Creating the Urban Forest:
Suitability Analysis for Green Space in the City of Boston

Project Objectives

The goal of this project is to prepare a suitability analysis for green space development in the City of Boston. Green space provides ecological benefits such as water retention and carbon reduction, and the social benefits of recreational space and quality of life. Population trends show that cities are growing, making the development and preservation of green space more important. The vision of the urban forest focuses on the built environment working with nature through mechanisms such as street trees, urban gardens, green corridors, and rooftop and wall vegetation. This suitability analysis attempts to make the first step in identifying where geographically to start the greening process.

The suitability analysis identified the following six criteria; population density, density of children under 16 years old, distance to parks, land cover, canopy cover and impervious cover, as shown in the maps below. The criteria were weighted towards high density populations with young children that lacked existing tree cover and other vegetation, with the general goal of bringing green space to underserved communities. Data used in these maps were gathered from MassGIS, the City of Boston and the USGS Land Cover Institute. For each criteria there is a scale of 1 to 4 (least to most suitable). These scores were combined to produce the final suitability map.

Results

The results for the six criteria are shown on the maps below, and they reflect the population and building density closer to downtown Boston. The neighborhoods of Back Bay/Beacon Hill and Allston/Brighton received high scores in population density, lack of canopy cover, land cover and impervious surfaces. However, they scored poorly with children under 16 and distance to parks because of their population demographics and their proximity to Boston's historic parks.

The final suitability map scores areas in Roxbury and East Boston as the most suitable for green space development. These two neighborhoods earned the top scores based on relatively high suitability in each category, and particularly for children under 16 years old. Based on these criteria, green space development would provide significant social and environmental benefits to these communities.

Remaining Questions

The criteria used for the final suitability map was purposely weighted towards bringing green space to neighborhoods without existing green space. The criteria and the scoring approach utilized in this analysis are subjective. Another approach to the urban forest might be to grow through existing green space which would have scored different areas as more suitable. There are other criteria such as social demographics, health statistics or environmental pollution that might also yield different results.

Finally, this suitability map is only the first step in creating the urban forest. GIS tools could be used to locate parcels and opportunities to implement green space in these neighborhoods. Parcel data from the city combined with other tools could be utilized to identify vacant land or buildings, underutilized public land, and roof tops or other structures with potential for green space. The site identification maps to the right are an example of potential next steps.

Green Space Suitability Map
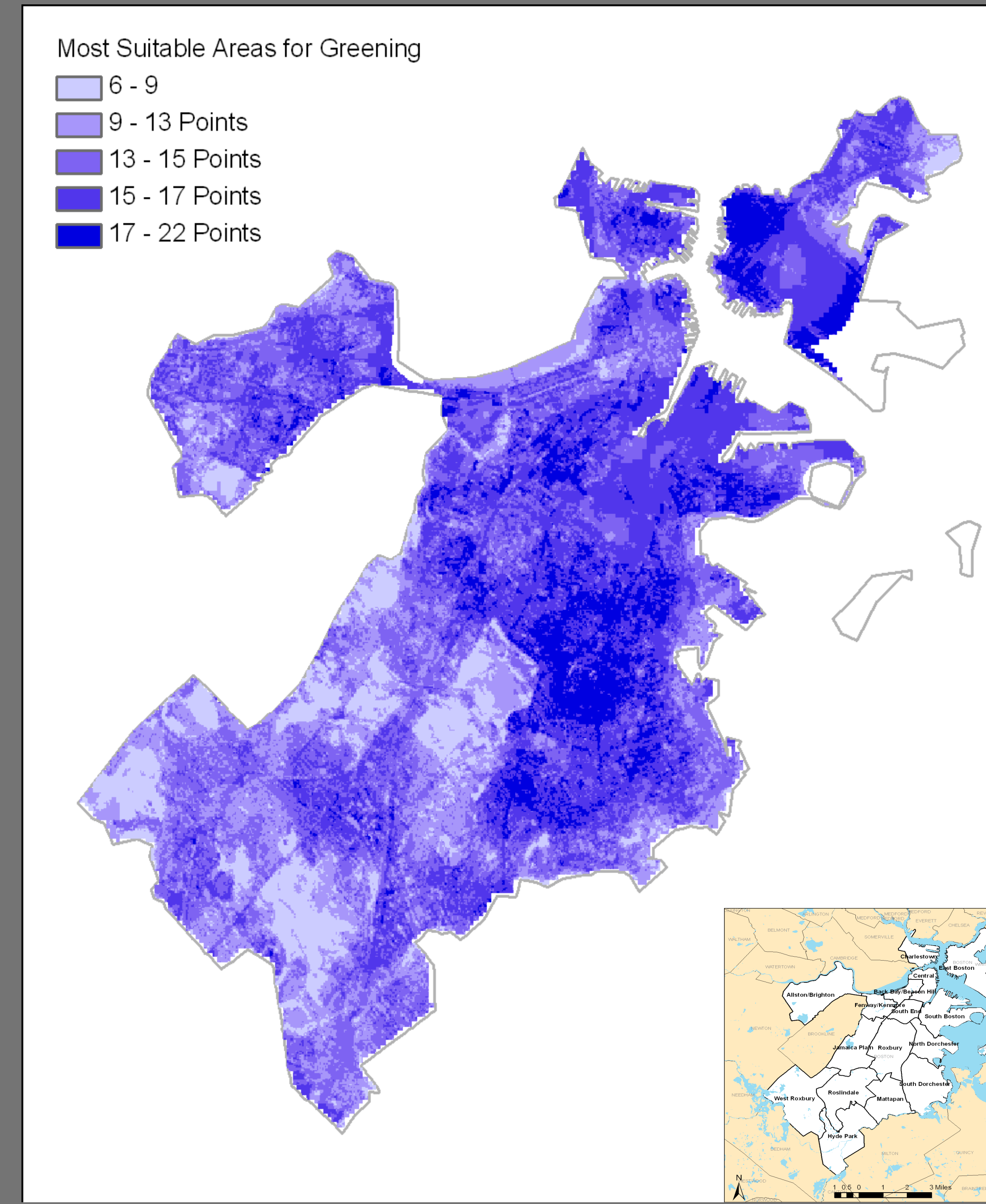
Most Suitable Areas for Greening
- 6 - 9
- 9 - 13 Points
- 13 - 15 Points
- 15 - 17 Points
- 17 - 22 Points

Image 1: East Boston

Image 2: East Boston

Image 3: Roxbury

Image 4: Roxbury

Site Identification

The site images show examples of parcels that are located in highly suitable areas in East Boston and Roxbury. Parcels that were identified as having zero building value are outlined in red. The purpose of these images is to show how the suitability analysis could be used to actually implement green space.

Images 1 and 2 identify several waterfront parcels in East Boston with open land. Images 3 and 4 show parcels of underutilized open land in residential neighborhoods of Roxbury.

Research was not conducted on ownership, zoning or other factors affecting whether these parcels are developable. However, the images do clearly show large amounts of potential land in highly suitable areas.

Population Density

Population per square mile
by census block
1 Point = 0 - 11,058   3 Points = 40,549—110,588
2 Points = 11,058 - 40,549 4 Points = 110,588-470,000

Children under 16

Children under 16 per square mile
by census block
1 Point = 0 - 2,082   3 Points = 4,165- 6,248
2 Points = 2,082 - 4,165   4 Points = 6,248– 8,330

Distance to Parks

Distance to Parks (meters)
1 Point = 0 - 374   3 Points = 750-1,124
2 Points = 374 - 750   4 Points = 1,124 -1,500

Land Cover

Land Cover by National Land Cover Type
1 Point = Not Dense   3 Points = Moderate Density
2 Points = Low Density   4 Points = High Density

Canopy Cover

Canopy Cover Percentage
1 Point = 77-100% 3 Points = 18-51%
2 Points = 51-77%   4 Points = 0-18%

Impervious Cover

Impervious Cover Percentage
1 Point = 0-16%   3 Points = 46-73%
2 Points = 16-46%   4 Points = 73-100%