



City of  
**Somerville**

# NEXT STOP: A Better Quality of Life

*How the GLX will improve the  
quality of life of residents  
in the City of Somerville*



Final Presentation

Monday, April 23, 2018

Ken Ryan, Wes Turner, John Wendelken



**massDOT**  
Massachusetts Department of Transportation

City of **Somerville**



# Agenda

1. Background on the GLX
2. Research Question
  - GLX Impact on Air Quality
  - GLX Impact on Commute Time
3. Recommendations



# Background on the GLX

1990	An extension of the Green Line proposed with mass-transit plan. Est. cost: \$600 m.
2005	The Conservation Law Foundation (CLF) sought to sue the Commonwealth for stalling projects, but settled when the government agreed to a set of deadlines for each project. The Green Line project's deadline was set for 2014.
2007	GLX postponed 2 years to seek federal funding.
2011	GLX postponed delayed 3 years, with service to Somerville and Medford expected to begin during the fall of 2018 at the earliest or 2020 at the latest.
2012	Construction began in Somerville, which included reconstructing the Harvard Street Bridge in Medford and the Medford Street Bridge in Somerville.
2015	MBTA announced that, in addition to the Green Line extension's then-\$1.99 b. price tag, they could need an additional \$0.7-\$1.0 b. to finish the project. MBTA also announced that it would cancel contracts with four firms working on the extension and that it would begin searching for a new manager to oversee the project.
2016	T appointed John Dalton to be the new manager of the now \$2.3 b. project; opening of the Green Line's new stations was pushed back to 2021.

Source: Eppolito, Sophia, "A history of the Green Line extension to Somerville" *The Boston Globe* Aug. 30, 2017

# Background on the GLX

## CommonWealth

POLITICS, IDEAS & CIVIC LIFE IN MASSACHUSETTS

### Curtatone on \$50m GLX contribution

'I don't think we had much of a choice,' says Somerville mayor  
Bruce Mohl Dec 12, 2016

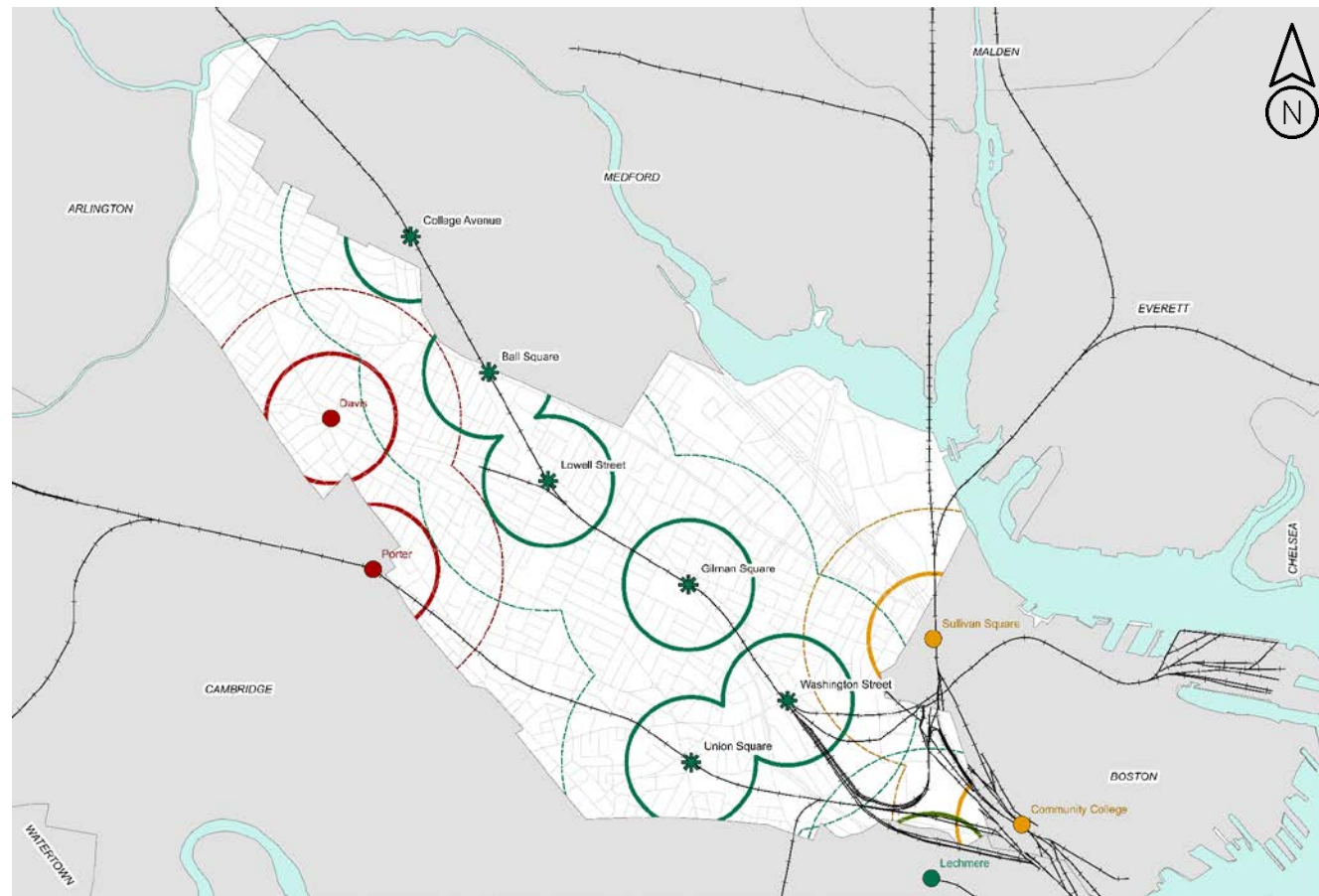


This is a project we were not only promised, but was legally required. Somerville, which has carried the burden of not just the Big Dig but I-93 and all the compounded negative impacts on our health and on our environment, has fought and advocated for this legal requirement.

Our environment will benefit. But the environment in the region and the Commonwealth will also benefit. Transportation equity will be realized by helping some of the most underserved and vulnerable populations in the region. And the economy will benefit. Billions of dollars in net new revenue will come into the Commonwealth's economy as a result of the Green Line extension.

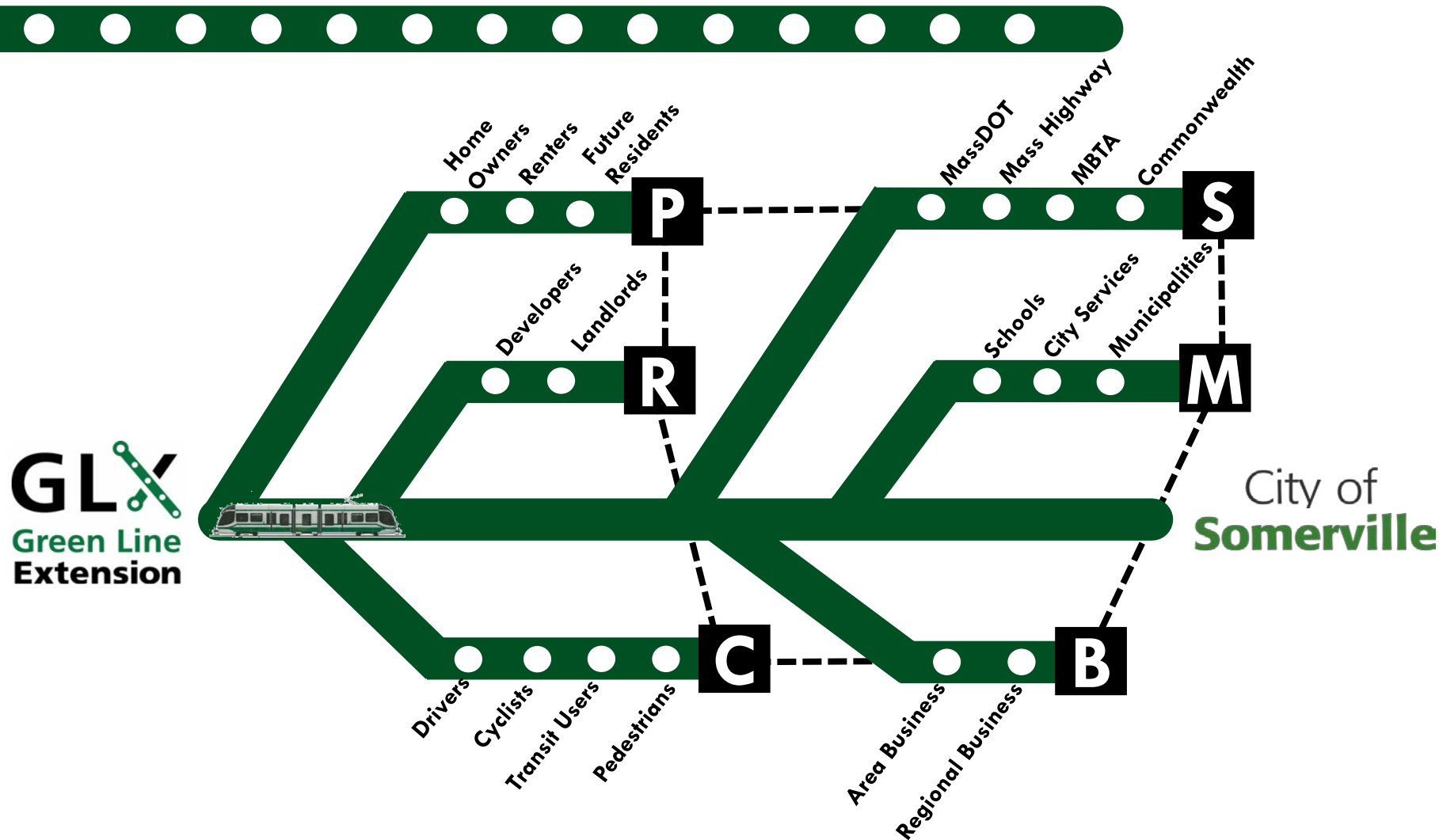
# Background on the GLX

- Current phase of the GLX will create 5.3 miles of new trolley track, taking the Green Line to College Avenue and Union Square; these current termini neither include nor preclude additional connections to Route 16 or Porter Square.



Source: MassGIS Data and Massachusetts Executive Office of Technology Services and Security

# GLX Stakeholders





# Research Project Goals

1. **Identify** some of the overarching goals for the Commonwealth's long-planned, \$2.3 billion GLX project.
2. **Compare** this investment to similar transportation infrastructure in the surrounding area.
3. **Analyze** through qualitative case studies and quantitative modeling the expectations and realities of such a transit investment in order to provide recommendations toward its continued success.



# Subject Matter Expert Interview

Teleconference with  
Melissa Woods, AICP  
Senior Planner, Somerville  
Tuesday, February 27, 2018



SomerVision - Somerville's comprehensive Master Plan - has 587 goals, policies, and actions - 31% (182) directly relate to zoning and how Somerville's existing zoning code is broken.

In areas where we want to see new development - Gillman Square, Lowell Street, Washington Street - there is currently zoning that does not facilitate the type of development we want to see - which is three to four story, mixed use development

One measurement in particular to look at in terms of the GLX's impact on quality of life in Somerville is the reduction in commute time over the next 10 years.



# Research Question

Q. What effects will the GLX have on *air quality* and *daily commute time* in the City of Somerville?

- What policies and investments can the City adopt to minimize and/or maximize these effects moving forward?



# Air Quality - Methodology

1 transit passenger mile = 0.05 CO (1 private automobile messenger mile)

< 0.08 VOCs

$\cong 0.50 \text{ CO}_2$

$\cong 0.50 \text{ NO}_x$



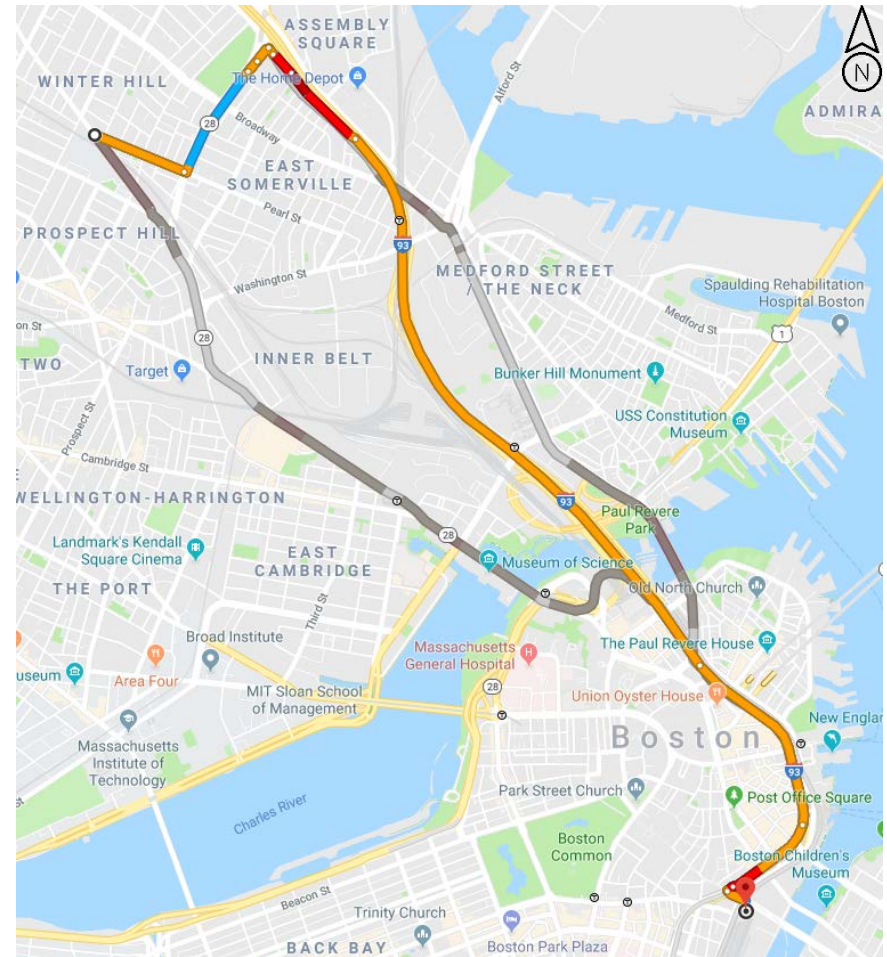
Source: Shapiro, R. J., Hassett, K. A., & Arnold, F. S. (2002). *Conserving Energy and Preserving the Environment: The Role of Public Transportation*. Washington, DC: American Public Transportation Association.

<https://www.apta.com/resources/reportsandpublications/Documents/shapiro.pdf>

# Case Study: Gilman Square to South Station

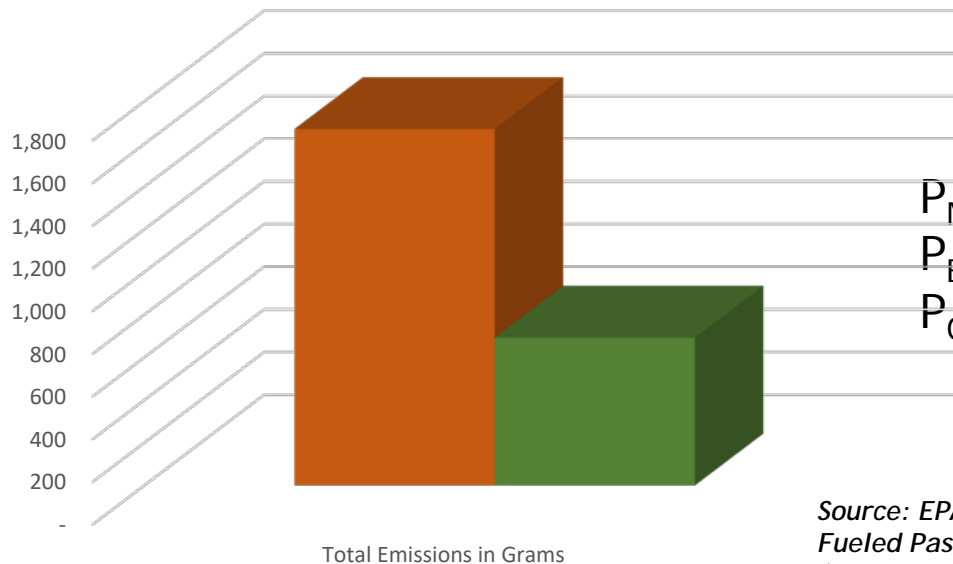
- South Station is the busiest T stop with ~25,000 riders\*:
  - Fastest driving route: 4.4 miles via I-93
  - Via MBTA and GLX: 3.75 miles
  - GLX = 15% fewer miles than driving alone
- Each commuter from Gilman Square to South Station who switches from driving alone to taking the MBTA will produce:
  - 4.3% the CO
  - 6.8% the VOCs
  - 42.5% the CO<sub>2</sub> and NO<sub>x</sub> by changing mode of commute.

Source: Boston.com Staff "These are the busiest T stops" (August 25, 2015) <https://www.boston.com/news/local-news/2015/08/25/these-are-the-busiest-t-stops>



# Case Study: Difference in Emissions

	Emissions in Grams				GLX/Drive
	per mile driven*	per drive commute	per GLX commute	change in emission	
VOCs	1.03	4.55	0.31	↓ 4.24	6.8%
CO	9.40	41.36	1.78	↓ 39.58	4.3%
CO <sub>2</sub>	368.40	1,620.96	688.91	↓ 932.05	42.5%
NO <sub>x</sub>	0.69	3.05	1.30	↓ 1.75	42.5%
<b>Total</b>	<b>379.53</b>	<b>1,669.92</b>	<b>692.29</b>	<b>↓ 977.63</b>	<b>41.5%</b>



$P_N = 100$  (0.0 reduction) = no change

$P_B = 100$  (1.0 reduction) = best case

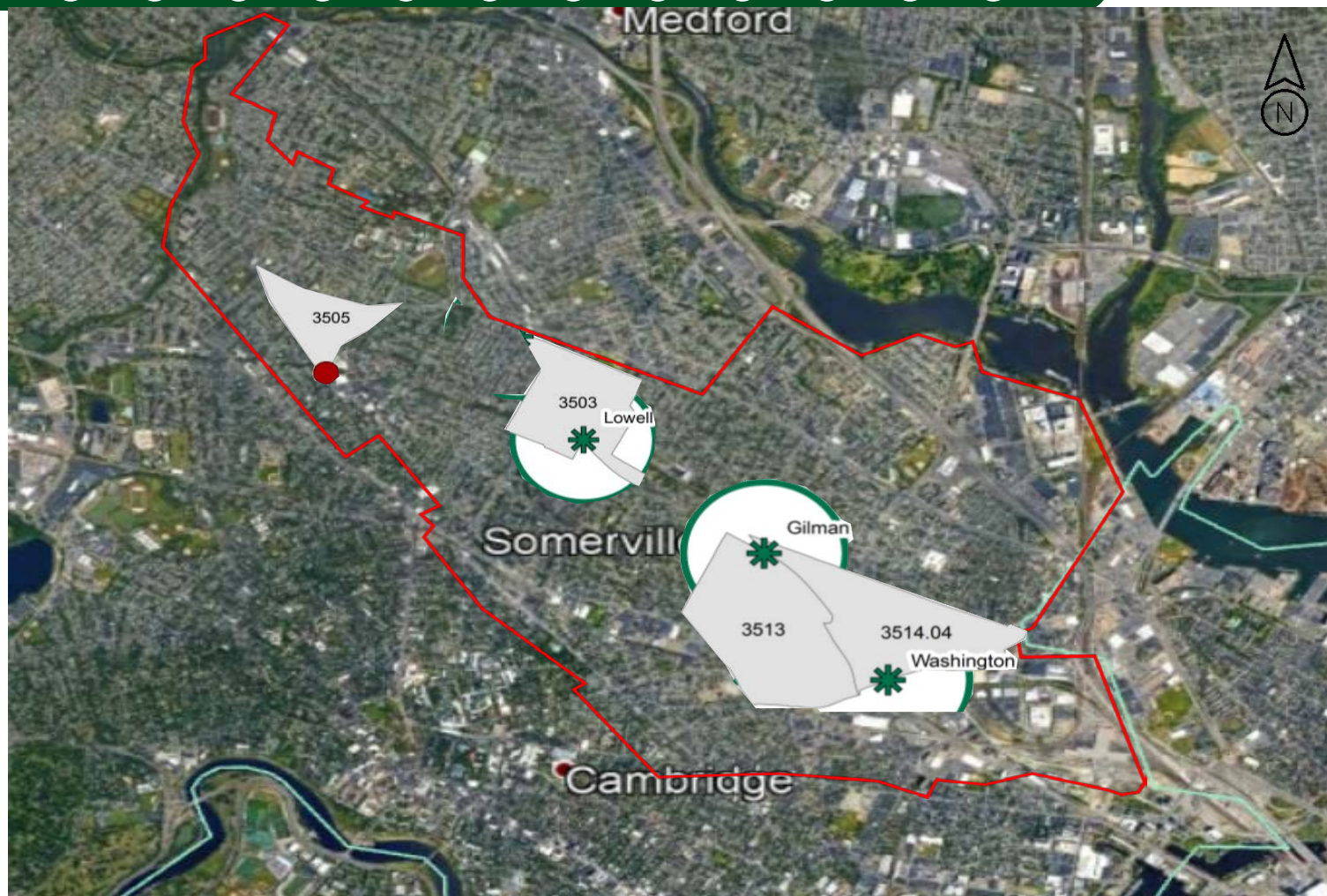
$P_{GLX} = 100$  (.585 reduction) = 58.5

Source: EPA, "Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks" 2008

(<https://nepis.epa.gov/Exe/ZyPDF.cgi/P100EVXP.PDF?Dockey=P100EVXP.PDF>)







# Commute Time - Case Study



# Current Commute Time

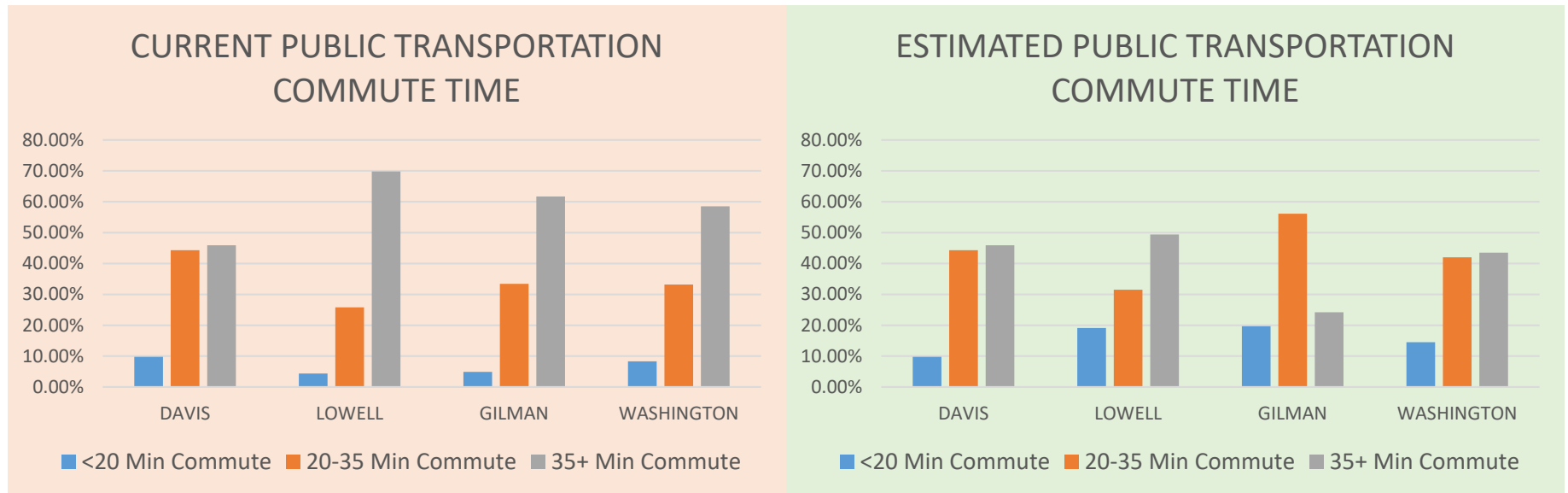


<u>Location</u>	<u>Mean Public Trans Commute time by Station</u> <u>Transit Time</u>
Davis (Tract 3509) 	33.4 Minutes
Lowell (Tract 3503) 	48.6 Minutes
Washington (Tract 3514.04) 	41.2 Minutes
Gilman (Tract 3513) 	38.6 Minutes

Source: U.S. Census Bureau; generated by James Turner; using American FactFinder, Report S0802 for Tracts 3504, 3503, 3514.04, and 3509 in Massachusetts; using 2010 data; <<https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>>; 31MAR18



# Commute Time Charts



Source: Green Line Extension Project. (2018, 04 02). Environmental Assessment and Section 4(f) Evaluation (Volume 1). Retrieved from Green Line Extension: <http://greenlineextension.eot.state.ma.us/documents.html>

# Commute Time Model

$T_1 = -1 * ((S_1 + S_2 + S_3 + S_4) / N)$  [CURRENT SOMERVILLE T SCORE]

$T_1 = 0.000$

HIGHEST POSSIBLE SCORE = .916

$T_2 = -1 * ((F_1 + F_2 + F_3 + F_4) / N)$  [FUTURE SOMERVILLE T SCORE]

$T_2 = 0.658$

**T = 72**

STATION	VALUE	Z-SCORE		
DAVIS	45.900%	-1.317		
LOWELL	69.800%	1.090	MEAN	58.975%
GIL.	61.700%	0.274	STD DEV.	0.099
WASH.	58.500%	-0.048		

Source: U.S. Census Bureau; generated by James Turner; using American FactFinder, Report S0802 for Tracts 3504, 3503, 3514.04, and 3509 in Massachusetts; using 2010 data; <<https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>>; 31MAR18

# Quality of Life Model

- Use a simple model to predict a quantitative measure of the effect of commute time on quality of life:

Current Quality of life = 0 [Baseline]

$Y_2 = (P) + (T) = (58.5) + (72)$  [Projected Change in Quality of Life with GLX]

Best case scenario provides a Y value of 200

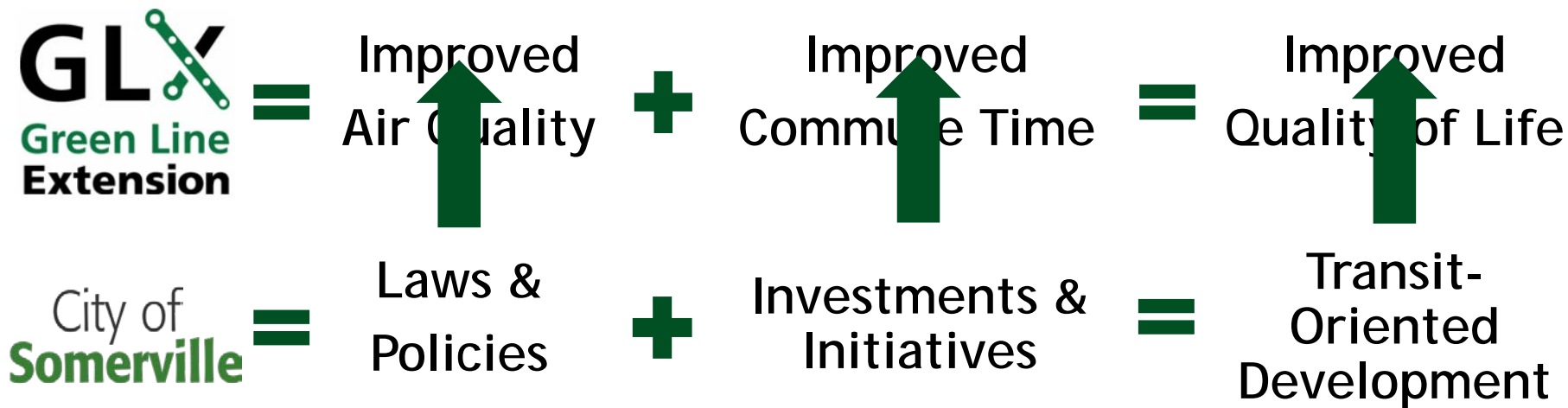
**$Y = 130.5 = 65\% \text{ increase}$**  in quality of life as measured by our case studies in air quality and commute time.

Y = Effect of public transportation and air quality on quality of life

P = Reduction in air pollution

T = Public transportation commute time

# Where does Somerville go from here?



# Recommendations

- Law & Policy- Capitalize on the ongoing SomerVision planning and the City of Somerville's Zoning Overhaul by establishing a **Chapter 40R smart growth zoning overlay** along the GLX corridor.
  - Spur affordable, transit-oriented development ahead of projected population increase and high-end development in key **"enhancement areas"**:
    1. Gilman Square
    2. **Lowell Street**
    3. Washington Street
- Initiative - Look at potential redevelopment opportunities in **city-owned parcels** to spur smart growth across Somerville.



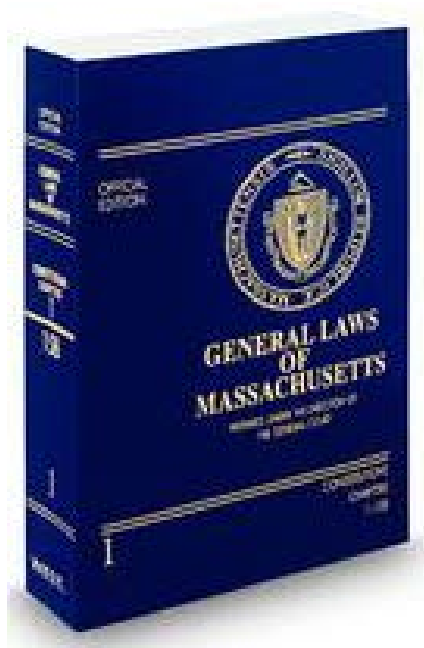
City of Somerville  
**ZONING OVERHAUL**

**LOWELL STREET**  
**STATION AREA PLAN**

# What is Chapter 40R?

## Smart Growth Zoning Overlay District Act:

- Signed by Governor Romney in 2004 (Massachusetts General Law - Chapter 40R).



1. "While municipalities have the power to regulate land use, they are sometimes ill-equipped to deal with a host of environmental issues caused, at least in part, by sprawl: air pollution and carbon emissions; water runoff pollution; reduction of open space and wetlands; ecosystem destruction, and increased use of fossil fuel and natural resources. 40R might allow municipalities to retain control over zoning while mitigating negative environmental outcomes."
2. Encourages municipalities to establish these smart growth zoning overlays near transit stations.
3. Communities become eligible for payments from a Smart Growth Housing Trust Fund, as well as other financial incentives.

Sources: <https://www.mass.gov/service-details/chapter-40r>; <https://dspace.mit.edu/handle/1721.1/90113>



# Benefits of Ch.40R to Somerville

1. Promotes sustainable means of transportation.
  - Prioritizes public transit, cycling, and walking - all modes that **reduce congestion, conserve fuel, and improve air quality.**
2. Generates mixed-use development.
  - **Builds energy-efficient homes near jobs, services, and transit.**
  - Supports the needs of people of all abilities, income levels, and household types.
3. Qualifies Somerville for Smart Growth Housing Trust funding.
  - Could support **potential City of Somerville initiatives.**

## Ex. Olmstead Green - Boston

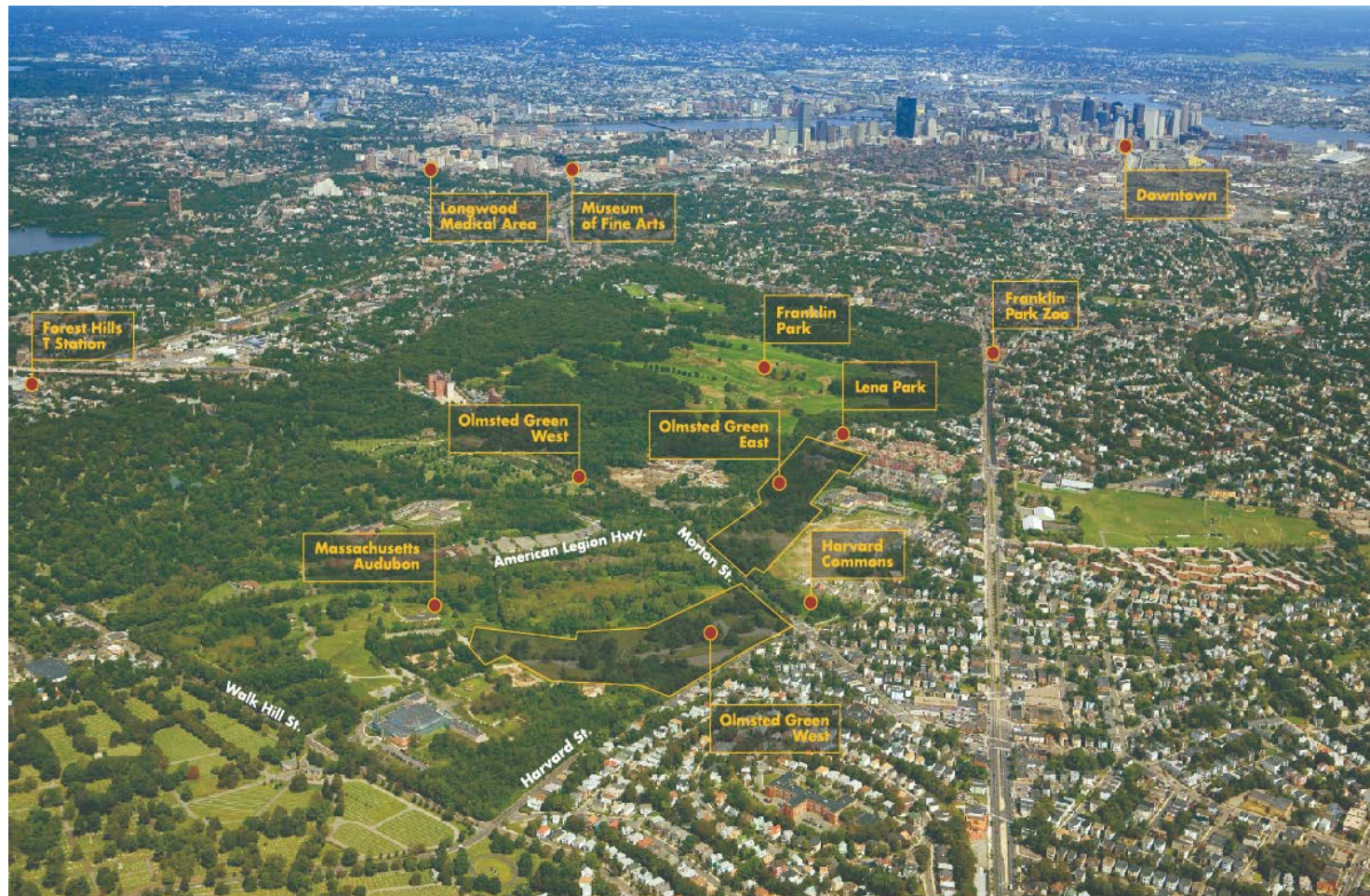


- ✓ 42-acre, \$200 million multi-phased, mixed-income development.
- ✓ 229/500 residences constructed.
- ✓ Centrally located, surrounded by green space; offers easy access to Boston neighborhoods and Forrest Hills Orange Line station.

Source: <https://www.olmstedgreen.com/>

Source: <https://www.cityofnewburyport.com/sites/newburyportma/files/file/file/statement-of-consistency-with-smart-growth-goals.pdf>

# Olmstead Green - Boston



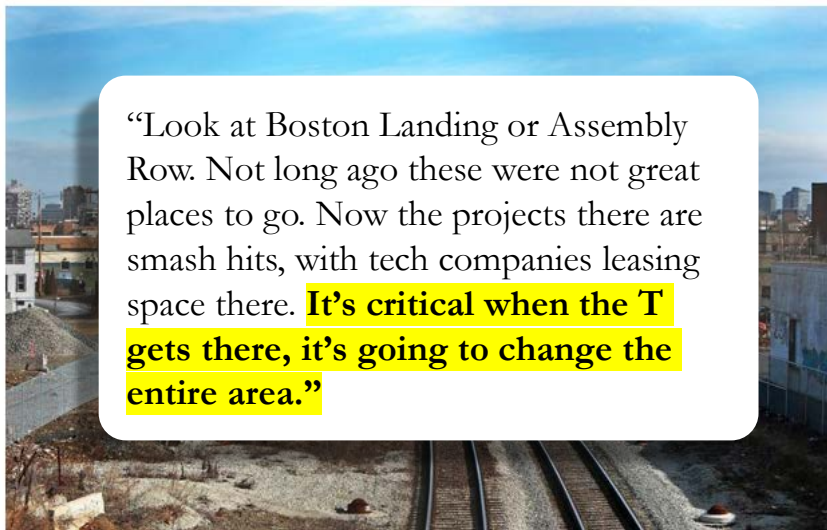
Source: [OlmstedGreen.com](http://OlmstedGreen.com)



# Somerville Housing & Zoning Today

## The Boston Globe

### Will Somerville's Union Square become the next Kendall? Developers think so



“Look at Boston Landing or Assembly Row. Not long ago these were not great places to go. Now the projects there are smash hits, with tech companies leasing space there. **It's critical when the T gets there, it's going to change the entire area.**”

The coming extension of the Green Line to Union Square in Somerville is a big factor in development plans for the area.

By [Tim Logan](#) GLOBE STAFF [MARCH 06, 2018](#)

## The Boston Globe

### These tenants pay \$3,000 rents, but are still being displaced

“The fact that tenants who can afford higher rents are being pushed out reinforces a harsh reality of Greater Boston's housing market: **It's becoming unaffordable for a larger swath of people. A housing shortage has driven up demand, particularly for condos close to the city and public transit.** High-end complexes under construction, like the Alloy in Somerville's Assembly Row, sell out before they are finished.”

“Every renter — not just low-income, but moderate-to-high-income as well — is vulnerable to tactics like condo conversions,” said Millbrook tenant Greg Santos, who moved to the Millbrook Lofts complex last August.

By [Kathleen Conti](#) GLOBE STAFF [MARCH 30, 2018](#)

# Somerville Housing & Zoning Today

## The Boston Globe

### Somerville's condo conversion law faces legal challenge



Two developers have sued the city, alleging the rules conflict with state regulations.  
By [Katheleen Conti](#) GLOBE STAFF MAY 28, 2017

“Two developers have sued the city, alleging the condo conversion rules conflict with state regulations that were adopted when rent control was repealed in Massachusetts in 1994.

**Somerville is the only community in the area that regulates the conversion of two- and three-family homes.”**

“There will be no getting around the loss of protection for tenants of two- and three-family homes if Somerville’s ordinance fails its legal challenge, **“From my perspective, the heart of the law is the part that allows us to regulate two- and three-families, and that’s where most of the conversions are taking place and the worst of the evictions,”** said Alderman Mark Niedergang. **“That’s what’s happening here; it’s gentrification.”**

# Somerville Housing & Zoning Today

**WICKED LOCAL** SOMERVILLE  
Includes content from the Somerville Journal

## New zoning in Somerville revives old debate on density



By Katie Gradowski / [somerville@wickedlocal.com](mailto:somerville@wickedlocal.com)

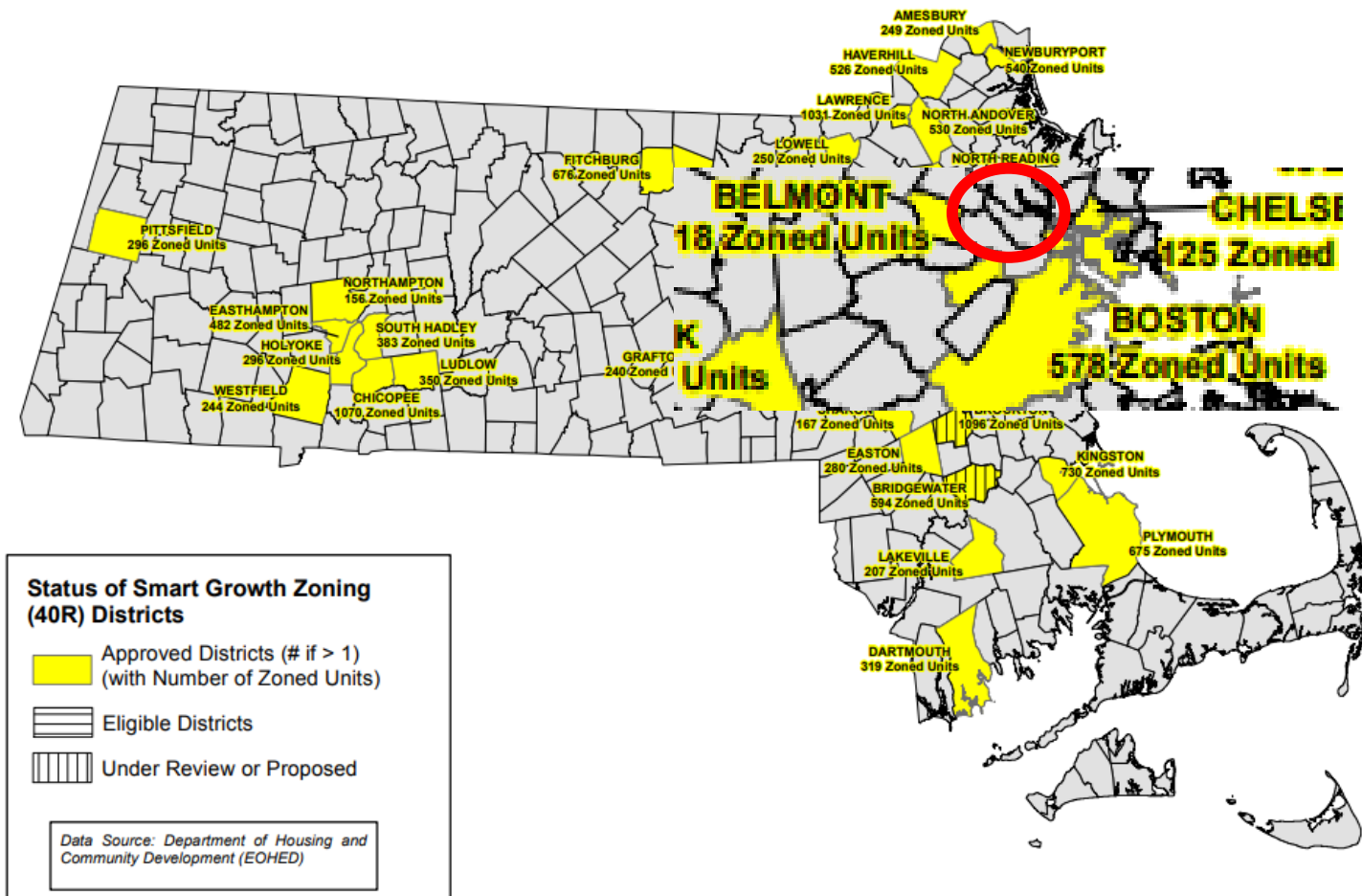
Posted Mar 8, 2018 at 3:15 PM

“What’s the upside of downzoning every neighborhood in the city? Limiting the total number of units in the neighborhoods will mean more parking for people who currently live there. **It also provides a satisfying way for residents to stick it to small-scale developers — many residents are tired of seeing luxury developers chopping up a single-family home to make a tidy profit.**”

“The downside? New housing must be built elsewhere, and it likely won’t be in the existing neighborhoods. **The cap will continue to push the development of all new housing — including affordable housing — to the transformational districts, including Assembly, Union, and Inner Belt.**”



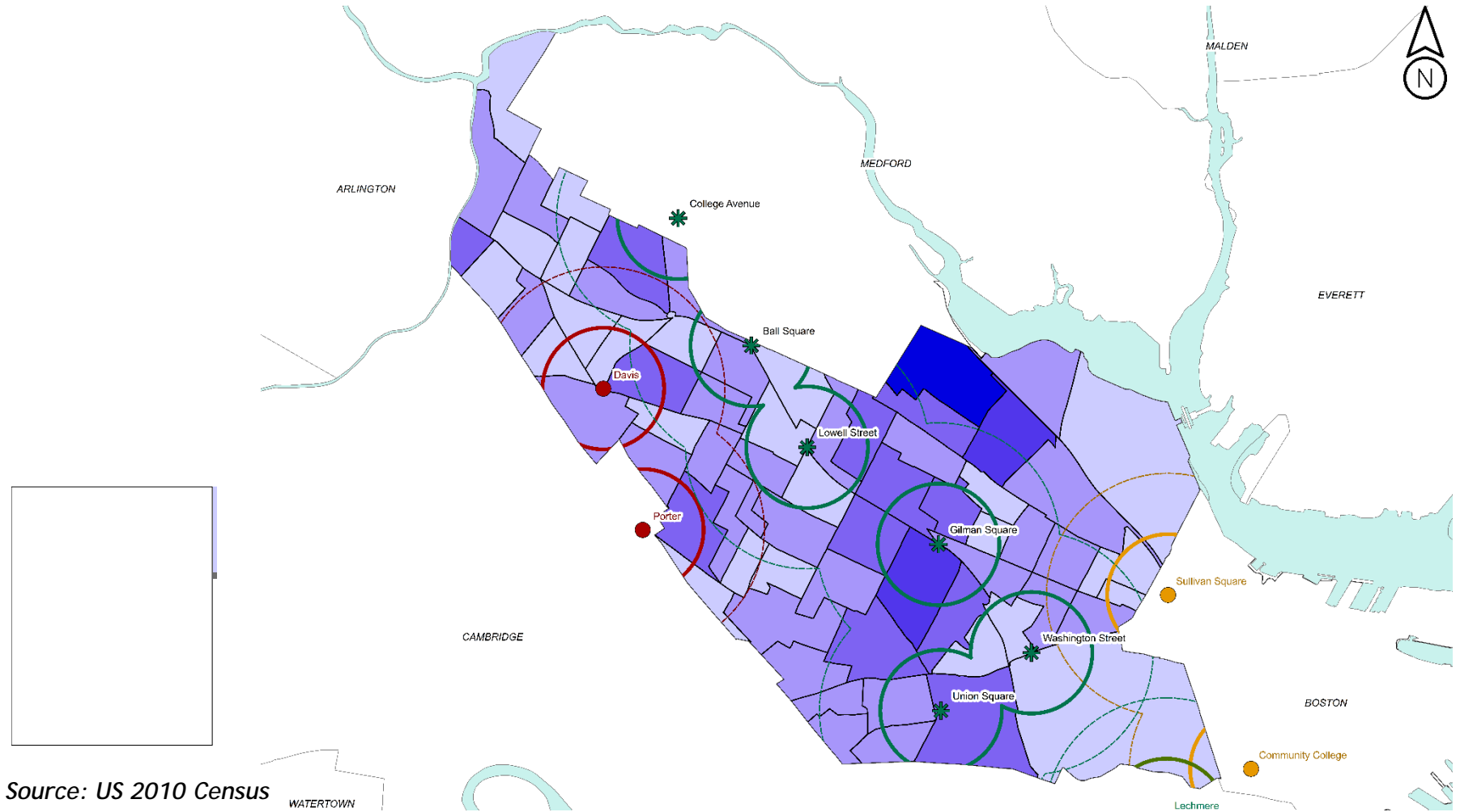
# Smart Growth Zoning Districts Today



Source: <https://www.mass.gov/service-details/chapter-40r>

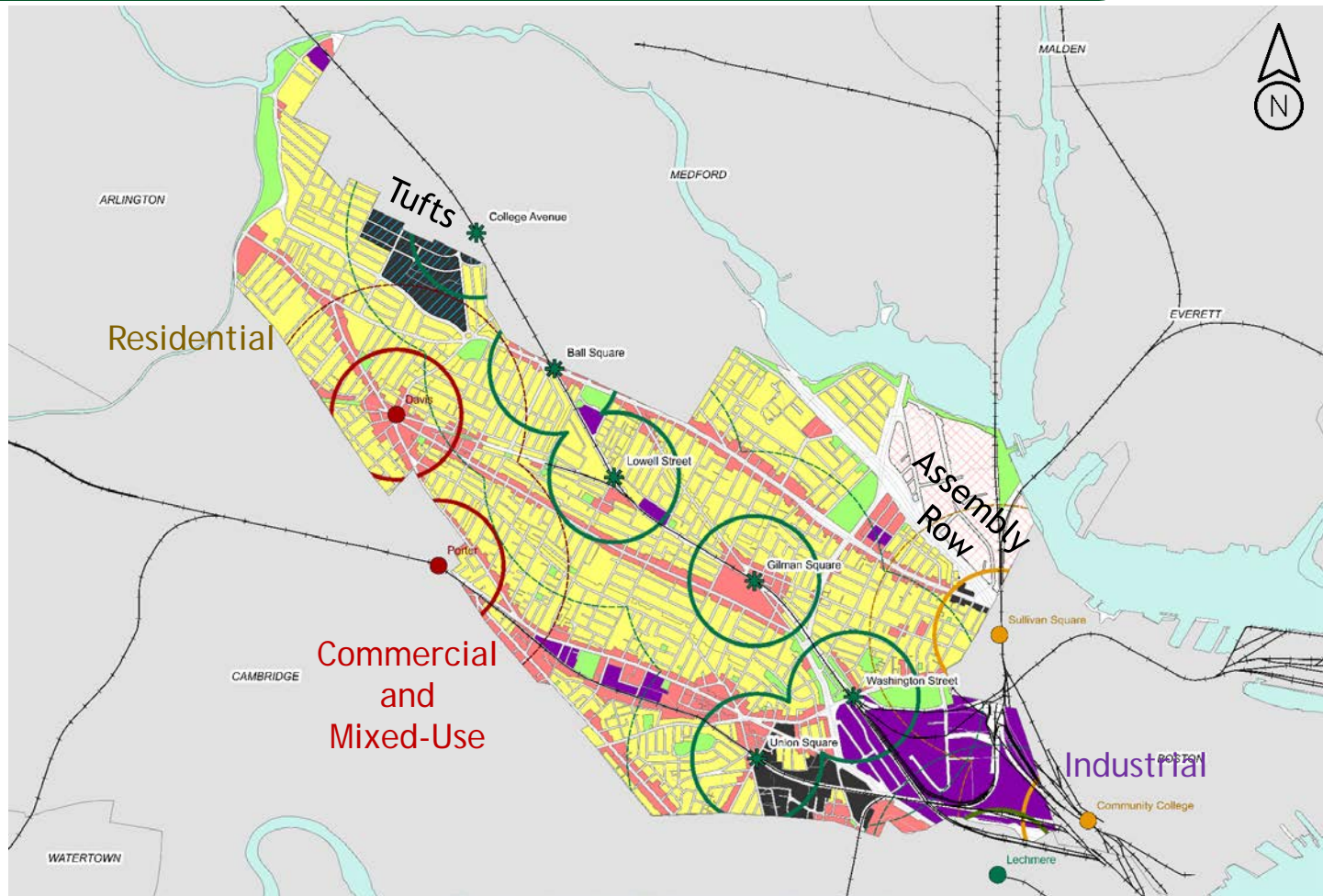


# Somerville Population by Block Group

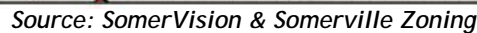


Source: US 2010 Census

# City of Somerville - Current Zoning

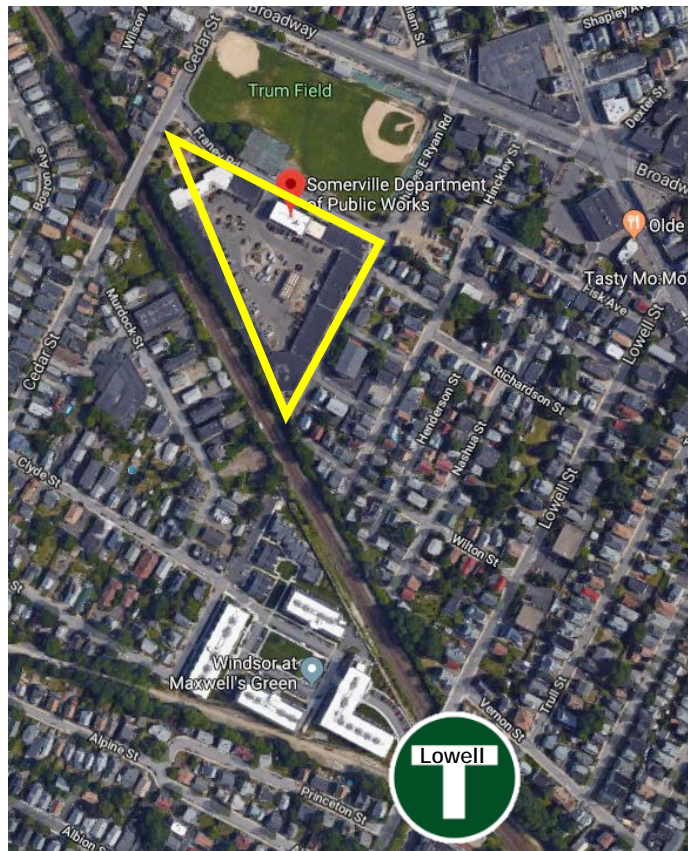


Source: City of Somerville <https://data.somervillema.gov/GIS-data/Zoning/crrw-ex2a>





# Potential Somerville 40R Initiative



## HOUSING

TOTAL HOUSING UNITS  
**2,045** ↑

OWNER OCCUPIED UNITS  
**814** (40%)

RENTER OCCUPIED UNITS  
**1,231** (60%)

HOUSING DENSITY (PER ACRE)  
LOWELL  
**16.4** /acre

OCCUPANCY (PEOPLE / UNIT)  
LOWELL  
**2.06**

BEDROOMS / HOUSING UNIT  
LOWELL  
**1.90** /unit

VACANCY RATE  
LOWELL  
**1.6** %

AFFORDABLE HOUSING  
PERMANENT  
**143** units ↑

↑10%



SOMERVILLE  
**12.73**

SOMERVILLE  
**2.25**

SOMERVILLE  
**1.79**

SOMERVILLE  
**4.8** %

## TRANSPORTATION

ON-STREET PARKING PERMITS  
**1,930**

MA AUTOMOBILE REGISTRATIONS (ESTIMATED)  
**2,050**

VEHICLES PER HOUSEHOLD  
**0.96**

VEHICLE MILES TRAVELED\* (9,000 ANNUAL MILES/HOUSEHOLD ESTIMATE)  
**18.40** million/year ↓

FUEL USE (22.3 M.P.G. ESTIMATE)  
**825** thousand gal./year ↓

CO<sub>2</sub> EMISSIONS (19.60 POUNDS PER GALLON)  
**8,090** tons/year ↓

FUEL COST (\$3.699/GALLON ESTIMATE)  
**\$3.05** million/year ↓

TRANSPORTATION COSTS\*  
**\$6,252** /year ↓

TRANSPORTATION COSTS\*  
**10%** of household income ↓

↓10%



Source: <https://www.somervillebydesign.com/planning/station-areas/lowell-street-station/>

# Conclusion

Q. What effects will the GLX have on *air quality* and *daily commute time* in the City of Somerville?

- What policies and investments can the City adopt to minimize and/or maximize these effects moving forward?

A. The GLX will have *positive effects* on both air quality and daily commute time in the City of Somerville.

- ↓ Emissions + ↓ Daily Commute Time = ↑ Quality of Life
- In conjunction with SomerVision and the Zoning Overhaul, the City of Somerville should utilize Chapter 40R to create affordable, transit-orient housing that will ultimately lead to further improved air quality, commute time, and quality of life for Somerville residents.

# *Question & Answer*

