classifications. Recreational areas and existing developments were excluded from this analysis. These maps were intersected to form a map that met the basic criteria: residentially zoned and undeveloped. Land areas smaller than 10 acres were removed, since this project is only analyzing potential for larger-scale development. Factors that would most affect construction costs were considered next: land slope, flooding, and access to existing groundwater sources and transmission lines. Distance buffers were created to demonstrate distance from groundwater sources and transmission lines. Potential for slope and flooding were mapped out. These data layers were intersected with the basic criteria map to show which parcels would be most suitable.

Next, criteria that potential residents would find important were considered. These factors are not essential to the existence of a housing development, but can determine its appeal to potential homeowners. Distance from existing roads and schools was examined, as well as distance from negative features such as landfills and polluters. These layers were also intersected with the basic criteria map.

Once the eight "factors maps" were created, a raster analysis was performed with an arbitrary weighting system to show which land parcels would be most suitable for new residential development.

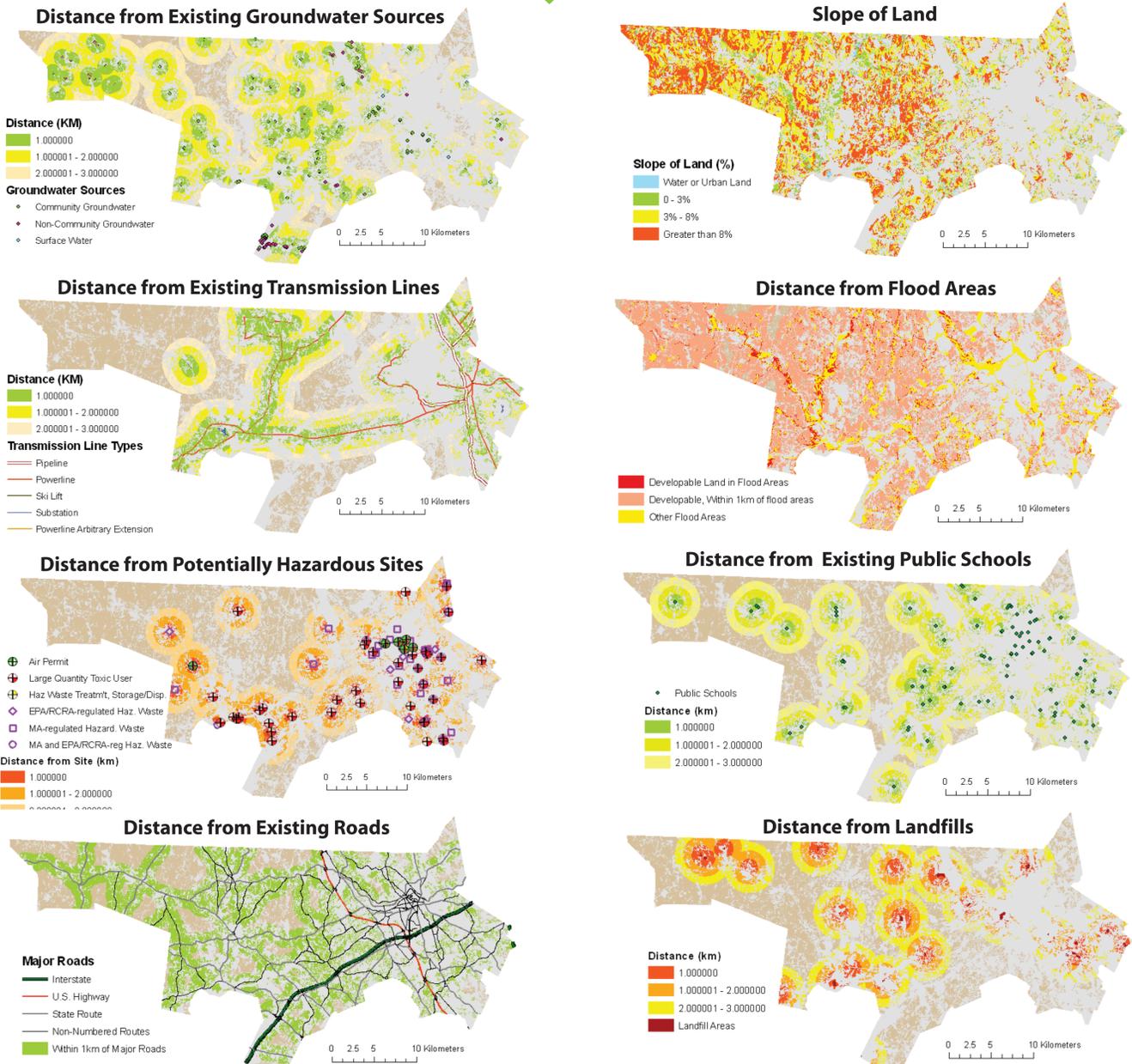
## Basic Criteria Map



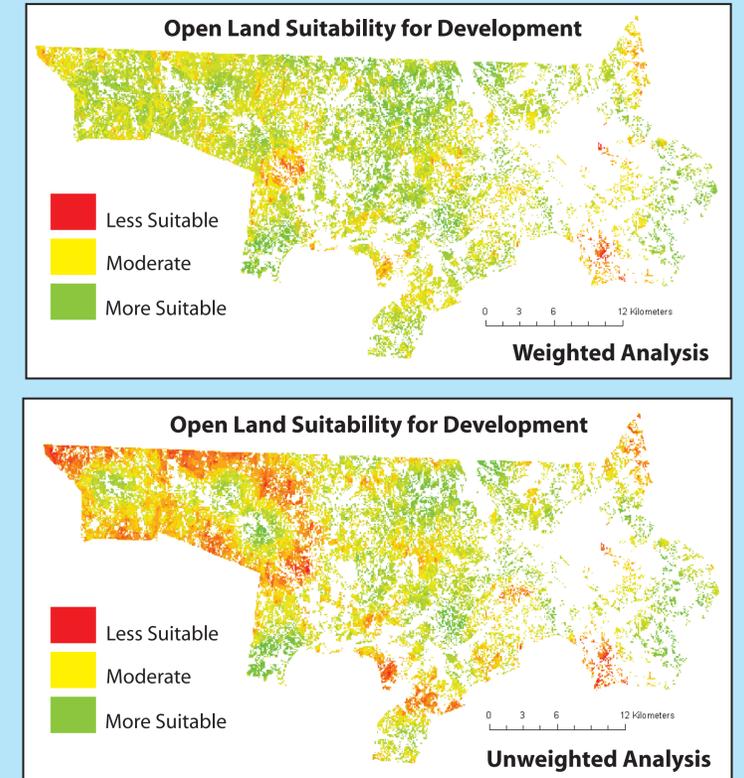
First, the map of residentially zoned areas in northern Middlesex County was intersected with the map listing only northern Middlesex County's undeveloped land uses to create a "Basic Criteria" map. All areas smaller than 10 acres were cut out.

Then the Basic Criteria map was intersected with distance buffer maps and the slope map to show the characteristics of these undeveloped areas.

## Factors Maps



## Raster Analysis



A raster analysis was performed using the data in the factors maps. Each "factors map" was reclassified on a scale of 1 to 5, with 1 being the least suitable (such as closer to hazardous waste plants and further from schools) and 5 being the most suitable. The bottom map shows the results of an unweighted analysis of all the factors examined, with all factors having an equal scale in the final picture. The top map shows the results of an arbitrarily weighted analysis, where distance from schools and roads are scaled with a factor of .025, distance from transmission lines and groundwater sources scaled with a factor of .075, distance from hazardous waste sites scaled with a factor of .1, and flood areas and slope scaled with the highest factor of .2. When distances from schools and roads are weighted lower, many more land areas fall under the "moderate" and "more suitable" classifications. However, this weighting is arbitrary and changing the scale based on factors important to developers or town planners could yield very different results.

## Limitations and Conclusion

This project was done to demonstrate a technique that could be used to make regional planning decisions. The scale of the area examined could be cut down to just the area of a single town or region within a town, or the scale could be expanded for county- or statewide charting purposes.

The level of detail of this project could also be expanded with the inclusion of different datalayers that would be useful in planning situations. Different layers would also be used depending on who is running the analysis and the goals of the analysis - for example, a developer looking to minimize costs of certain resources might rank layers such as distance from existing transmission lines and roads higher in order to visualize the areas that already contain those resources.

Some of the datalayers used in this analysis are specifically noted by Mass GIS as not to be used in decisionmaking, as they may not be up to date (such as the current land use data layer). If this technique was to be used for any kind of official planning purposes, it would be necessary to get the most up-to-date information on all the factors being analyzed.

Overall, this technique can provide a picture of which areas have the potential for residential development, provided the data for current available land is accurate and datalayers are chosen that illustrate prerequisites for successful development.

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**Map Projection:** North American 1983  
Massachusetts Mainland  
**Data Source:** Mass GIS  
<http://www.mass.gov/mgis>