

Putting Back The Tracks

A Suitability Analysis for Commuter Rail Expansion North of Boston

Cartography: Jay Monty
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Data Source: MassGIS 2010
Coordinate System: NAD 1983 State Plane MA



Commuter Train in East Lexington c.1955
 Photo: George Dimond

Background

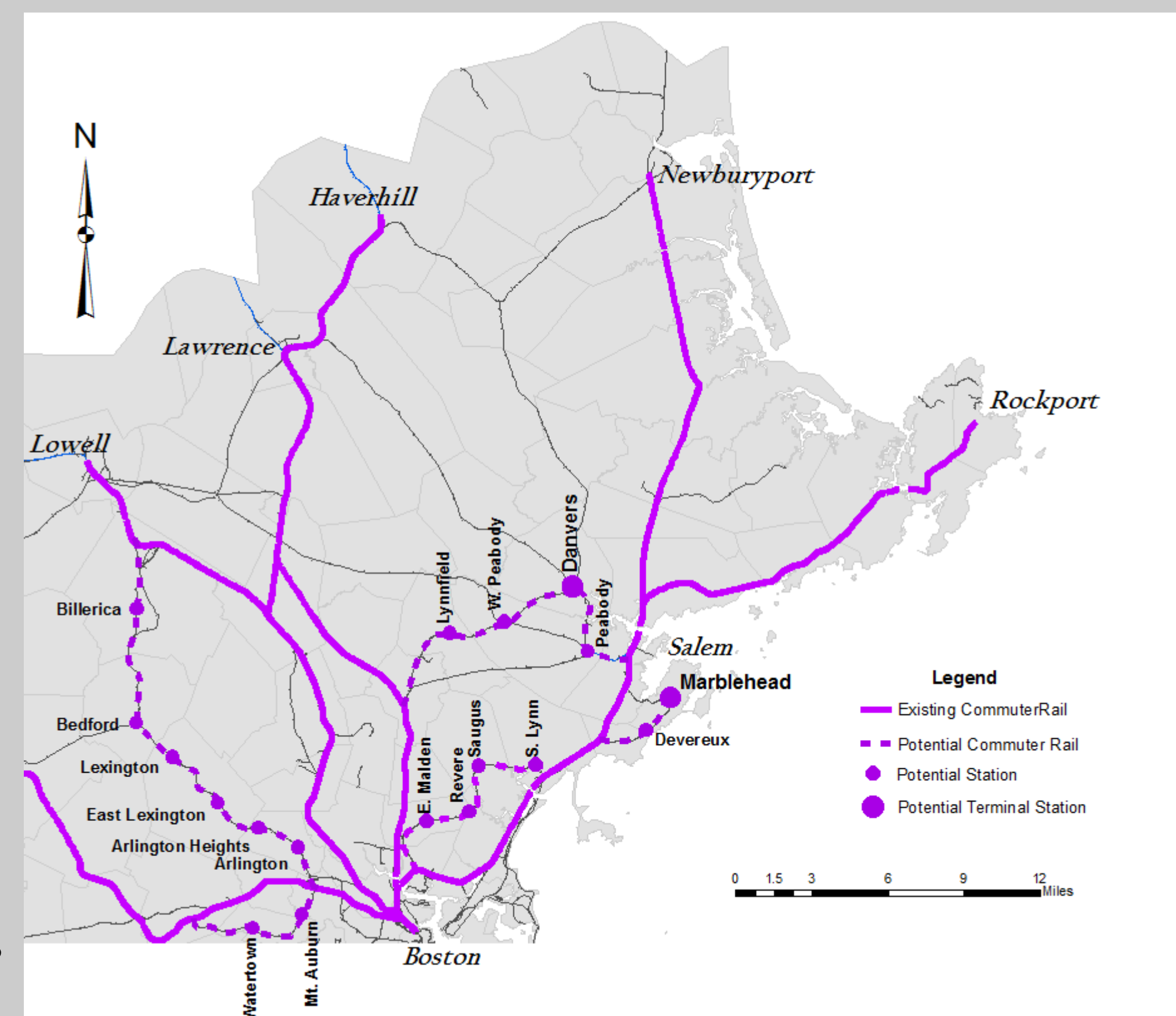
From the mid-19th to mid-20th century, eastern Massachusetts had one of the densest regional rail networks in the nation. Most towns in Essex and Middlesex counties had at least one rail line linking them to Boston and other important cities such as Haverhill, Lawrence, Lowell, and Salem. From the 1920's to the 1970s, competition from cars and trucks forced the closure of most of these lines, however the desire for urban and suburban revitalization as well as environmental concerns have renewed interest in the passenger rail network. The purpose of this exercise is to use GIS analysis tools to determine which of these abandoned lines may be best suited to support a new passenger rail service.

Methodology

The suitability analysis was based on demographic data and the geography of past and current rail infrastructure. Land parcels were evaluated as 30 meter cells using criteria based on the characteristics of the existing commuter rail system and service area. These included:

- . Housing Unit Density
- . Proximity to abandoned rail lines
- . Distance from existing rail stations
- . Distance from existing transit stations
- . Distance from North Station in Boston

These criteria were not necessarily straightforward. For example, while commuter rail requires a minimum housing density, the highest densities are in fact better suited to rapid transit and not commuter rail. In this regard the weighting system scored parcels located in either high density urban areas or near rapid transit, or both, lower than moderately dense parcels in the suburbs. Catchment areas for existing stations were set with a two-mile radius. This was a compromise between accepted values for urban areas, which may be smaller, and low density suburban areas which may be larger. Proximity analysis were done using a combination of straight line distances to a point, as well as network analysis calculating the travel distance over the existing



Potential Route Expansions Based on Suitability Analysis

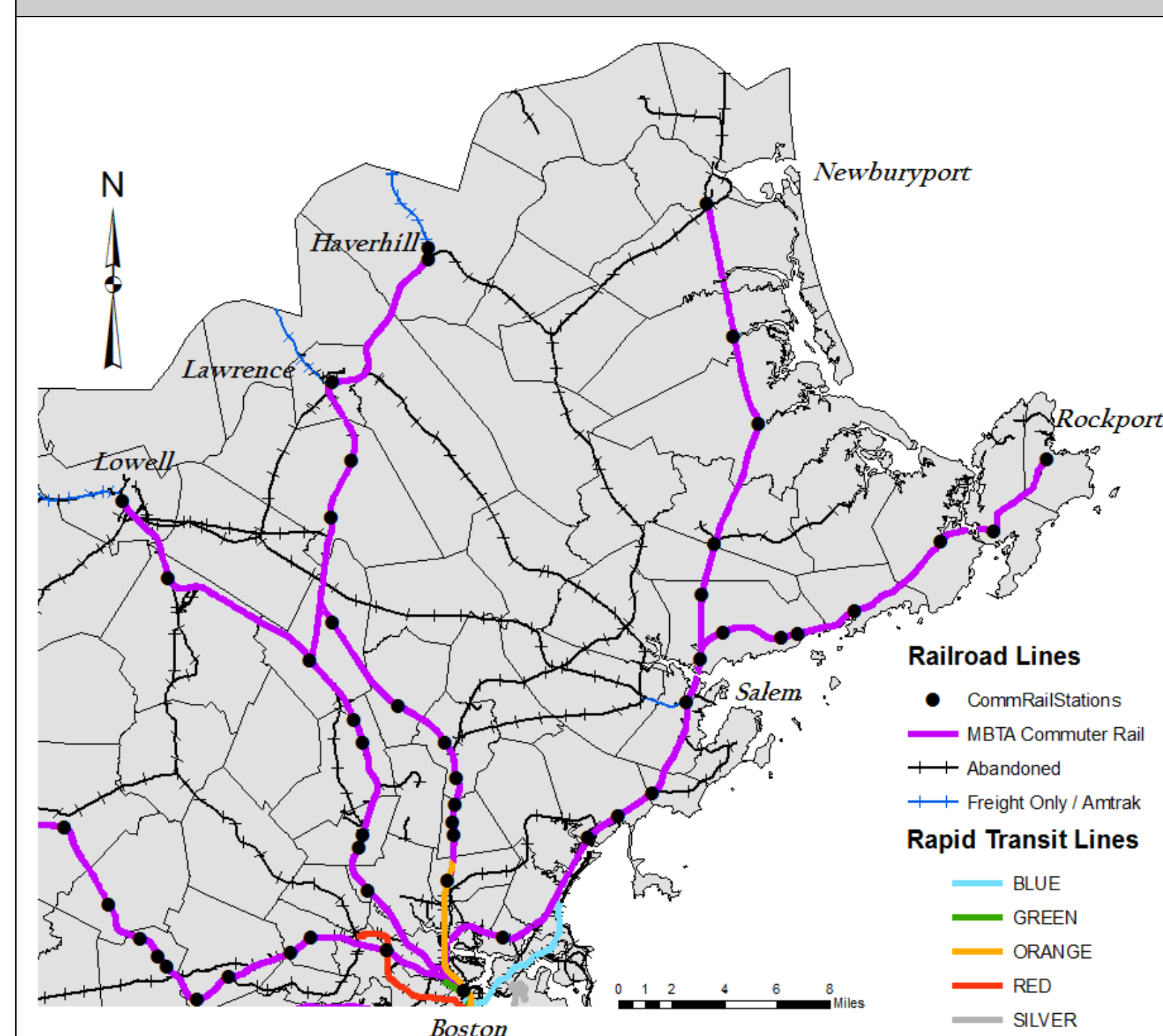
street network. Housing unit densities were determined by calculating the acreage of residential land per census block group and then dividing the total number of housing units by those values. The weighting system gave the highest scores to land parcels close to abandoned rail corridors in moderately densely populated areas within a declining score proportional to their distance from Boston.



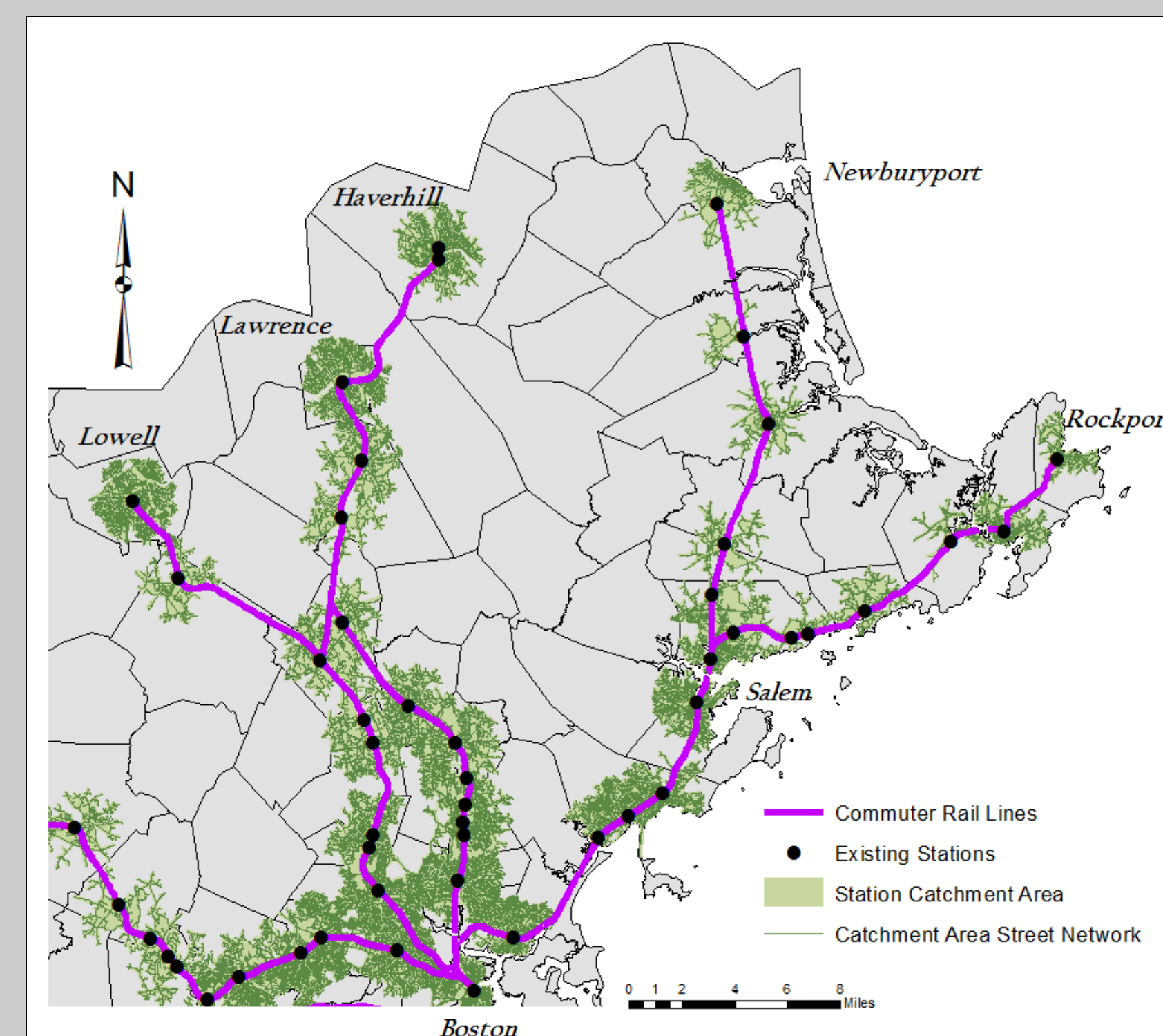
MBTA Commuter Rail train on the restored line to Plymouth
 Photo: Michael Taylor

Conclusion

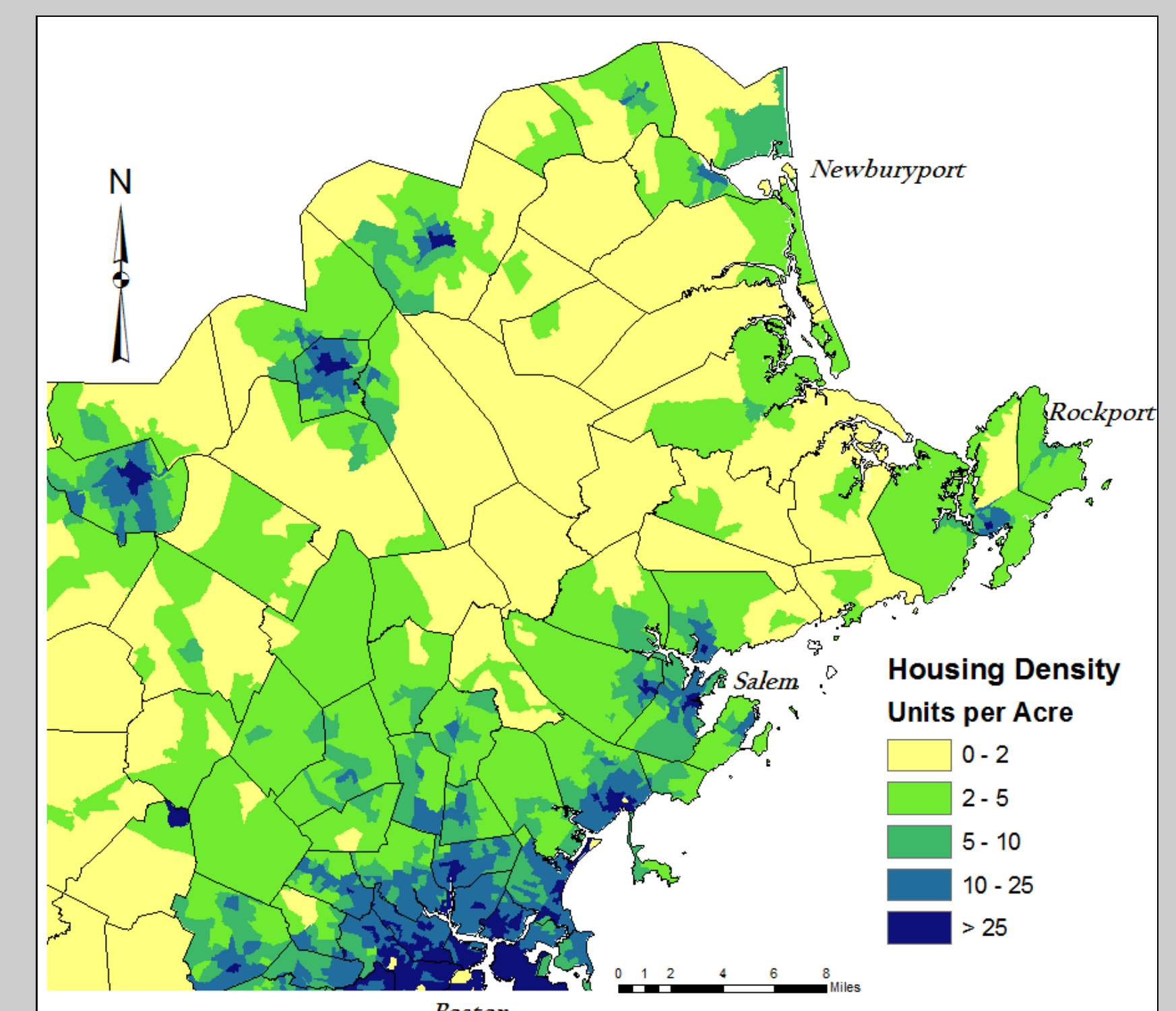
The GIS tools and available data were successful in determining areas currently underserved by rail transportation, and linking them to vacant or under-utilized rail corridors. One task which the current tools were unable to perform, was a network analysis of the existing and abandoned rail network. This would have been valuable in determining routes which were best suited to reach a particular destination. Nevertheless, using the given analysis in the graphic below and our own intuition, the most promising corridors become apparent; the routes from Swampscott to Marblehead, Arlington to Billerica, Salem and Wakefield to Danvers and Lynn to Boston via Saugus as shown above.



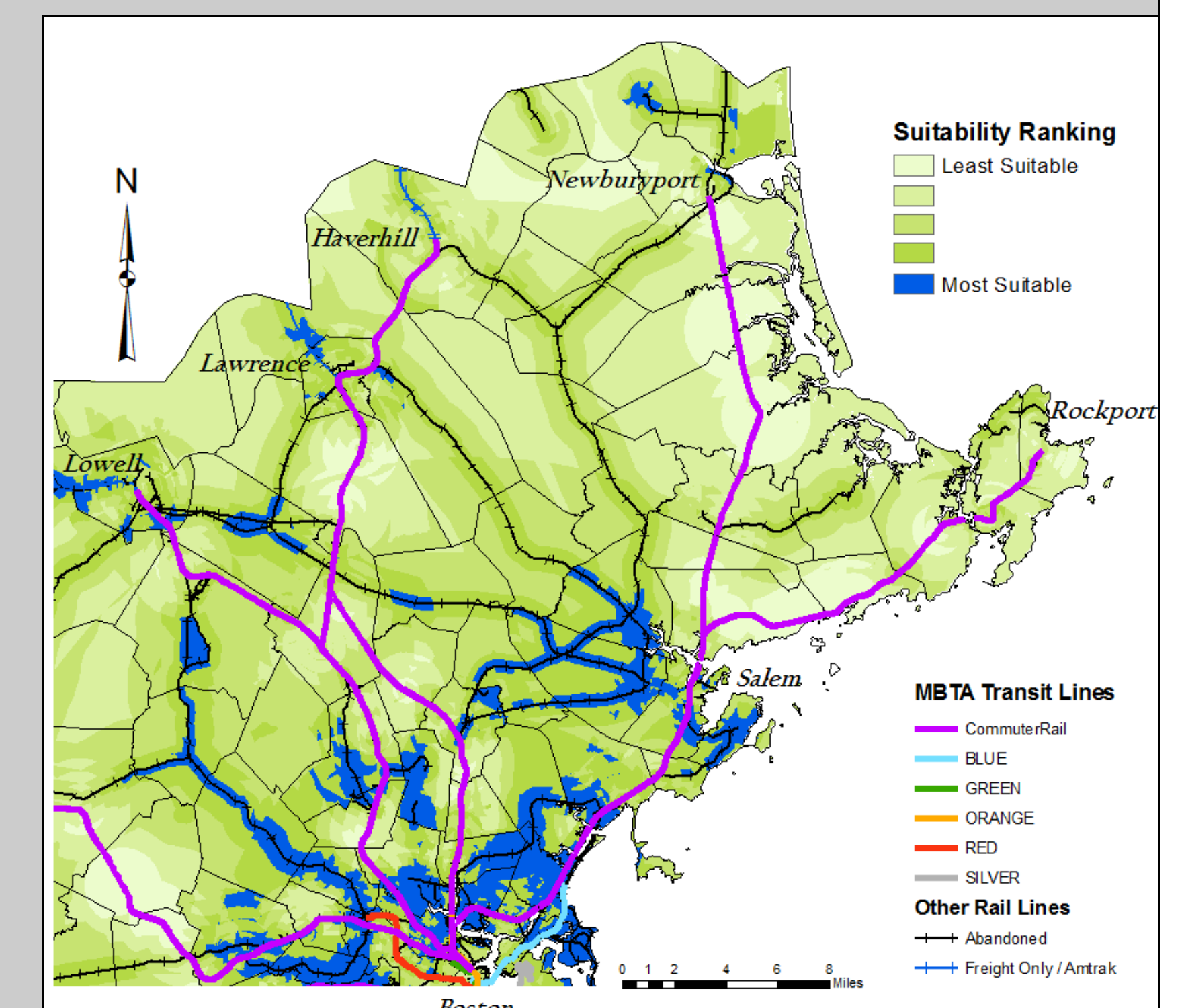
Existing and Abandoned Rail Lines North of Boston



'Catchment Areas' Show Locations Currently Well-Served by Rail



Green and Blue Areas Contain Densities Able to Support Transit



Suitability of Abandoned Rail Corridors for New Service