OPTIMAL SITES FOR PUBLIC RECYCLING BINS | SOMERVILLE, MA

INTRODUCTION

Despite the implementation of many successful curbside single-stream recycling programs in residential neighborhoods across the nation, many municipalities are still struggling to get the public to participate in recycling outside of their homes. This could be partly due to the lack of conveniently-located recycling bins in public areas. If this is the case, then the placement of recycling bins in areas of high pedestrian foot traffic could help increase public recycling rates. For this reason, a suitability analysis of possible sites for the placement of recycling bins in public areas would be a useful resource for city planning officials and other Department of Public Works employees in cities and towns across the nation.

As the most densely populated municipality in New England, the City of Somerville (Fig. 1) has seen tremendous population growth in the past decade. In November 2013, Somerville was named the 7th most walkable city and the 9th most transit-friendly city in the nation by Walk Score. This should come as no surprise to anyone who has ever visited Somerville, as the city has a number of squares that serve as local centers for business and entertainment such as Davis Square, Teele Square, and Ball Square. All of these factors make Somerville an ideal location for a suitability analysis of possible sites for public recycling bins. Areas of high pedestrian foot traffic were determined based on a number of factors including proximity to MBTA bus stops, T stations, school campus grounds, parks and sports fields, and areas of high business density. Only sites located on city sidewalks or within school campus grounds, local parks, or sports fields were considered as suitable sites for public recycling bins in this analysis (Table 1).

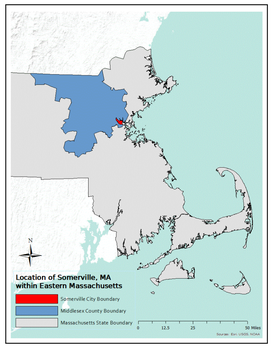

Figure 1. Location of Somerville Within Eastern Massachusetts.

METHODOLOGY

Six spatial factors were used to determine areas of high pedestrian foot traffic in Somerville, MA.

Opportunity Factors
- Within 20 feet of an MBTA Bus Stop
- Within 10 feet of an MBTA Subway Entrance
- Within 20 feet or Located Within School Campus Grounds
- Within 20 feet or Located Within a Park or a Sports Field
- Within Areas of High Business Density (> 1,000 Employees)
- Located on a Sidewalk or a Pedestrian Pathway

Table 1. Opportunity factors for the placement of public recycling bins based on association with high levels of pedestrian foot traffic.

After spatial data was obtained from the MassGIS database, all layers were clipped to the area of Somerville (Fig. 2) before buffer layers were created based on target proximities to show areas of opportunity. All suitable sites for public recycling bins were found using the Union function to join the buffer layers of all sites located on sidewalks or within school campus grounds, local parks, or sports fields after the Building Footprint layer was removed using the Erase function (Fig. 3). All suitable sites were ranked based on the number of opportunity factors they contained after giving each factor a value of 1. The Union function was used to join together all six opportunity factors. Using the Field Calculator function, all six factor values were added together to create a "Total Value" score in the Union layer. Sites of the highest optimality were found to have 4 opportunity factors overlapping within them. Sites with 3 overlapping opportunity factors were designated as "priority sites" (Fig. 4).

Figure 2. Locations of All Opportunity Factors.

Figure 4. Flow Chart of Suitability Analysis Methodology.

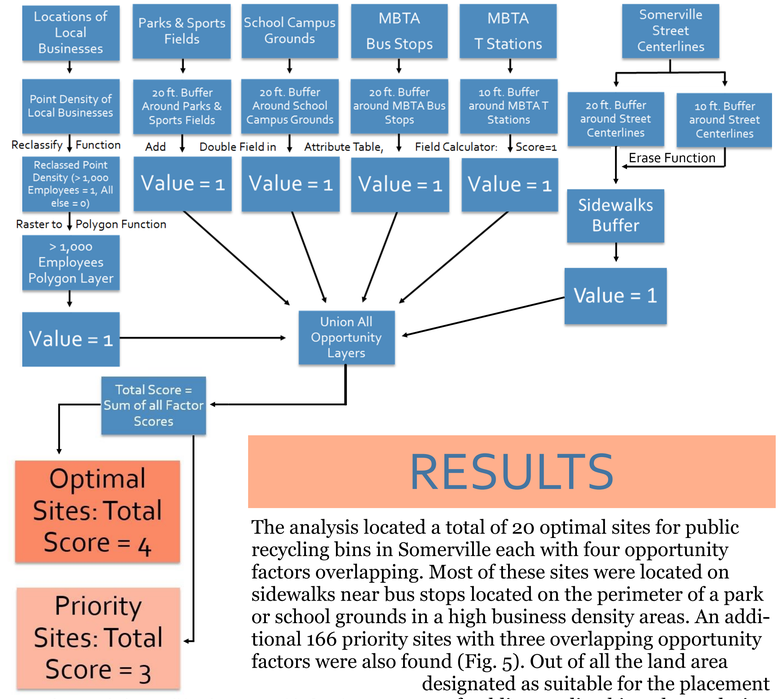

Figure 3 (below). All land area suitable for placement of public recycling bins in Somerville, MA.

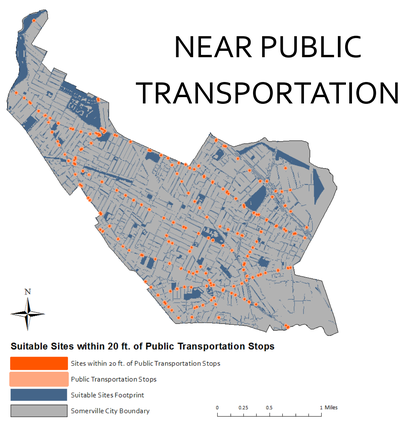

Figure 6. Suitable Sites Near Public Transportation (actual polygons enlarged on map for visibility).

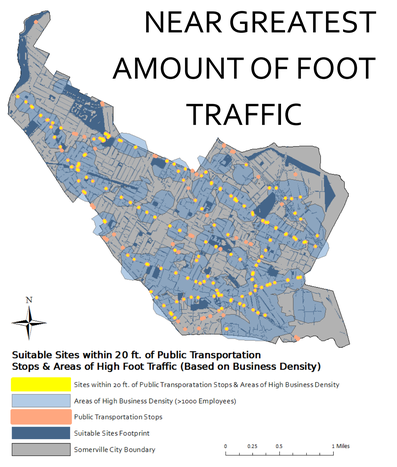

Figure 7. Suitable Sites for Public Recycling Bins Near Public Transportation & Areas of High Foot Traffic Based on Business Density (actual polygons enlarged on map for visibility).

RESULTS

The analysis located a total of 20 optimal sites for public recycling bins in Somerville each with four opportunity factors overlapping. Most of these sites were located on sidewalks near bus stops located on the perimeter of a park or school grounds in a high business density areas. An additional 166 priority sites with three overlapping opportunity factors were also found (Fig. 5). Out of all the land area designated as suitable for the placement of public recycling bins, the analysis found 102 sites located within 20 feet of public transportation stops (Fig. 6) and 83 of these sites also fell within areas of high pedestrian foot traffic based on high density of businesses (areas with > 1,000 employees) (Fig. 7). Given the large number of potential sites for public recycling bins located near convenient areas of high pedestrian foot traffic found in Somerville, there is evidently great potential to increase public recycling rates in this city as well as in other cities like it throughout the country.

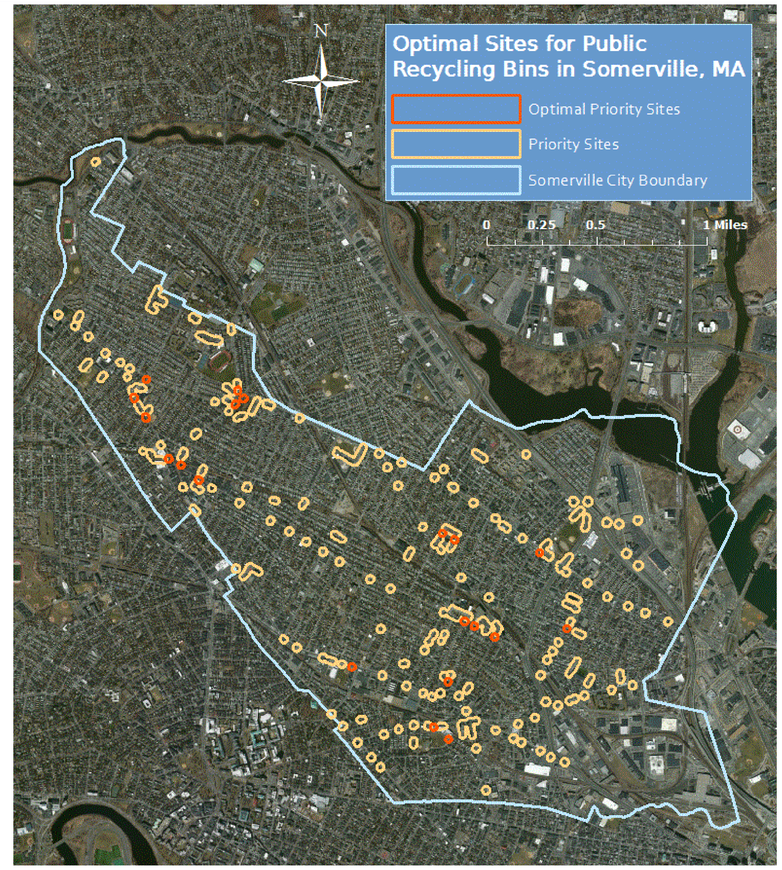

Figure 5. General Locations of Optimal & Priority Sites for the Placement of Public Recycling Bins in Somerville,

CONCLUSION

While this analysis produced a great number of well-suited sites for the placement of public recycling bins in Somerville, these sites could be susceptible to a variety of constraining factors. For instance, many could already be the sites of existing public recycling bins, in which case, redundancy would be a waste of municipal resources. Unfortunately, for this demonstration, the City of Somerville's Department of Public Works was unable to provide data on the locations of existing public recycling bins in the city. Additionally, without further data, it is impossible to know whether the opportunity factors used in this analysis actually reflect areas with high levels of pedestrian foot traffic in the real world. If this suitability analysis demonstration were to be undertaken for a larger project, I would suggest including data on the coordinate locations of existing public recycling bins as well as actual data on daily pedestrian foot traffic flow in various locations around the city. These additional analysis factors would ensure better data validity and produce more comprehensive study results to reflect the best sites for public recycling bins in municipalities all across the country.

REFERENCES

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Introduction to GIS
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Scale: 1: 24,995

Map Projection: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001

Data Sources: MassGIS, Massachusetts Management Information Systems (MIS)