

Vulnerability Index of Expected Childhood Asthma Prevalence in Somerville, MA

A Guideline for Further Study of factors potentially contributing to childhood asthma



Background

Somerville, Massachusetts is a densely populated city, located in the metro-Boston area. The city is approximately 4.2 square miles in size and home to an estimated 76,000 people. In recent decades, Somerville has undergone significant changes in regard to housing renovations, brownfield remediation, and new development. Overall, the city is a vibrant and growing municipality, looking to increase its appeal as a family-friendly city in a health conscious world.



This report is to serve as a guideline for conducting a more in-depth analysis of the incidence of childhood asthma in Somerville, MA. What we would expect to find is a correlation between increased likelihood of childhood asthma in relation to increased number of children living in older housing units (or un-renovated units), within close proximity of major roads and/or brownfield sites.

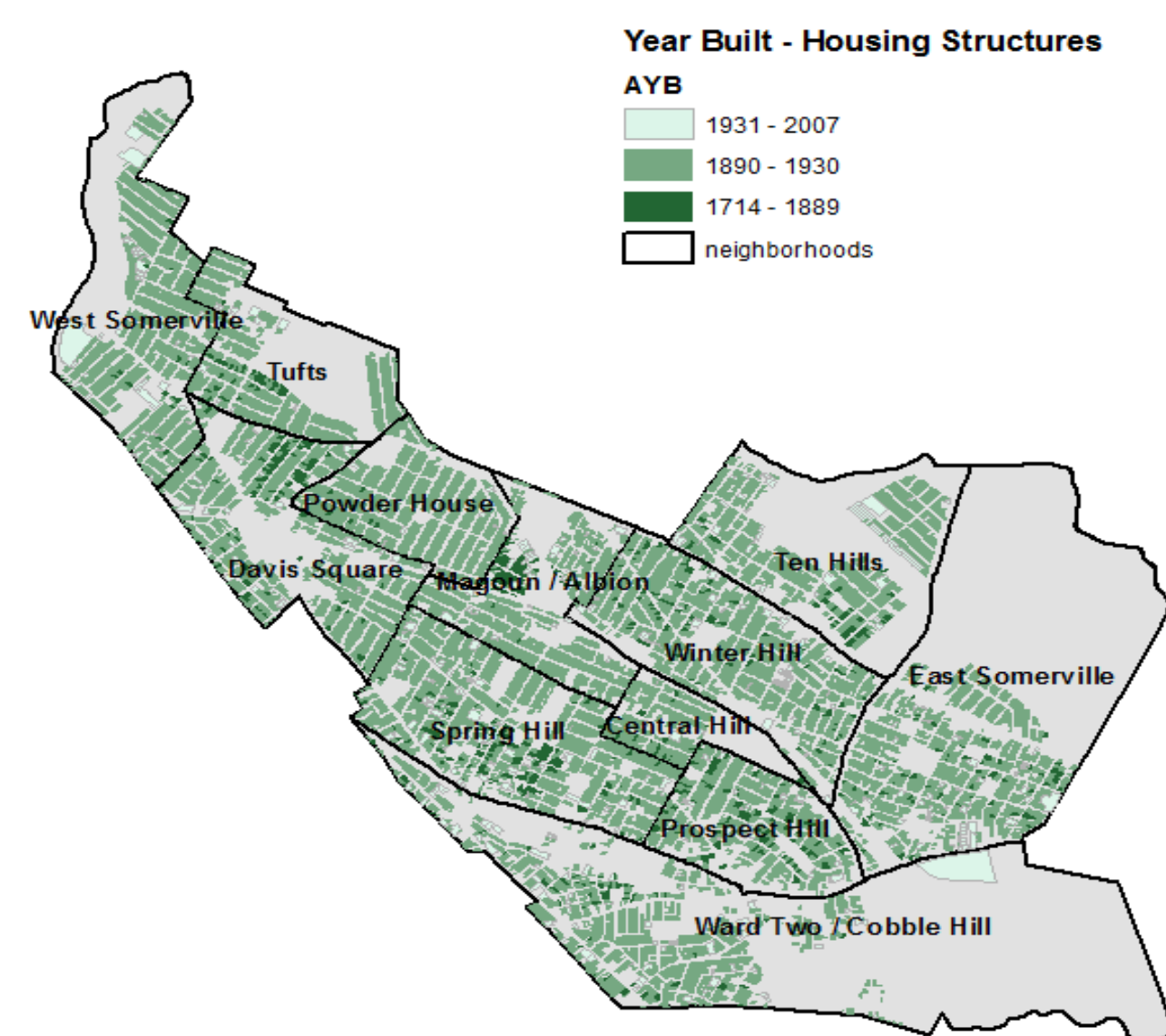
Methods

Several criteria were examined and serve as a starting point for deeper analysis of this issue. Criteria included in this study:

- * Age of home structures
- * Presence of children
- * Proximity to major roads
- * Proximity to polluting facilities

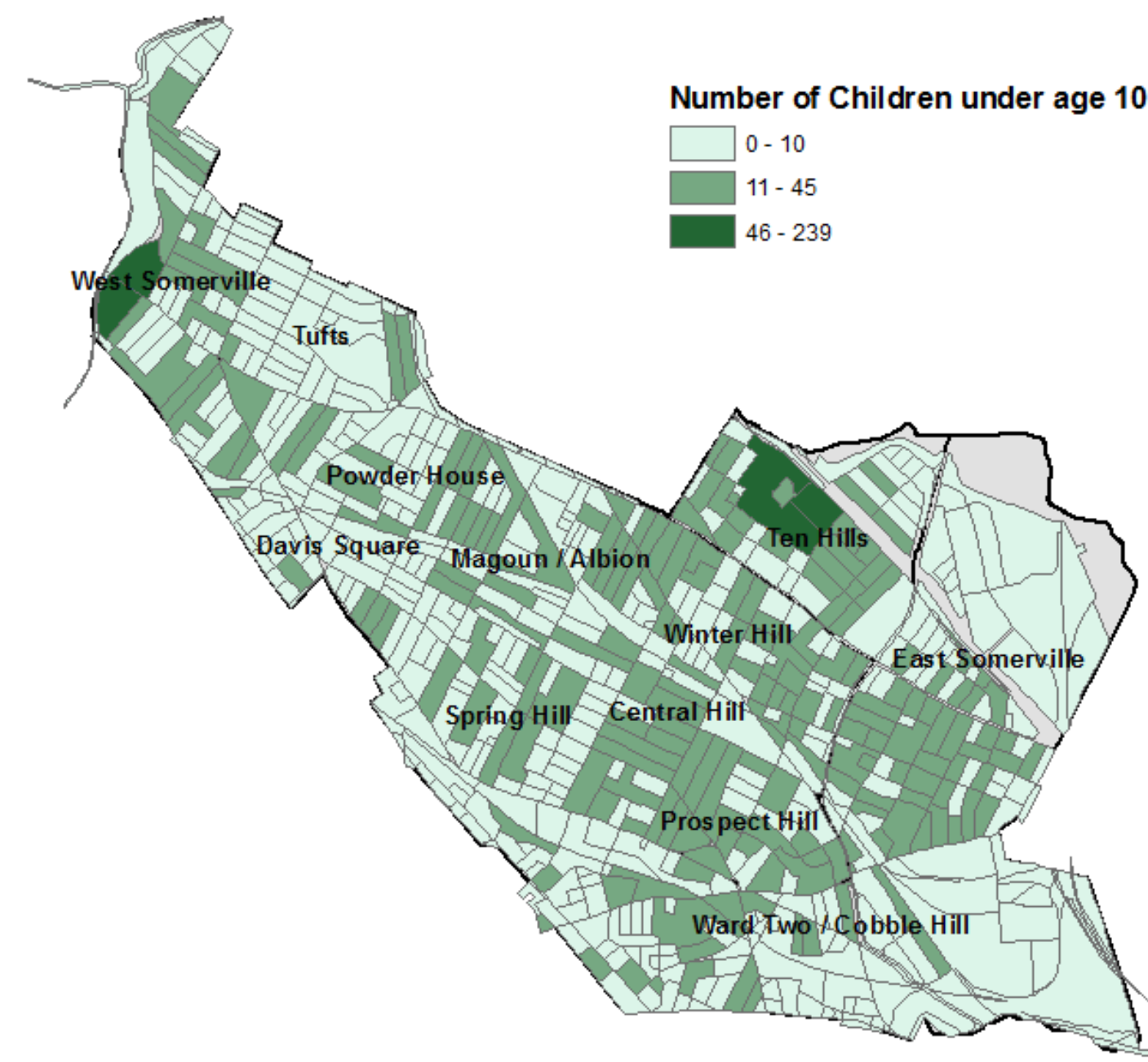
Age of housing stock: According to 2009 parcel data of the city, there are 11,594 existing housing structures in Somerville. Of the existing HU's, 89% were built between the years 1890-1930, correlating with the great wave of immigration to the US prior to, and during, that time period.

Present condition of these existing HU's varies considerably throughout the city. As the existing housing stock ages, those homes which have not undergone renovations may have poorer indoor air quality, contributing to increased likelihood of asthma in the children residing there.



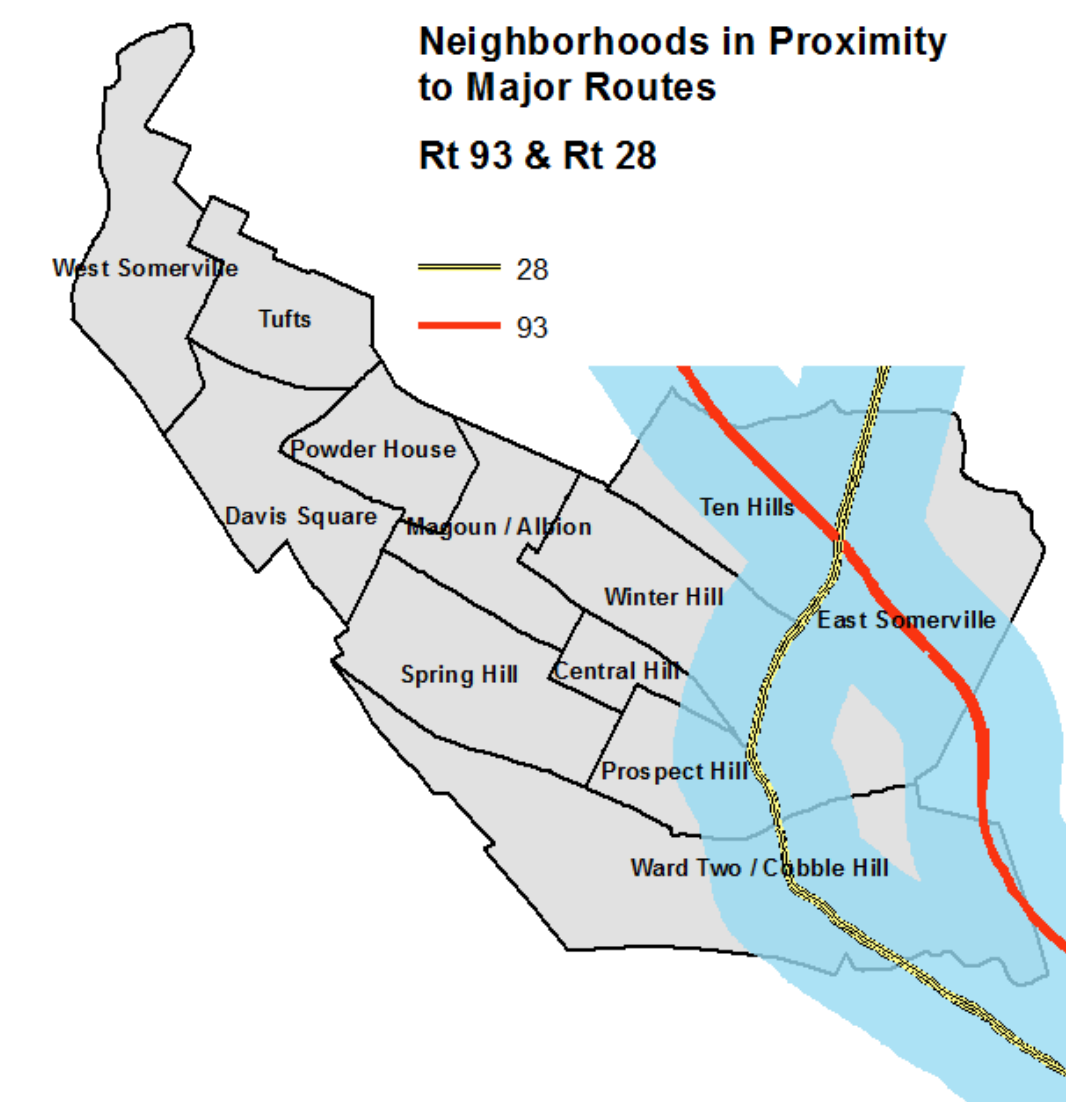
Location of Children:

Using US Census block group data, number of children under age of 10 living in Somerville were identified. Majority of blocks have between 11-45 children; two areas of West Somerville and Ten Hills area showed numbers between 46-239. These two areas have multiple public housing facilities.



Proximity to Major Roads

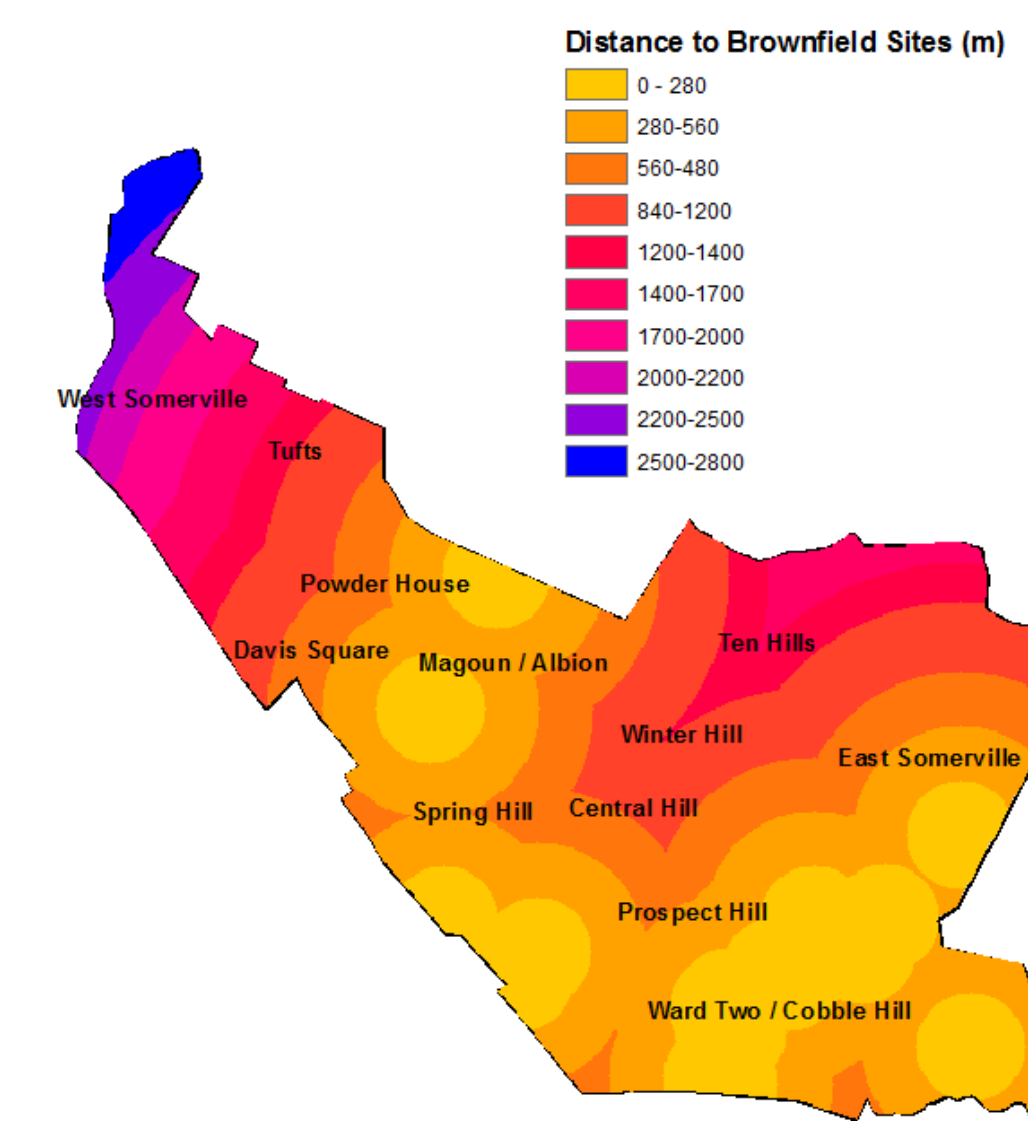
Proximity to highways could potentially reveal correlation with childhood asthma. A distance analysis was conducted using the buffer tool, to identify which neighborhoods are most impacted by the Interstate 93 and Route 28 McGrath Highways. The areas most impacted by the presence of these roadways are Ten Hills, East Somerville, Winter Hill, and Prospect Hill neighborhoods. The Ward Two/Cobble Hill area is also within this close proximity however, until recently a large part of this area was mostly industrial. It is currently under redevelopment with the influx of Green Line extension to Union Square.



Proximity to other main roads, such as Highland Ave, Somerville Ave, Broadway, and Beacon Street would be recommended for further analysis, as an extraordinary amount of traffic journeys on these streets every day. Exposure to increased vehicle emissions on these other main roads could also potentially correlate with increased childhood asthma rates.

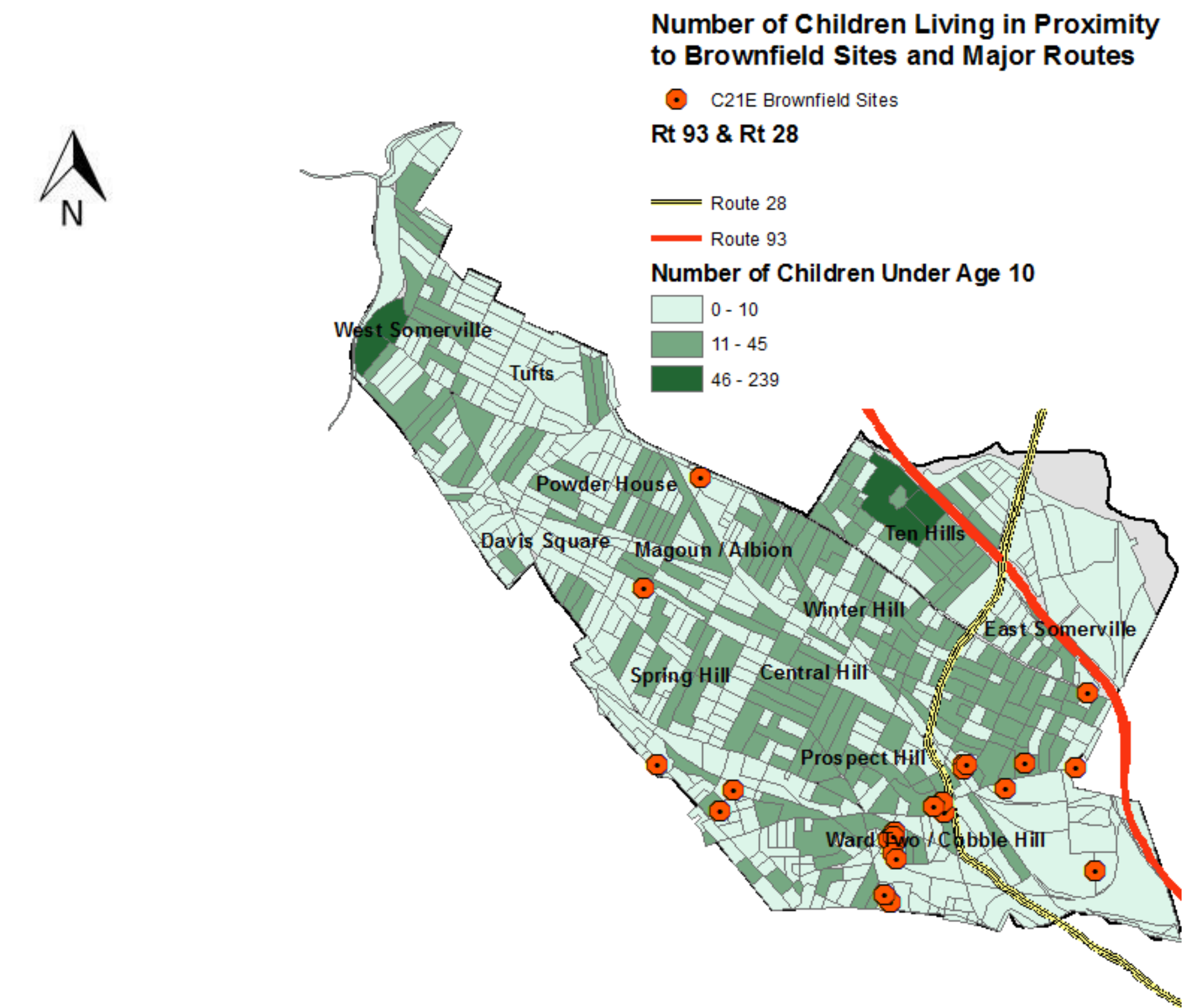
Proximity to Brownfield Sites

A spatial join was conducted between brownfield (C21E) sites and block group data. A total of 24 C21E sites are currently listed in Somerville. The majority of them are listed in the Ward 2/Cobble Hill and East Somerville neighborhoods. A Euclidean Distance analysis was conducted to identify areas of potential impact from these sites and is displayed here.



Results

The areas showing potentially greatest vulnerability to incidence of childhood asthma, based on proximity to brownfield sites and major routes are Tens Hills, East Somerville, Prospect Hill and Ward Two/Cobble Hill neighborhoods. Since the majority of homes are originally dated between 1890-1930, it is not possible at this level of analysis to draw conclusions as to which areas of housing units present greater vulnerability for childhood asthma.



Conclusions

Somerville has a vast majority of older housing stock, which may or may not have been renovated. Dense housing structures results in close proximity of housing units to roads and increased exposure to vehicle emissions. Multiple brownfield sites have been identified within the city, also within close proximity of residential housing units. In recent years, the city has benefited greatly from innovative urban planning, new growth, residential renovations and enthusiasm for creating a more livable city for all residents. The upswing in residential renovation in recent years has undoubtedly improved the indoor air quality conditions of many older homes. However, further analysis needs to be done to identify exactly what percentage of homes have undergone renovation work, and how many still un-renovated housing units have children living there, potentially putting them at higher risk to asthma incidence, due to poorer indoor air quality. In addition, remediation of brownfield sites has also been underway, and areas such as Ward 2/Cobble Hill have seen many changes in regard to the preparations for the Green Line Extension project. With deeper analysis of these issues, a greater understanding of vulnerability for childhood asthma within the city could be obtained.



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Projection: NAD_1983_StatePlane_Massachusetts_Mainland_FIPS_2001
Scale: 1:30,000
Data Sources: MASS GIS, City of Somerville 2009, US Census 2010