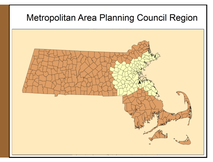
Brownfield Redevelopment:
Prioritizing Based on Smart Growth and Demographics

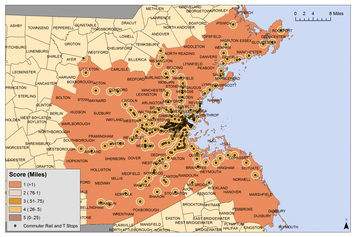
Metropolitan Area Planning Council Region



Background

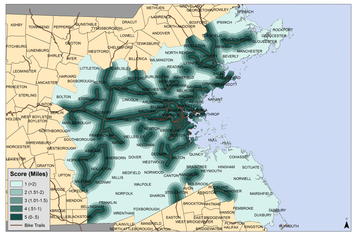
A brownfield is defined by the US Environmental Protection Agency as "any real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant." Due to a significant industrial past, Massachusetts has already discovered a significant amount of brownfield sites and is particularly concerned with how to take advantage of their redevelopment potential. This is a challenging task with many developers steering clear of the expensive clean up and liability issues associated with brownfield redevelopment. To deal with these difficulties, cities and towns may need to put incentives in place in order to attract potential developers.

Raster Distances From Train Stations

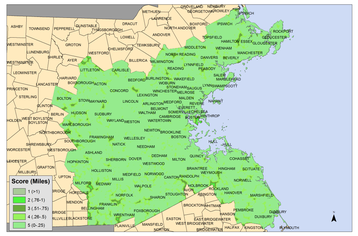


This GIS spatial analysis was performed in order to determine what brownfields should be prioritized for redevelopment and therefore should also come along with incentives for redevelopment. The extent of the analysis was the Metropolitan Area Planning Council Region in Massachusetts.

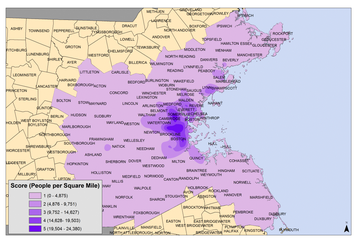
Raster Distances From Bike Trails



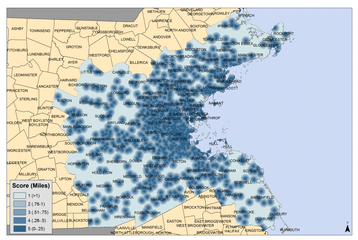
Raster Distances From Open Space



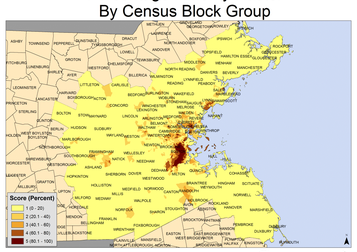
Population Density Raster



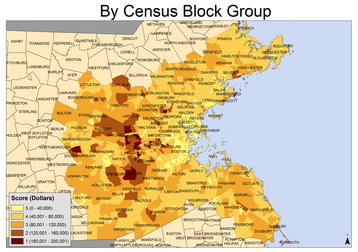
Raster Distances From Schools



Percentage Minority Raster By Census Block Group



Median Household Income Raster By Census Block Group



Methodology

In order to prioritize brownfields for redevelopment, a scoring system was set up based on both smart growth factors and the demographics of the communities in which the brownfields are located. Seven raster distance surfaces (below left) were created that fed into this scoring system. Each brownfield was assigned a number 1-5 based on the scoring below.

Score →

Criteria ↓

	5	4	3	2	1
Train Stations	Within .25 mile	.26 - .5 miles	.51 - .75 miles	.76 – 1 mile	Greater than 1 mile
Open Space	Within .25 mile	.26 - .5 miles	.51 - .75 miles	.76 – 1 mile	Greater than 1 mile
Bike Trails	Within .5 miles	.51 – 1 mile	1.01 – 1.5 miles	1.51 – 2 miles	Greater than 2 miles
Schools	Within .25 mile	.26 - .5 miles	.51 - .75 miles	.76 – 1 mile	Greater than 1 mile
Population Density (People Per sqm)*	19.504-24,380	14,628-19,503	9,752-14,627	4,876-9,751	0-4,875
Median Household Income (Dollars)*	0-40,000	40,001-80,000	80,001-120,000	120,001-160,000	160,001-200,001
Percentage Minority*	80.1-100	60.1-80	40.1-60	20.1-40	0-20

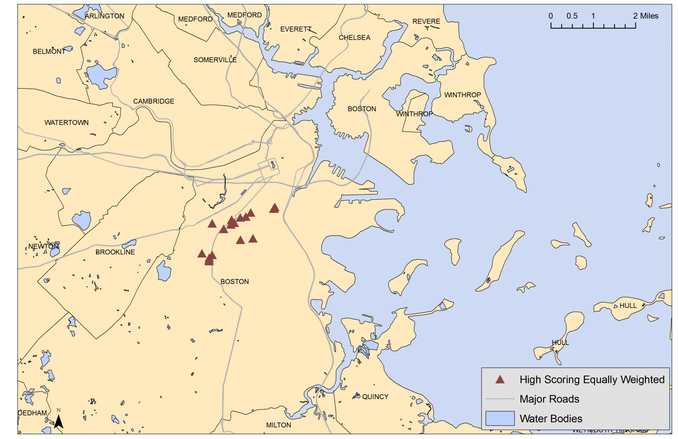
*Five Ranges Based on Equal Interval

After each brownfield was assigned an individual score for each separate criteria, composite scores were assigned to each brownfield for Smart Growth and for Vulnerable Population. The Smart Growth score was calculated by adding together 5 of the brownfields' individual scores (distance to train stations, distance to open space, distance to bike trails, distance to schools, and population density). The highest possible score was a 25 meaning that the brownfield was located in a very "smart" location and should therefore be prioritized for redevelopment. The Vulnerable Population score was calculated by adding together 2 of the brownfields' individual score (percentage minority, median household income). The highest possible score was a 10 meaning that the brownfield was located in an area with very low incomes and very low median household incomes, hereto after referred to as a "vulnerable" area. A series of maps were created that considered the "Smart Growth" and "Vulnerable Population" score with different weights (right).

Results

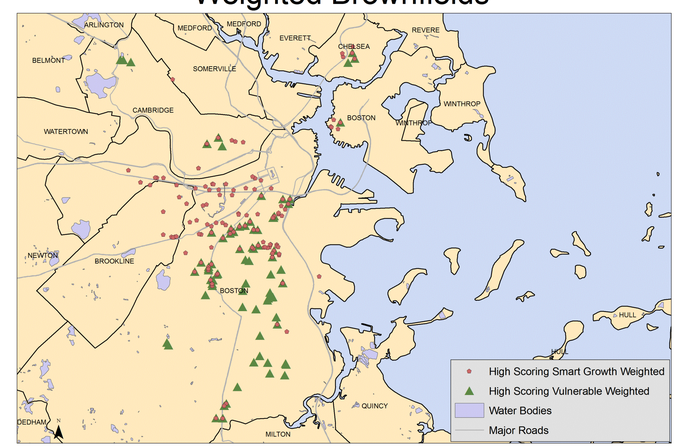
The spatial analysis indicates that all of the brownfields no matter how they were weighted in the corresponding maps were concentrated towards the urban inner core of the Metropolitan Area Planning Council Region. The equally weighted "Smart Growth" and "Vulnerable Population" sites are all located within an even smaller radius: the Boston boundary. The Smart Growth and Vulnerable Population categories did return different high scoring brownfields. However, it is important to note that many brownfields, again no matter how they were weighted in the corresponding maps, did score high on both the "Smart Growth" score and the "Low Income" score, as is indicated by overlapping symbols on the maps to the right. In order to address both equity and smart growth concerns, these brownfields that scored high on both Smart Growth and Vulnerable Population should be prioritized for development.

Equally Weighted Smart Growth and Vulnerable Population Brownfields*



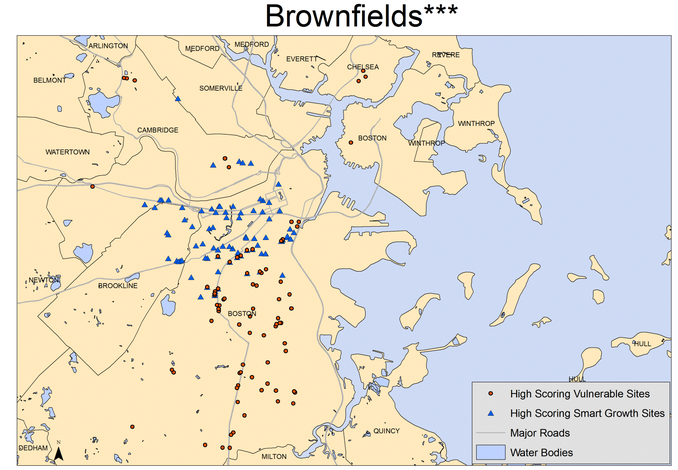
* Based on 50% Smart Growth Weighted Score and 50% Vulnerable Population Weighted Score

Smart Growth vs Vulnerable Population Weighted Brownfields**



** "High Scoring Smart Growth Weighted" based on 75% Smart Growth Weighted Score and 25% Vulnerable Population Weighted Score. "High Scoring Vulnerable Weighted" based on 25% Smart Growth Weighted Score and 75% Vulnerable Population Score.

Smart Growth vs Vulnerable Population Brownfields***



*** "High Scoring Smart Growth Sites" based on 100% Weighted Smart Growth Score. "High Scoring Vulnerable Sites" based on 100% Weighted Vulnerable Population Score.

Tufts

Cartographer: Amanda Cleveland

Sources: MassGIS and ESRI
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