BEYOND ALEWIFE

Revisiting Transportation Expansion in Middlesex County

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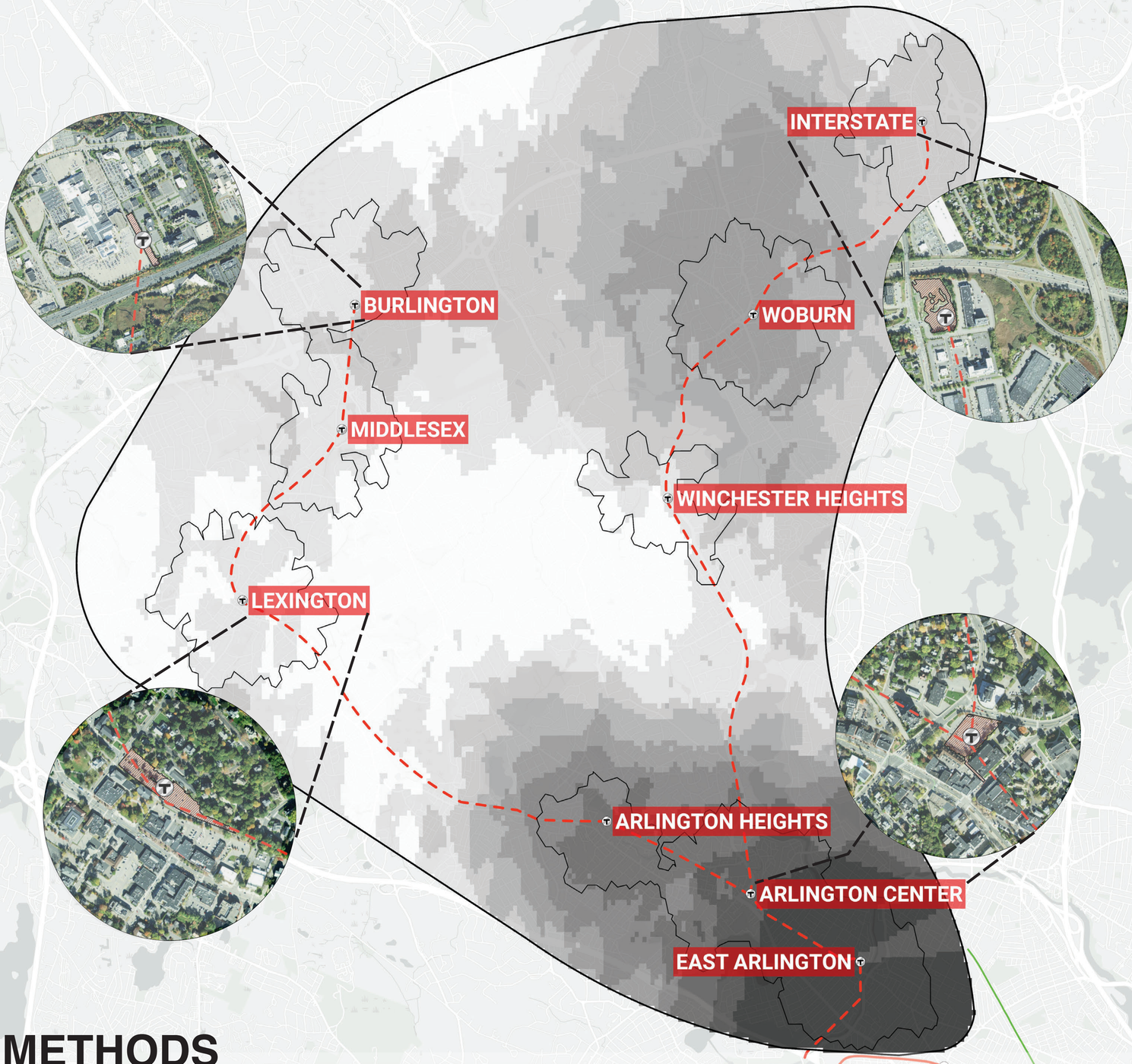


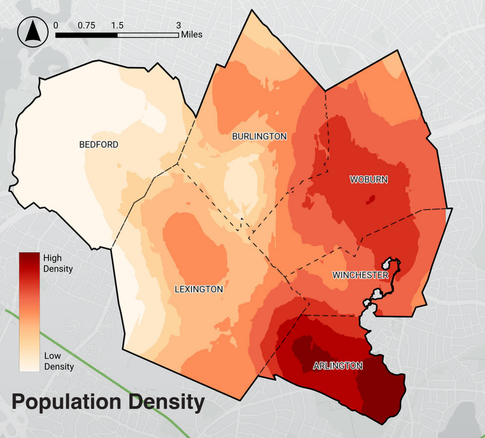
INTRODUCTION

In the late 1970s, the Massachusetts Bay Transit Authority proposed to extend the Red Line through Arlington, constructing two stations in the town before continuing on through bordering Lexington to a terminus at Route 128. However, prevailing attitudes of the time were not favorable to mass transit, and a powerful local opposition coalition ultimately succeeded in halting the Red Line expansion to Arlington. Since the opposition movement to stop the Red Line 50 years ago, Arlington has changed demographically and attitudinally. Recent town meeting votes by Arlington residents signal a desire for the MBTA to reinvest in their community, and state officials who represent the town are sponsoring legislation to extend Red Line service. Given the more favorable political environment, studying a future extension has become more salient. More so, a Red Line Extension to Arlington, Lexington, and beyond would be transformative for the region's climate goals, as transportation is the largest contributor of carbon emissions in the state. An extended Red Line has potential remove tens of thousands of vehicles from the roads daily as residents from all over Middlesex County would have far easier public transportation options to reach Boston. This project sets out to determine the suitability of new stations and their potential impact.

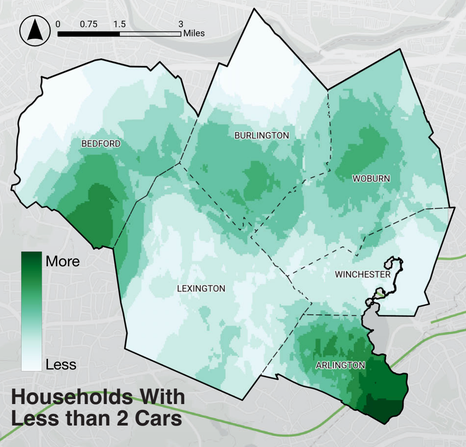
METHODS

This study area encompasses the municipalities of Arlington, Bedford, Burlington, Lexington, Winchester, and Woburn. Existing bus ridership estimates were used to determine suitable areas for rapid transit expansion. To do this, ridership data was collected for each bus stop within the study area and intersected with census block groups. This ridership data was then summarized, creating a measure of the average number of bus boardings for each block group, which was used as the dependent variable for further analysis. Socioeconomic and land use data was then gathered and joined with block group data. This set of variables underwent principal component analysis, which reported eigenvalues, indicating each variable's relative importance. This informed how each should be weighted relative to each other. Multivariate linear regression as used to confirm significance. Block group data for these 12 variables were each converted to centroid points. These points were then interpolated to rasters using the Kriging method, and then rescaled from 1 to 9. The combined suitability layer was made with the raster calculator, using weights derived from the eigenvalues.

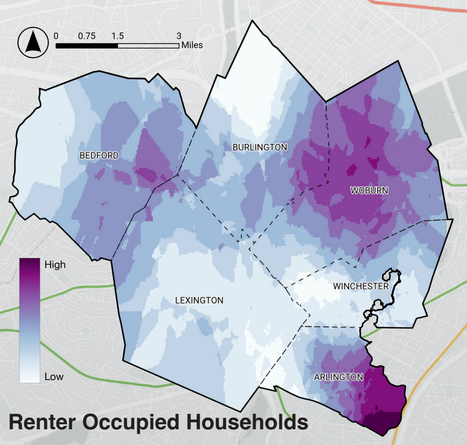
SUBSET OF INPUTS



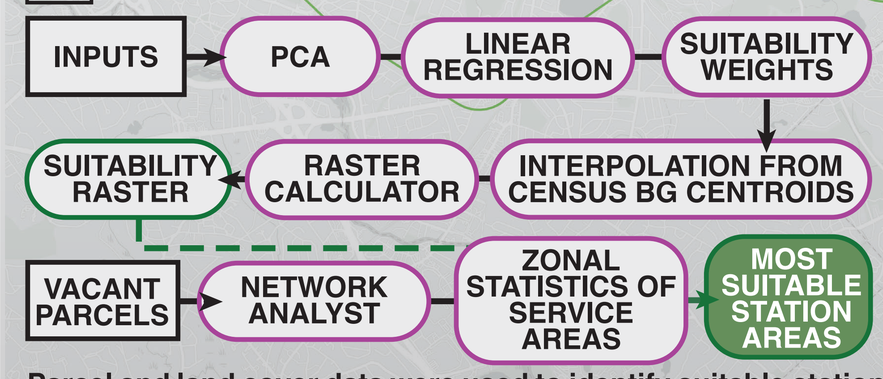
Population Density



Households With Less than 2 Cars



Renter Occupied Households



SUITABILITY FACTOR	EIGENVECTOR	WEIGHT
Population Density	0.312	21.8%
Households With 2 or More Cars (-)	-0.324	16.1%
Households With 1 Car	0.299	15.8%
Renter Occupied Households	0.274	13.4%
Walkability	0.241	9.0%
Means of Transit to Work: Vehicle (-)	-0.219	4.2%
Zero-car Households	0.212	4.2%
Means of Transit to Work: Bus	0.203	4.0%
Means of Transit to Work: Other	0.201	4.2%
Means of Transit to Work: Bike	0.183	2.8%
Employment Density (Jobs/Acre)	0.183	2.6%
Median Household Income	-0.165	1.8%

Parcel and land cover data were used to identify suitable station locations. Parcels that were attributed as "Vacant" or "Developable" were selected, and intersected with land cover data. This combined layer was filtered to only show vacant parcels on impervious surfaces, and parcels that were larger than 1 acre. 15-minute walk areas were generated from the centroid of these vacant parcels. These walkshed polygons were then used as the input features for zonal statistics, and the final suitability layer was used as the raster. This provided the average suitability of potential station locations. The most suitable station locations areas were intersected with commercial parcel data and 2023 population estimates to generate the service area commercial/retail square footage and population estimates.

RESULTS

Characteristics and statistics of each station and it's 15-minute walkshed area

BURLINGTON

Major retail and employment destination

Service Area Statistics
Population: 600
Commercial SqFt: 1,122,386

MIDDLESEX

Commuter node with potential for future growth

Service Area Statistics
Population: 1,598
Commercial SqFt: 480,802

LEXINGTON

Historic town center with retail and dining

Service Area Statistics
Population: 3,413
Commercial SqFt: 405,116

ARLINGTON HEIGHTS

Dense neighborhood of inner suburb

Service Area Statistics
Population: 5,623
Commercial SqFt: 349,254

EAST ARLINGTON

Dense neighborhood adjacent to urban core

Service Area Statistics
Population: 9,928
Commercial SqFt: 402,768

INTERSTATE

Key transportation hub for I-95/I-93 commuters

Service Area Statistics
Population: 3,114
Commercial SqFt: 413,286

WOBURN

Densely populated suburb with rich urban fabric

Service Area Statistics
Population: 7,671
Commercial SqFt: 484,901

WINCHESTER HEIGHTS

Commuter node with infill potential

Service Area Statistics
Population: 1,666
Commercial SqFt: 68,931

ARLINGTON CENTER

Dense and growing town center with abundant retail and civic amenities

Service Area Statistics
Population: 12,248
Commercial SqFt: 803,902

This proposed Red Line Extension provides rapid transit service to several historic inner suburbs of Boston. Beyond the 45,000 people within walking distance to the stations, hundreds of thounsads of people in Middlesex County would benefit, as well as the thousands of daily commuters heading on I-95/I-93 towards Boston. Further study would include population growth estimates related to MBTA Communities Act zoning changes.

REFERENCES

Projection: *NAD 1983 (2011) StatePlane Massachusetts FIPS 2001 (US Feet)*
Data Sources: *MBTA, MassGIS, U.S. Census ACS 2022, 2023 5-Year Estimates, EPA Smart Location Database*