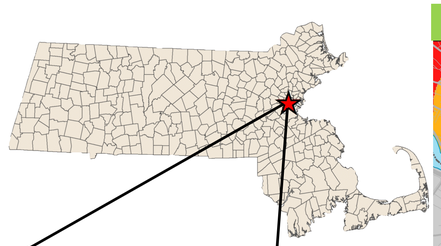
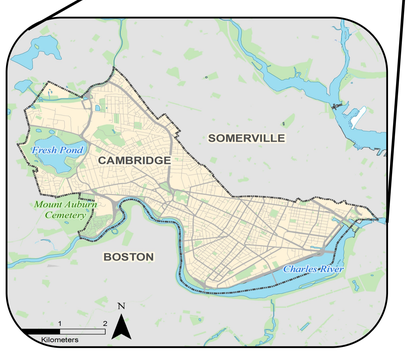
Transportation & Food A Suitability and Accessibility Model Evaluating Farmers Market Sites in Cambridge, MA

INTRODUCTION

Farmers markets have been used a strategy to improve consumption of healthful foods within communities by making fruits and vegetables accessible and affordable. When evaluating possible sites for new markets, ease of access should be considered, ensuring they are in high traffic areas and accessible via foot, public transportation, or by personal vehicle.[1] Ideally, markets should be in walking distance (500 meters) from parking areas or public transportation. The purpose of this model is to discover if farmers markets in Cambridge are in high traffic areas that are easily accessible to commuters and residents. Furthermore, this model evaluates areas that are accessible by multiple modes of transit but are not within 500m of an existing market. This may serve as a tool when considering recommendations to add or move a market. Additionally, land use data will identify best suited areas for public markets that are zoned as open, commercial, public, or institutional. While parking benefits people who have personal vehicles, it may also represent areas of high foot traffic for commuters and residents. Therefore market viability can use parking space density as a proxy for pedestrian activity.

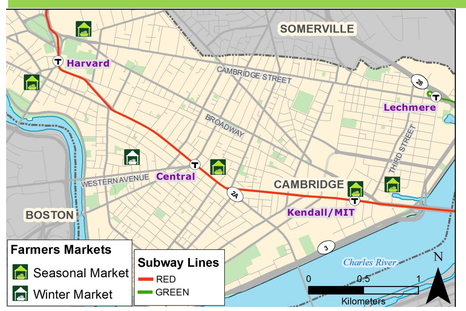
This model does not observe or properly represent handicap accessibility or mediating conditions such as sidewalks, stairs, and elevators.





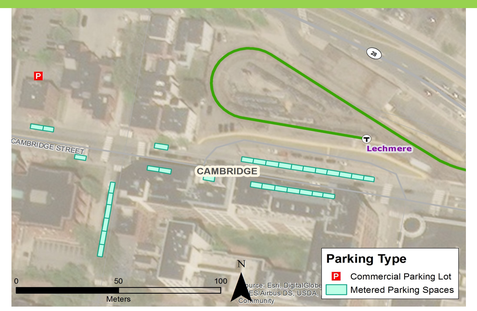
Projection: Massachusetts State Plane Mainland

DATA SOURCES

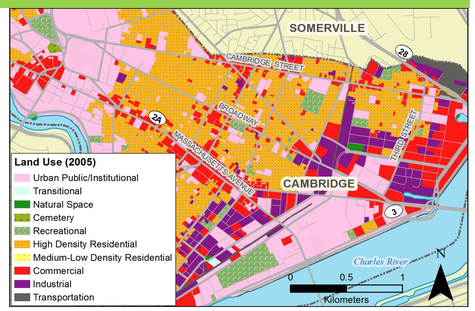


Farmers market data are maintained by the Massachusetts Department of Agricultural Resources. They help farmers find appropriate markets to participate in and encourages consumers to utilize them.

The Rapid Transit layer shows the stops on the subway lines in the Massachusetts Bay Transportation Authority's rapid transit rail network. Original linework was acquired from USGS with additional editing by MassGIS.

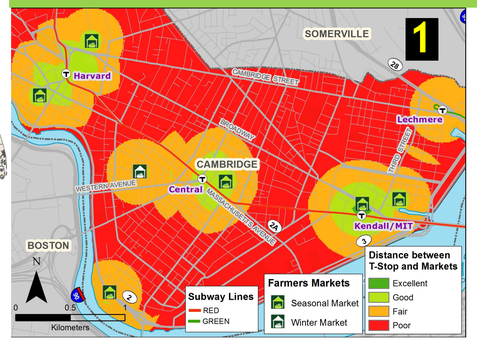


Cambridge parking layers contain point and polygon features of commercial and municipal lots and metered street parking spaces in Cambridge. These are used for identifying parking lot locations, permitting for moving vans, dumpsters, etc., and maintaining parking meter inventory. Key attributes for lots include structure type and total number of spaces. MBTA parking lots are not included in this data set.

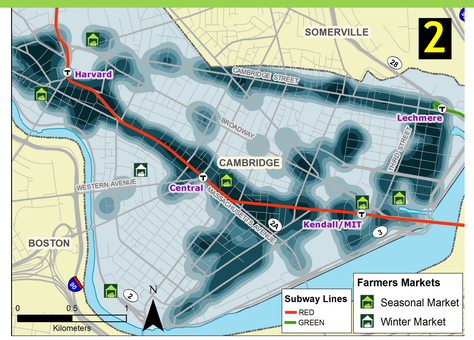


The 2005 Land Use layer is a statewide digital dataset of land cover and land use. The classification scheme is based on the coding used for previous state land use datasets with modifications. Delineation and coding was carried out by Sanborn with editing by MassGIS. 40 land use codes were reorganized into 10 to aid in determining suitability for potential farmers markets.

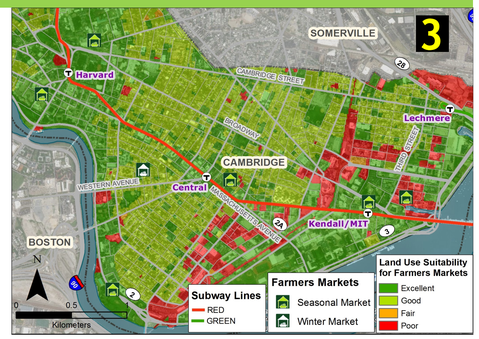
MODELS



The Euclidian Distance tool was used to determine proximity of markets to T-stops based on a 500 meter radius. Areas were reclassified to score proximity <100m = Excellent; 100-300m = Good; 300-500m = Fair; >500m = Poor. The raster calculator tool used score data to determine which areas were serviced by T-stops and markets within a 500m radius. Areas of market saturation are noted near Kendall/ MIT, Harvard, and Central, while Lechmere does not have a market within 500m.

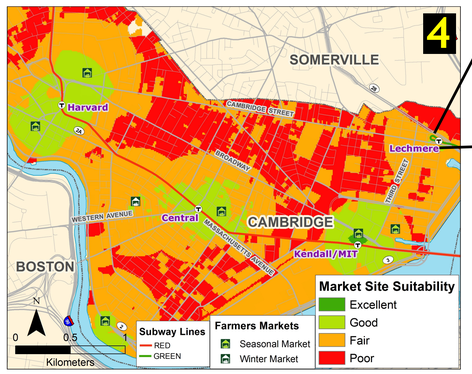


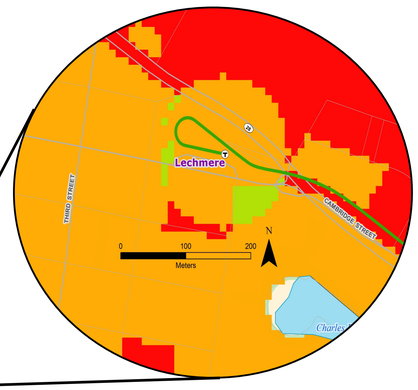
Metered Parking Spaces were converted to points from polygons. Commercial spaces and metered spaces were merged into one feature. Summary statistics were calculated for total spaces in Cambridge equaling 18,671 individual spaces. Given that parking lots have multiple spaces, this model assumes individual shoppers are interested in fewer spaces. Thus, all parking lots were coded to have three total spaces while metered spaces continued to be counted as one. This allowed for the use of the kernel density tool to value each parking spot cumulatively, creating a heat map of parking intense locations within 500m.



The 10 land use codes were manually recategorized for site suitability. Commercial, institutional, and high-density residential areas are generally indicative of heavy foot traffic, and therefore would be suitable, while industrial and freight transportation sites would make poor choices for potential farmers markets. The recategorized land use codes were fed into a raster calculator, creating a choropleth map. According to this model, most 2016 markets were located in excellent areas. The data identifies parts of East Cambridge as being suitable.

Lastly, the raster tool calculated a composite score of distance from markets to T-stop, land use, and parking intensity. The output supports current market locations as being near rapid transit and parking, and in suitable land use areas. However, if someone were to consider adding a market, they might want to look within 200 meters of the Lechmere train stop.





LIMITATIONS

- Farmers market data do not account for openings, closures, or changes to hours of operation since 2016. Markets may operate in the same place during the winter and summer and may be counted twice. Markets may operate in parking lots, reducing the number of available spaces.
- Transit system data may not account for modifications or closures of T-stops since summer 2018. Bus routes are not represented in this model.
- Parking data do not include a publication date. Data is limited to Cambridge. Parking spaces crossing into Somerville may skew site suitability. Some private spaces are included within municipal lots, but private lots are not identified.
- Parking lots have hundreds of spaces, but were only counted as having a max of three for use of the kernel density tool.
- Land use data may not reflect changes since 2005. Data does not distinguish between commercial and non-commercial parking lots. Both urban public/institutional and commercial areas may include hospitals and medical offices, museums, or prisons which may not be considered suitable.

CONCLUSION

This model does provide insight into areas that, as of 2016, were not served by a farmers market, as well as areas that may benefit from the addition of a market. It does not provide the most up to date information on parking, markets, or land use and should not be used to make any decision concerning adding or moving farmers markets. Further investigations are recommended along with updated datasets.

SOURCES

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