



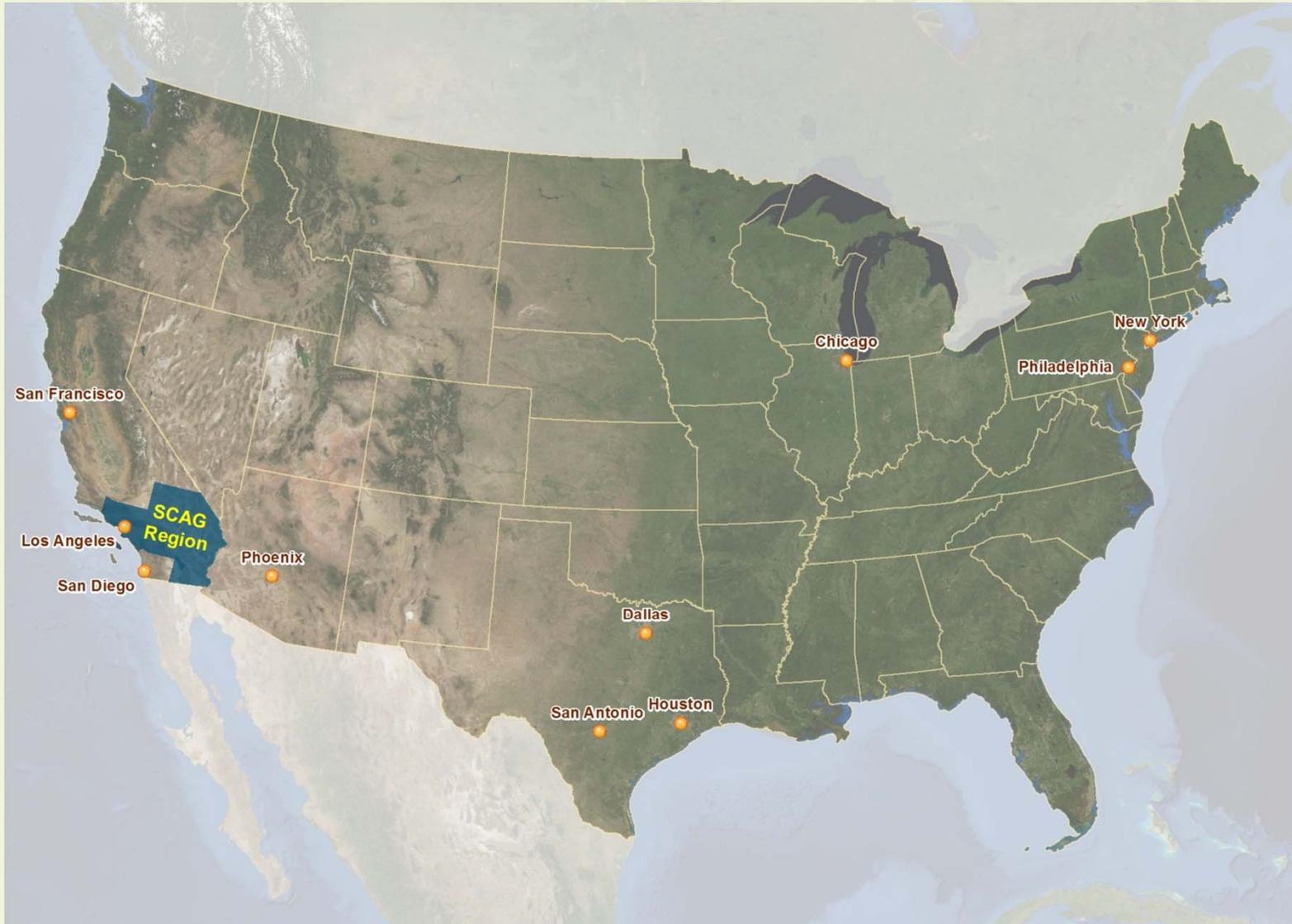
Integration of a Parcel-Based Sketch Planning Model with GIS to Measure GHG Emissions

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Southern California Association of Governments

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Southern California Association of Governments (SCAG)



SCAG Quick Facts



Nation's largest Metropolitan Planning Organization (MPO)

6 counties and near 200 cities

18 million people within 38,000+ square miles

GDP in 2012: \$890 Billion, 16th largest economy in the world

RTP/SCS and SB 375

- Regional Transportation Plan (RTP)
- SB 375 - Nation's first law to control greenhouse gas (GHG)
- Sustainable Communities Strategy (SCS)
- Reductions in GHG emissions from automobiles and light duty trucks

Research Objective

- Parcel-Based Transportation Model as a Supplemental Analysis Tool
- Analysis of Impact of Land Use Scenario on Travel Behavior and GHG Emissions.
- Estimates of Greenhouse Gas (GHG) Emission using Vehicle Miles of Travel (VMT)

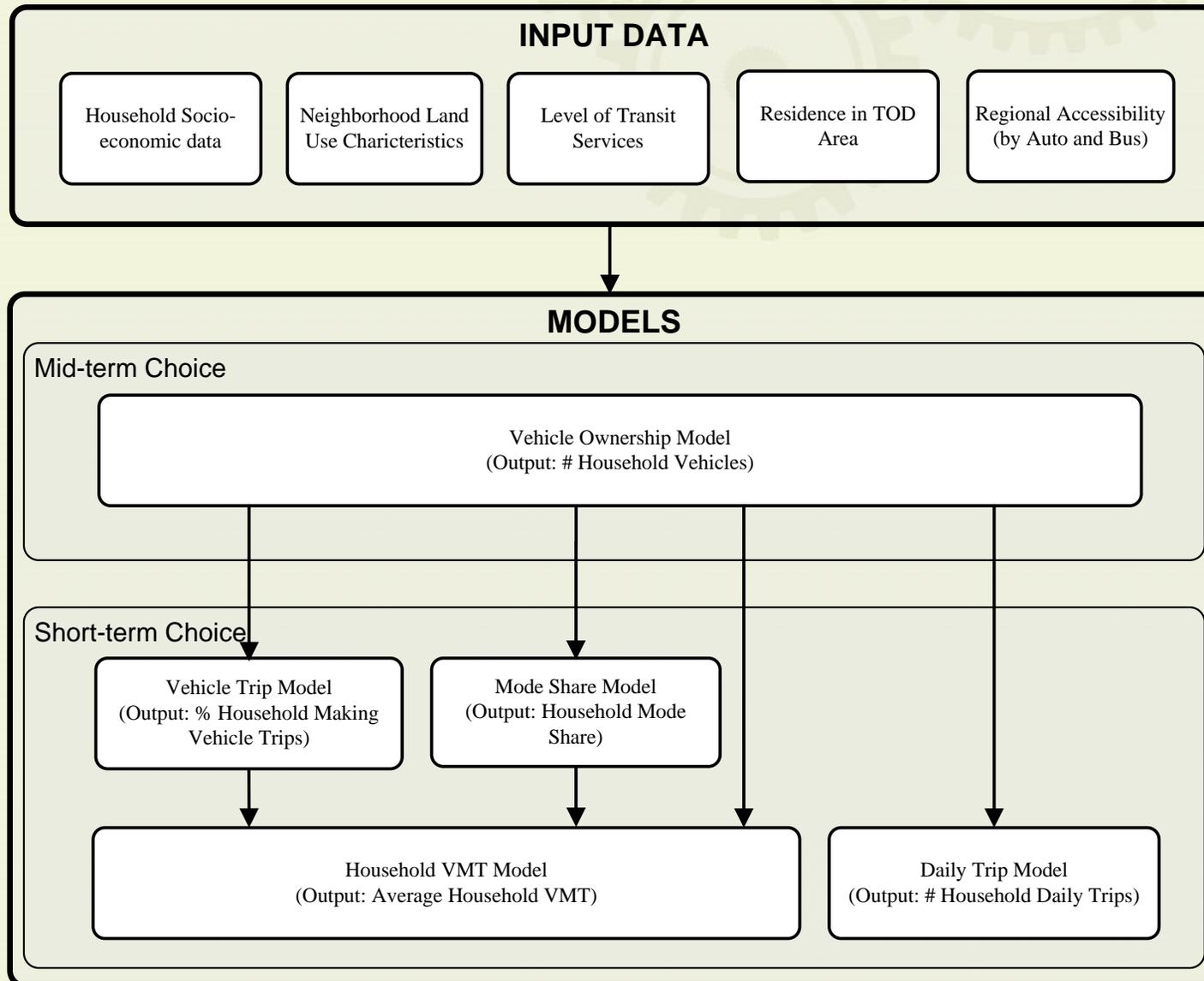
Land Use and Regional Transportation Plan

- Transit-Oriented Development (TOD)
→ Approach to reduce GHG emissions.
- TOD land use scenario for SCAG's 2012 RTP/SCS.
 - More housing supply in TOD areas → Reduction in Regional GHG emissions
 - High Residential Density, Better Accessibility, Mixed Use, Proximity to Major Transit Services

SCAG Parcel-Based Sketch Model

- Alternative modeling approach to TAZ-Based SCAG Regional Travel Demand Model
- Supplemental Analysis Tool to estimate of the impact of land use on vehicle use
- Estimated by using 2009 National Household Travel Survey (NHTS) data

Modeling Approach



Variable Description

- Household Travel Data
- Socioeconomic Characteristics
- Accessibility
- Job-household Ratio

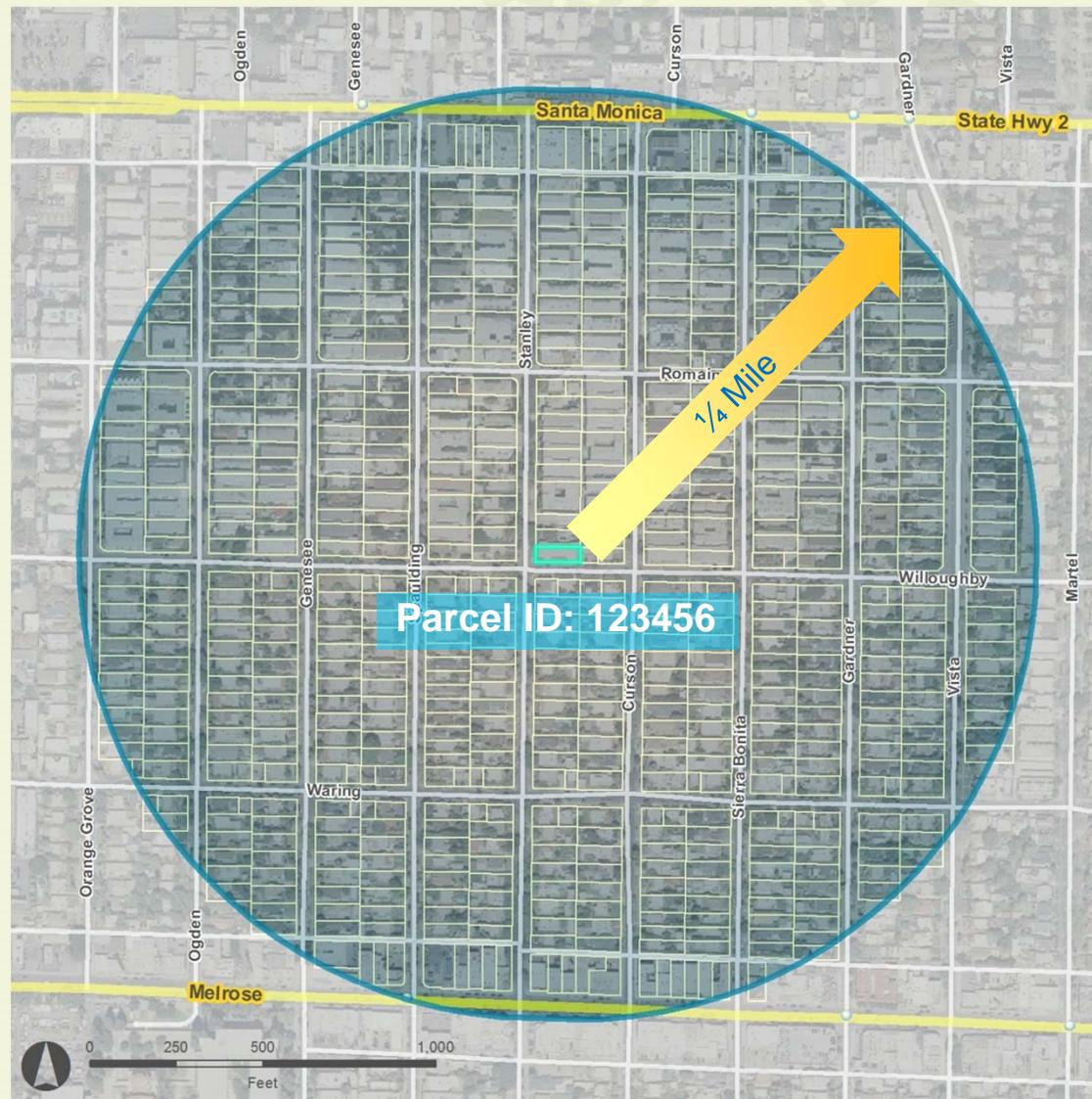
Neighborhood-Based Analysis

(1/4 mile buffer)

- Household Density & Employment Density
- Walkability
- Job Diversity
- Bus Stop Density
- Urban rail access

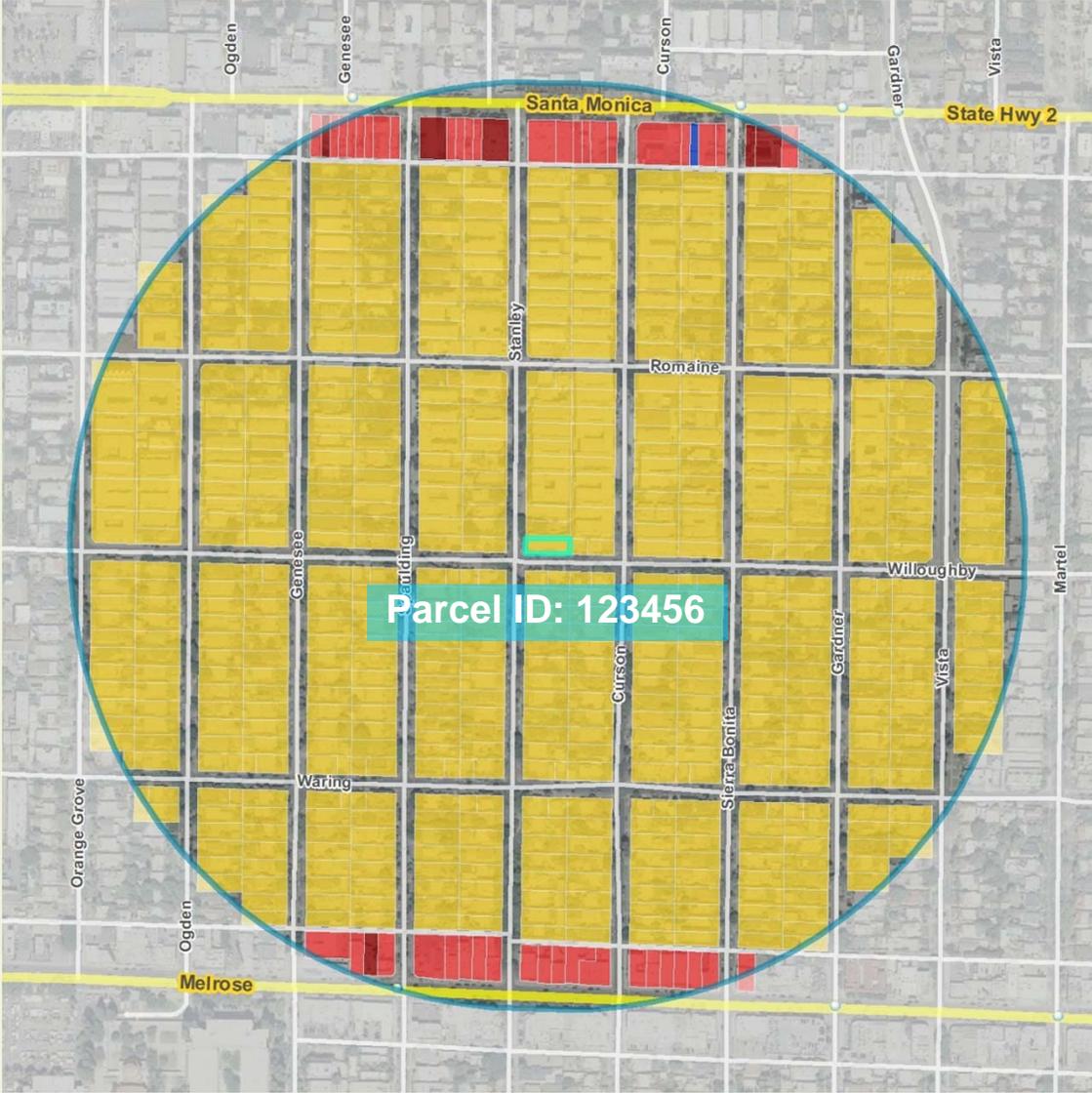
Neighborhood Household Density

(Select Parcels within $\frac{1}{4}$ Mile from Residential Parcels)



Neighborhood Household Density (cont.)

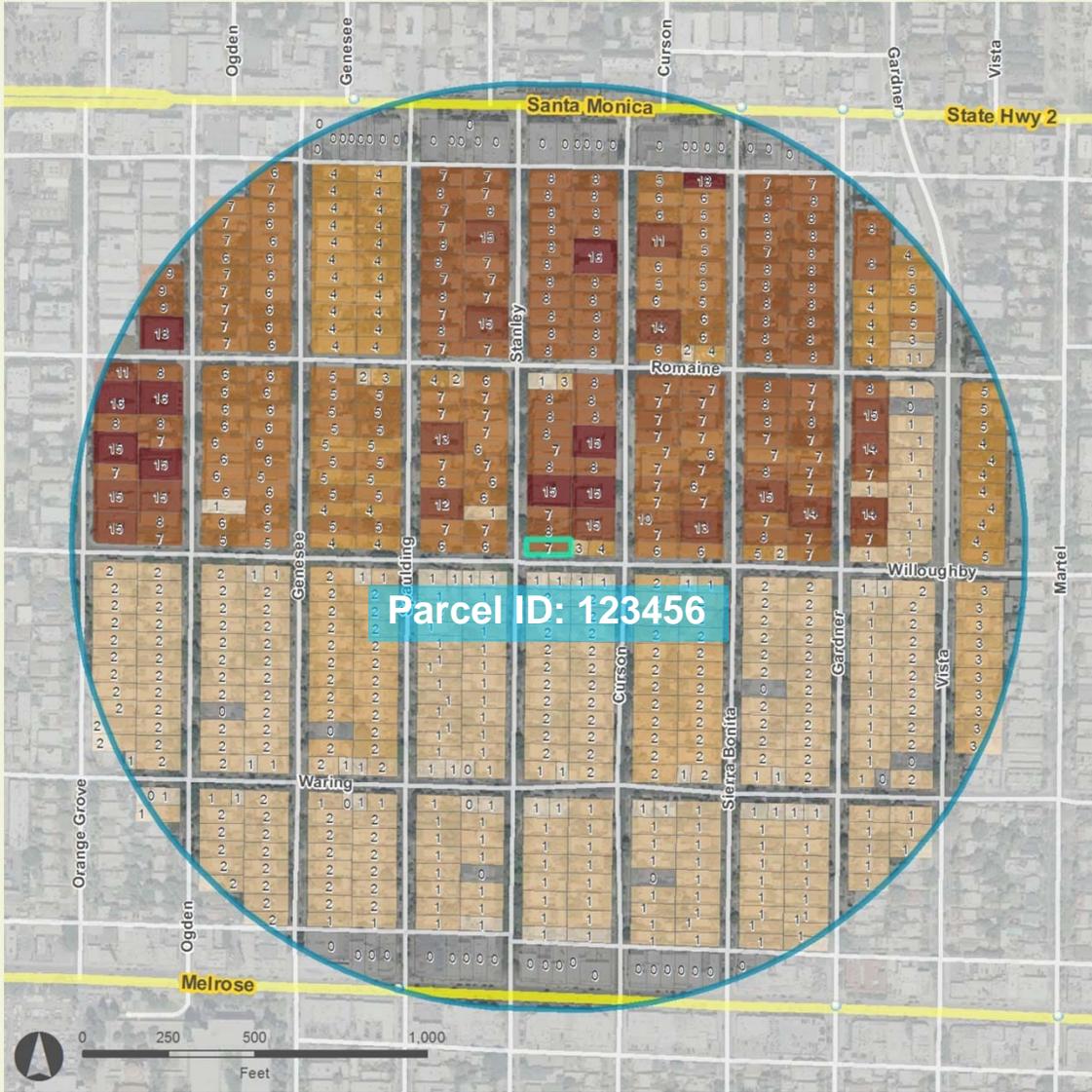
(Identify Land Uses within ¼ Mile Buffer)



- Land Use Categories**
- Residential
 - General Office
 - Commercial / Services
 - Industrial
 - Facilities

Neighborhood Household Density (cont.)

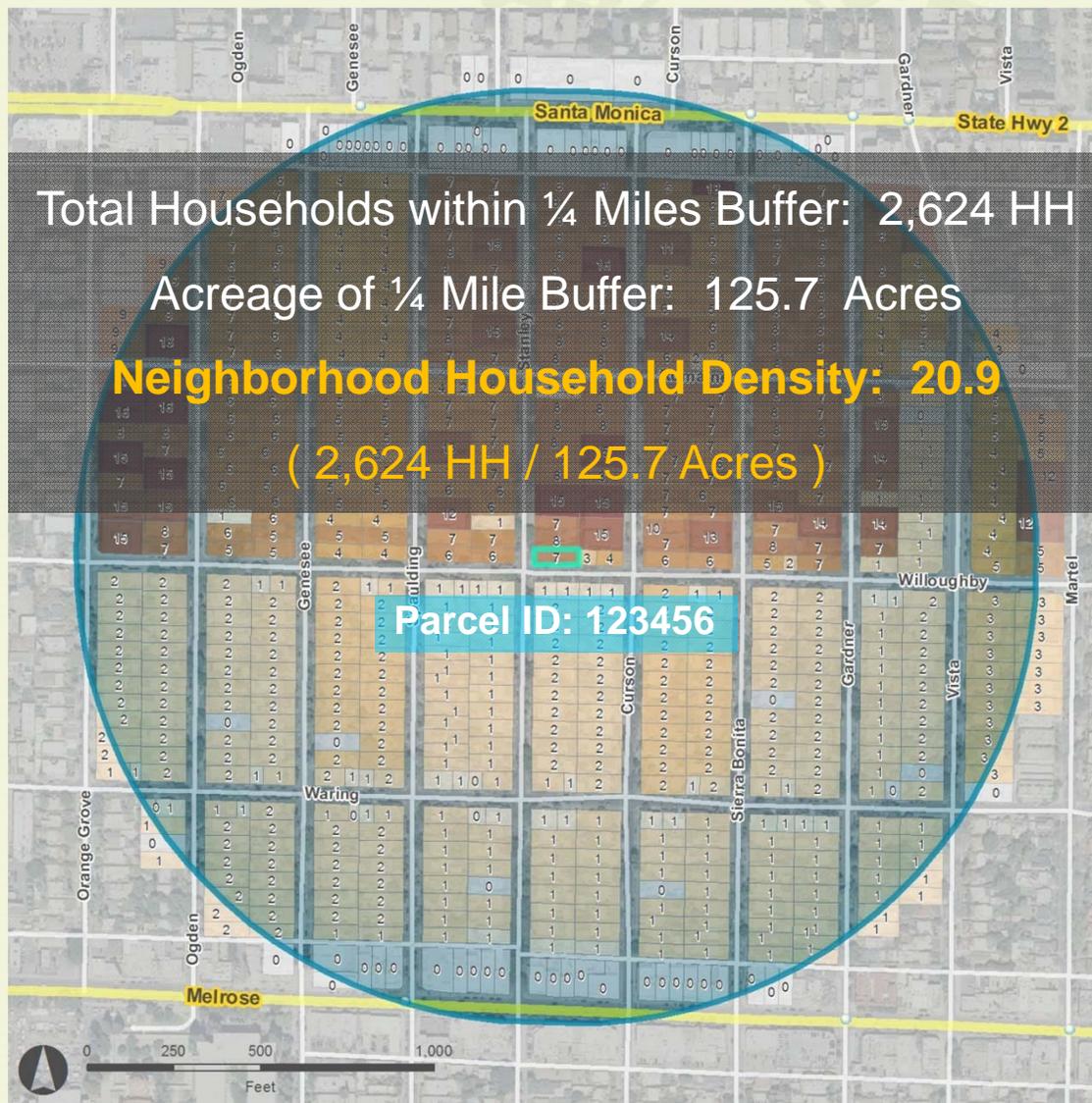
(Total Number of Households within ¼ Mile Buffer)



**Total Households
within ¼ Miles of
Parcel 123456 :
2,624 HH**

Neighborhood Household Density (cont.)

(Total Households Divided by Area)



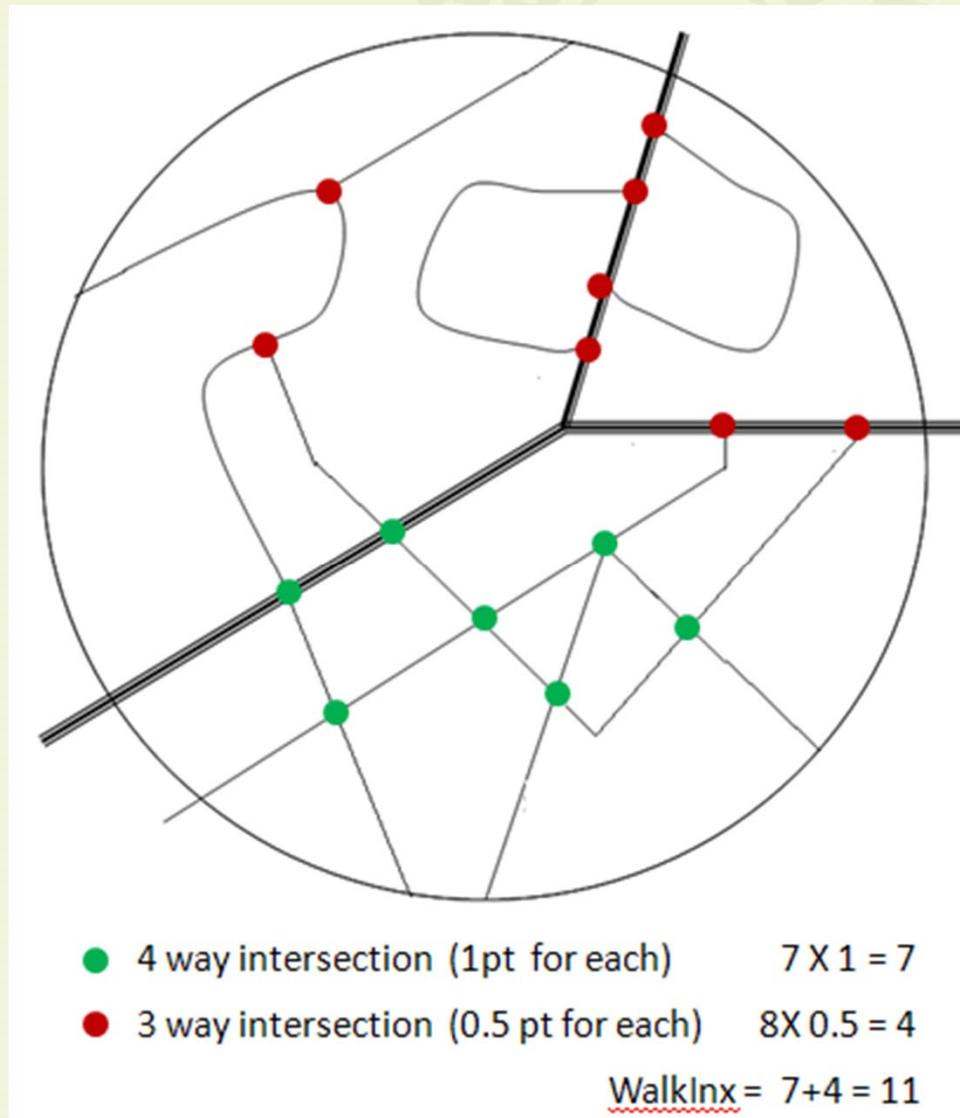
Neighborhood Household Density (cont.)

(Calculate the Household Density for the Entire Parcels)

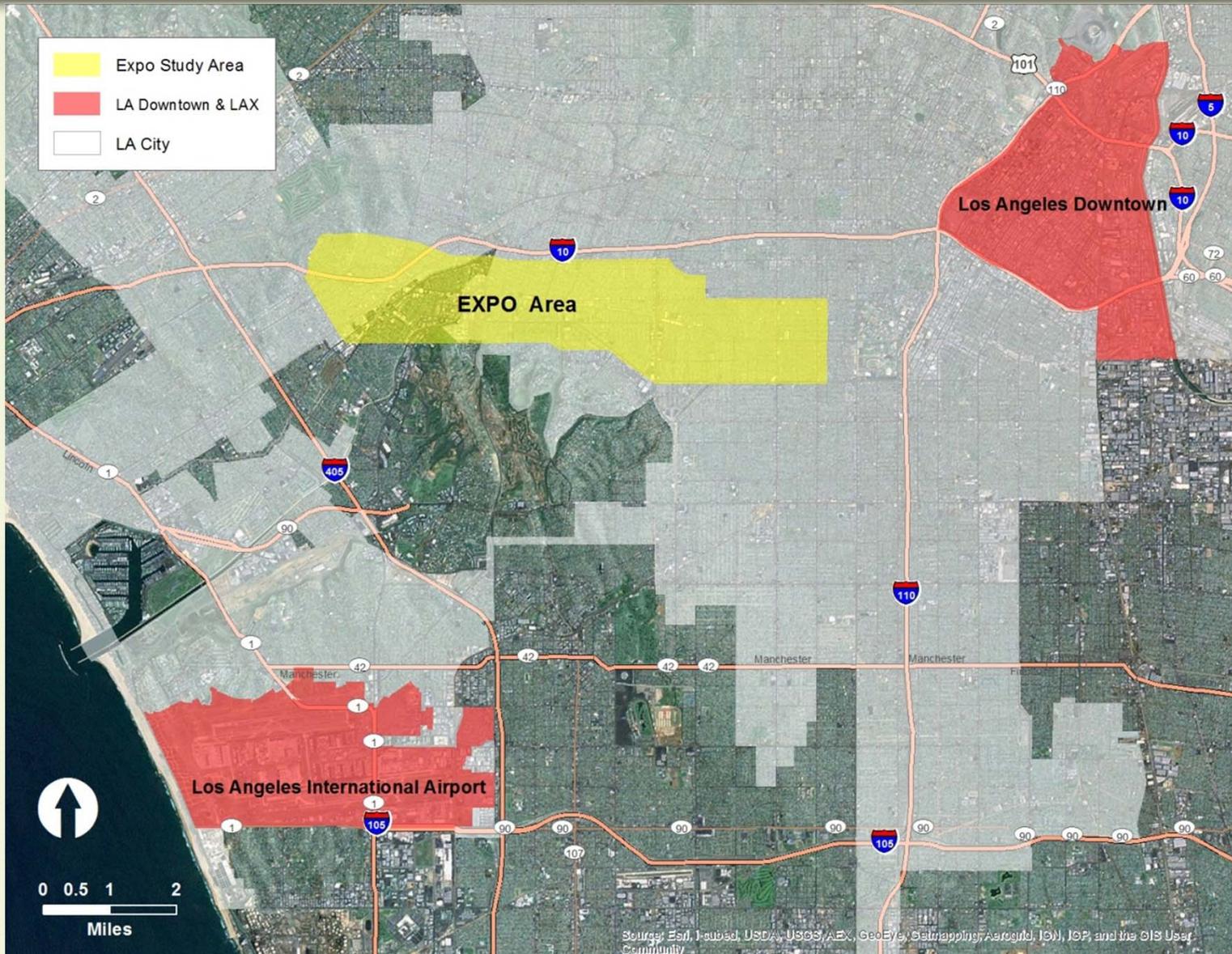


Walkability Index

(Street Connectivity within ¼ Mile Buffer)

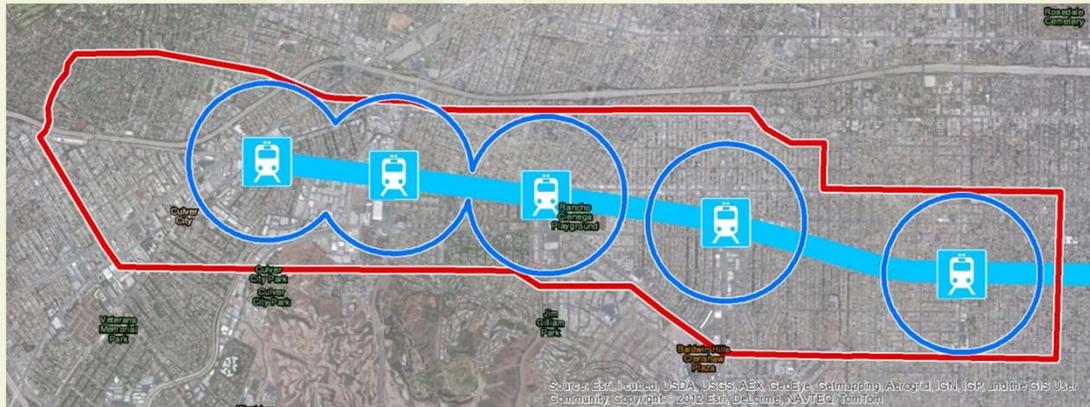


Study Area



Study Area

- Surrounding area of Exposition Line (LRT) Phase I (opened in 2012)
- ½ mile buffer and bounded by major streets

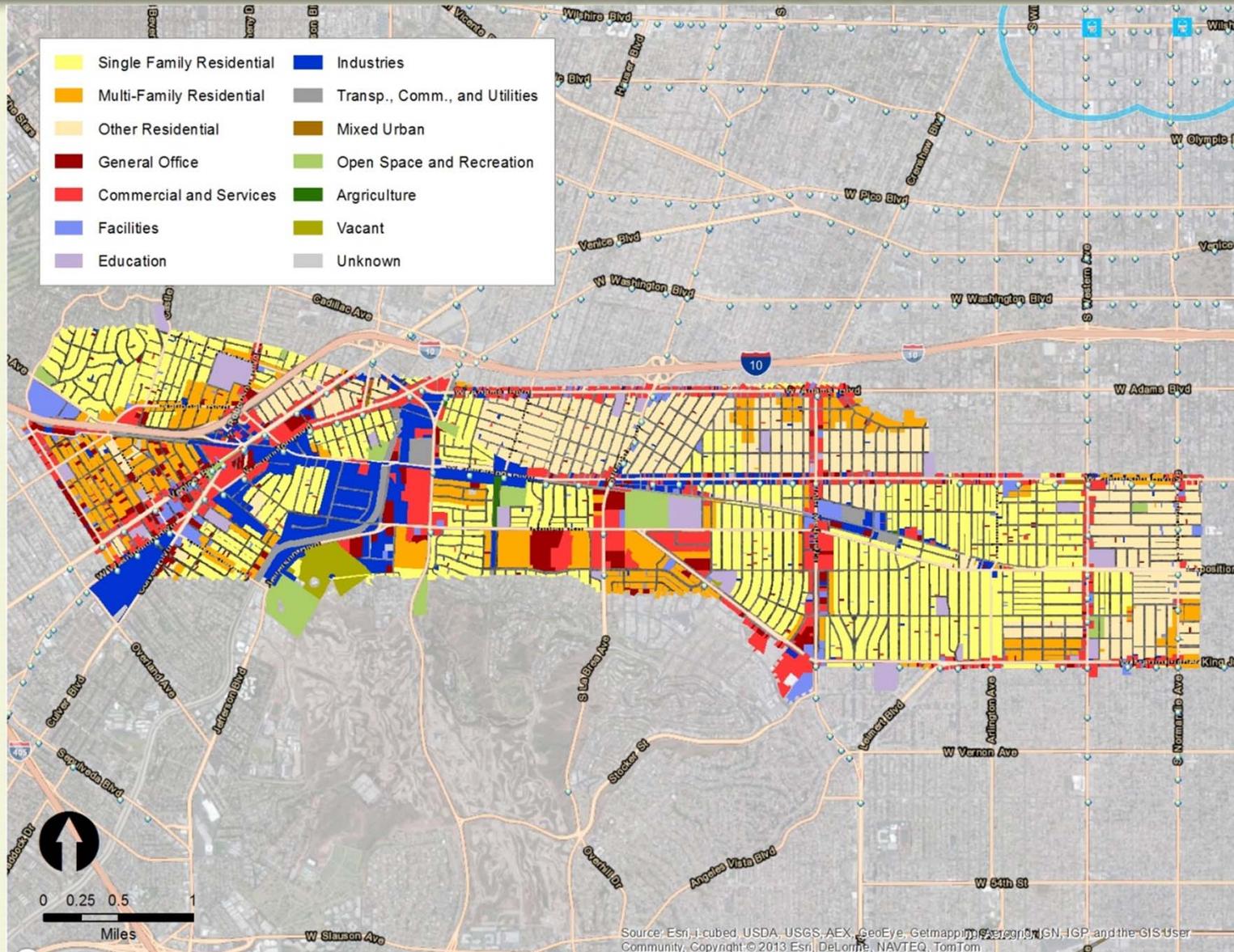


Analysis:

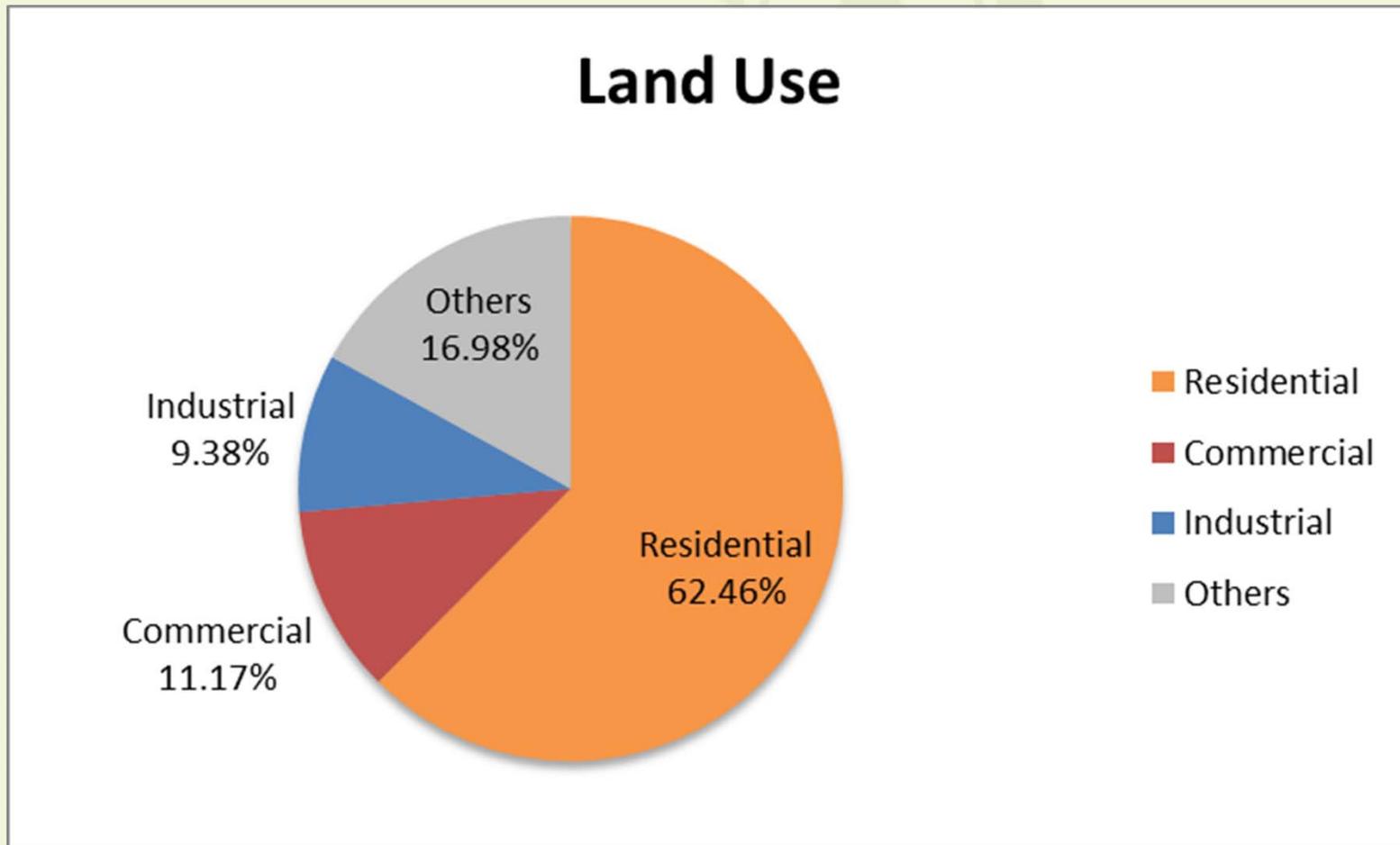
- 2008 vs. 2035 Plan (TOD)



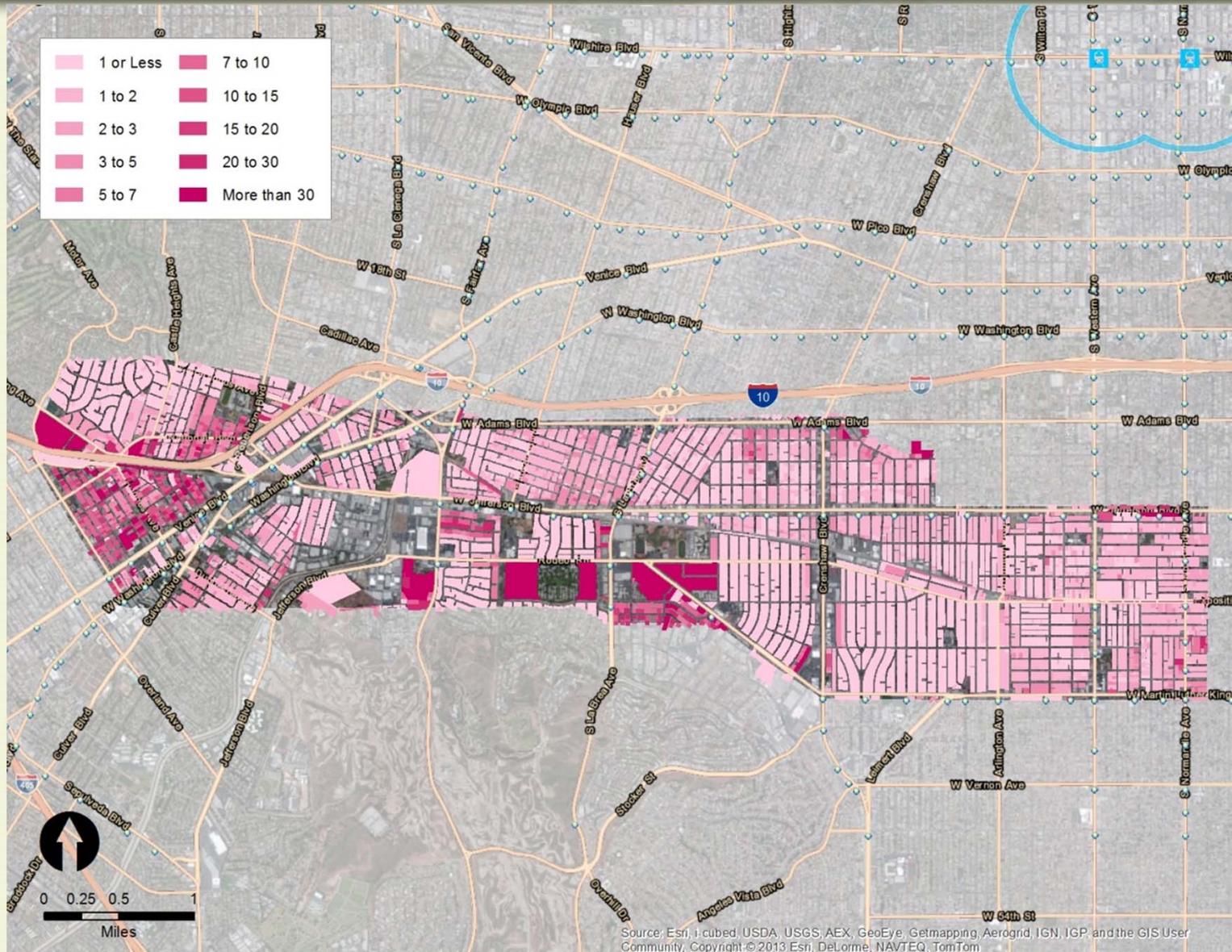
Existing Land Use (2008)



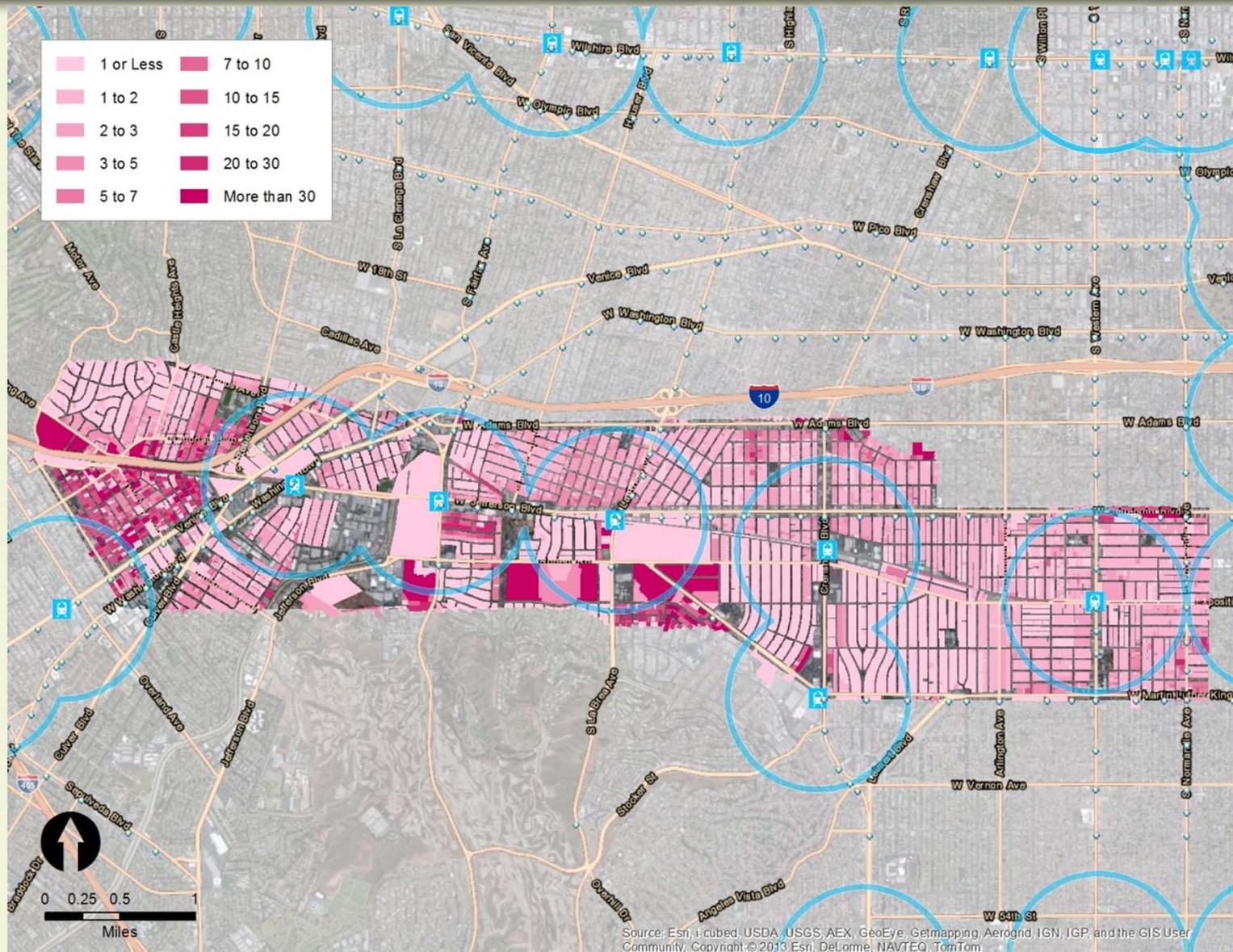
Existing Land Use (2008)



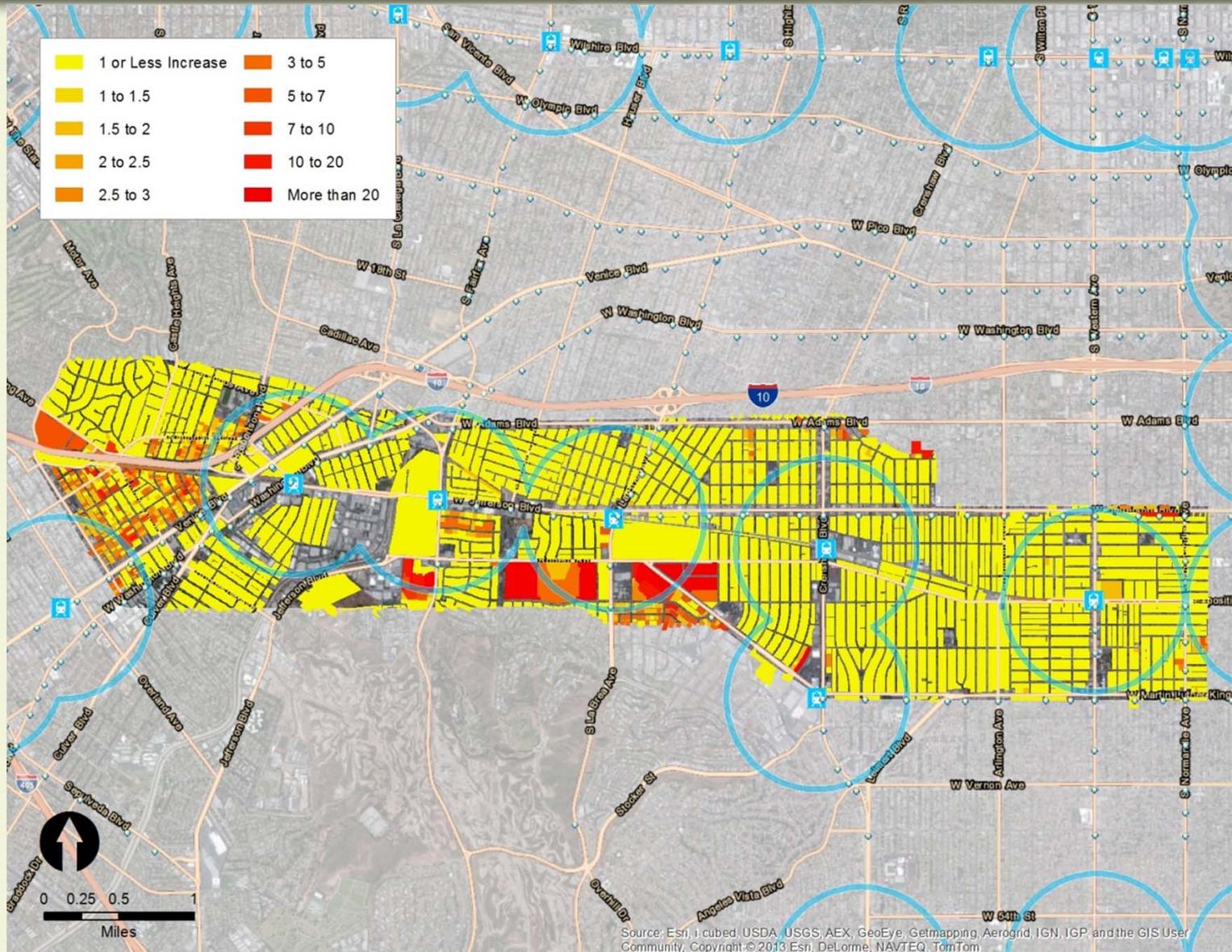
Number of Households (2008)



Number of Households (2035 Plan)



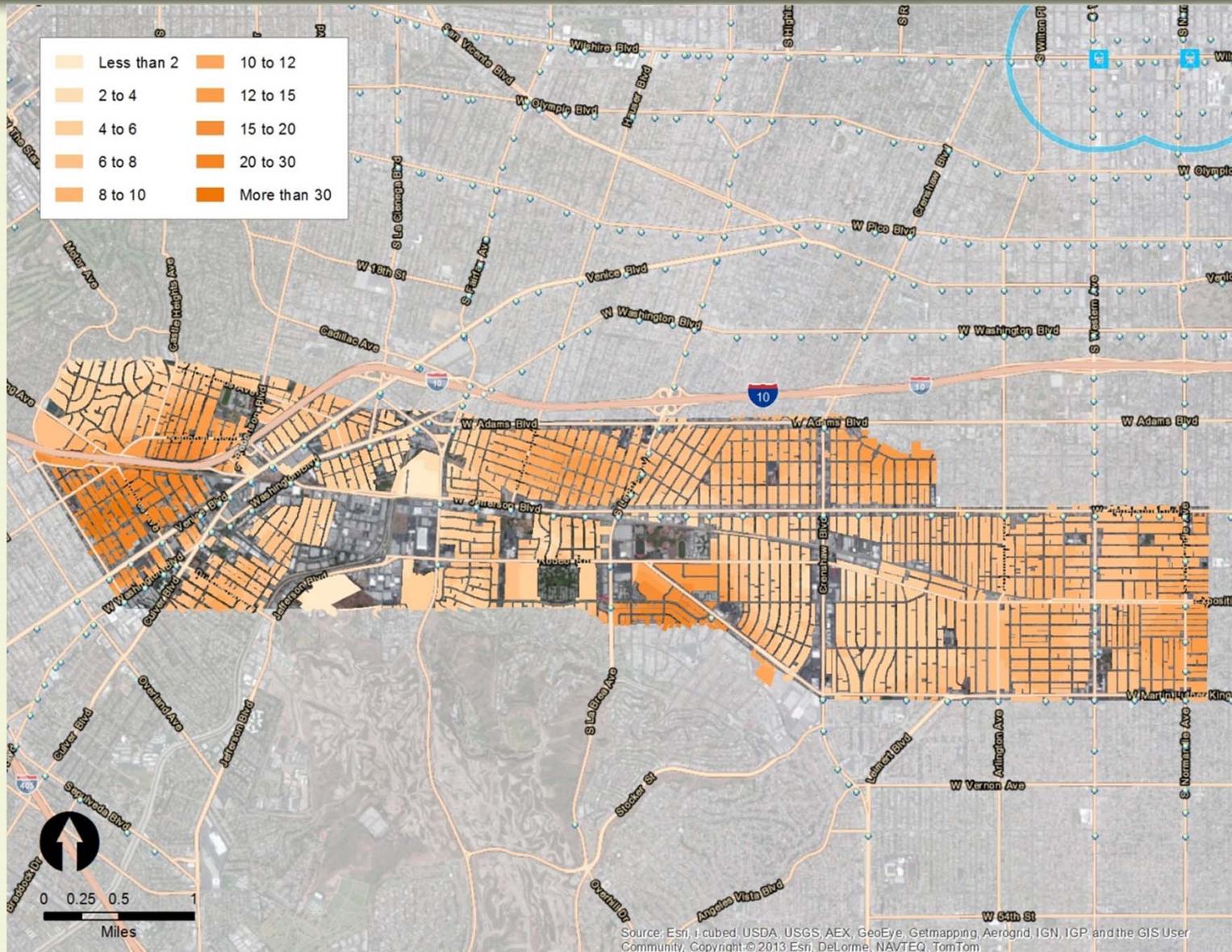
Number of Households (2008 to 2035)



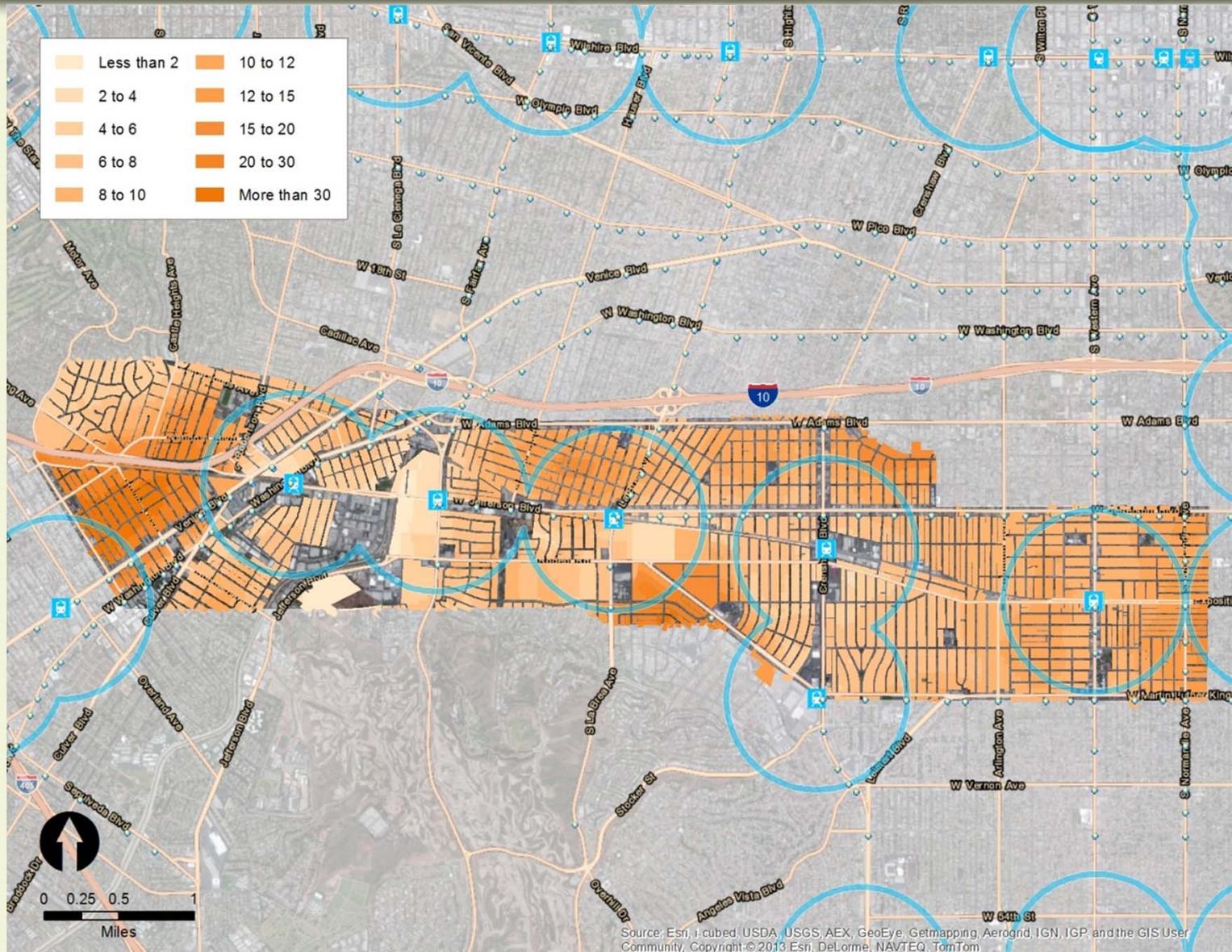
Land Use & Socioeconomic Characteristics (2008 vs. 2035 Plan)

Study Area	2008	2035 Plan	% Change
Residential Density	11.25	13.86	23%
Job Density	7.04	7.61	8%
Household Size	2.73	2.57	-6%
Household Income	\$35,500	\$35,600	0.3%
Total Household	38,119	46,479	22%

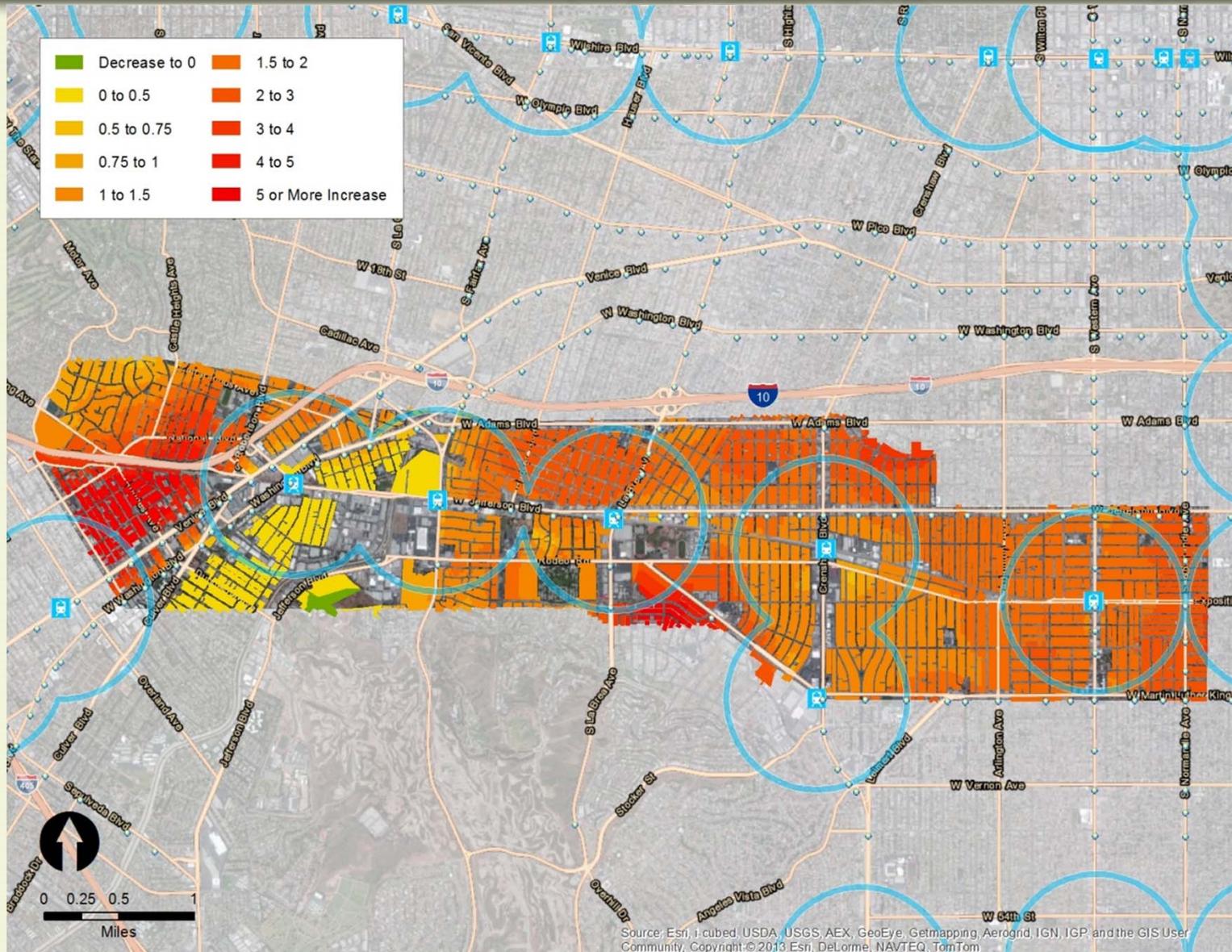
Neighborhood Household Density (2008)



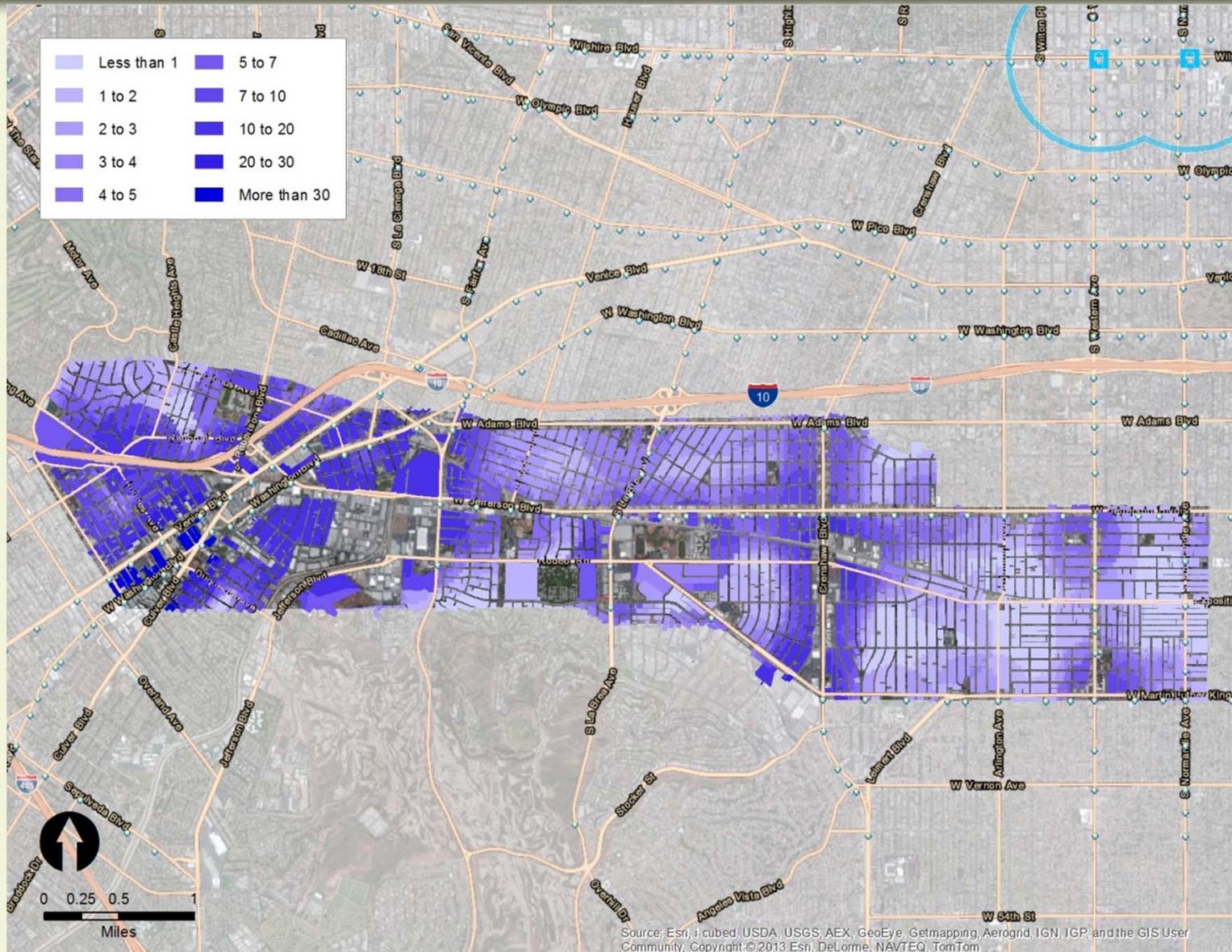
Neighborhood Household Density (2035 Plan)



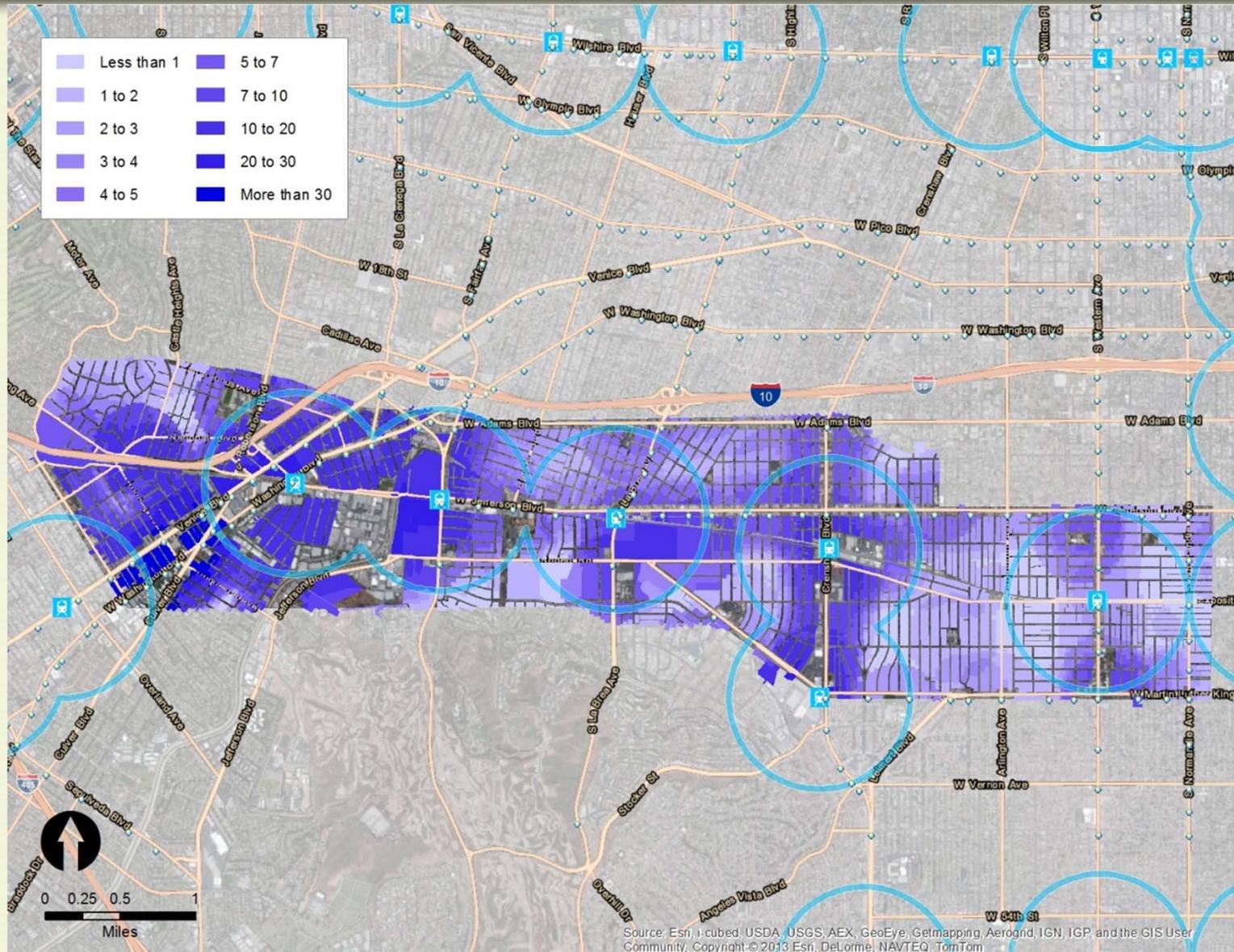
Neighborhood Household Density (2008 to 2035 Plan)



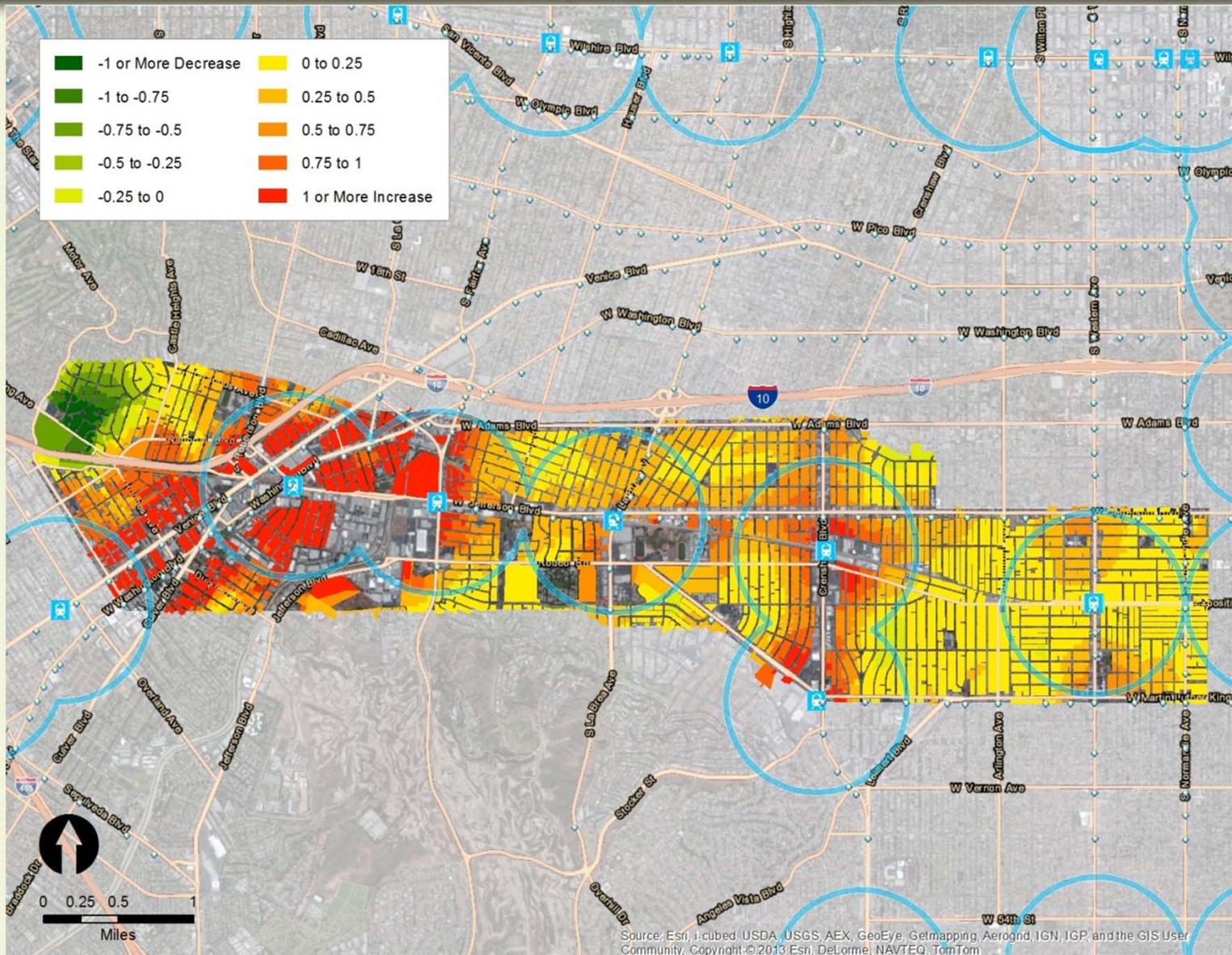
Job Density (2008)



Job Density (2035 Plan)



Job Density (2008 to 2035)

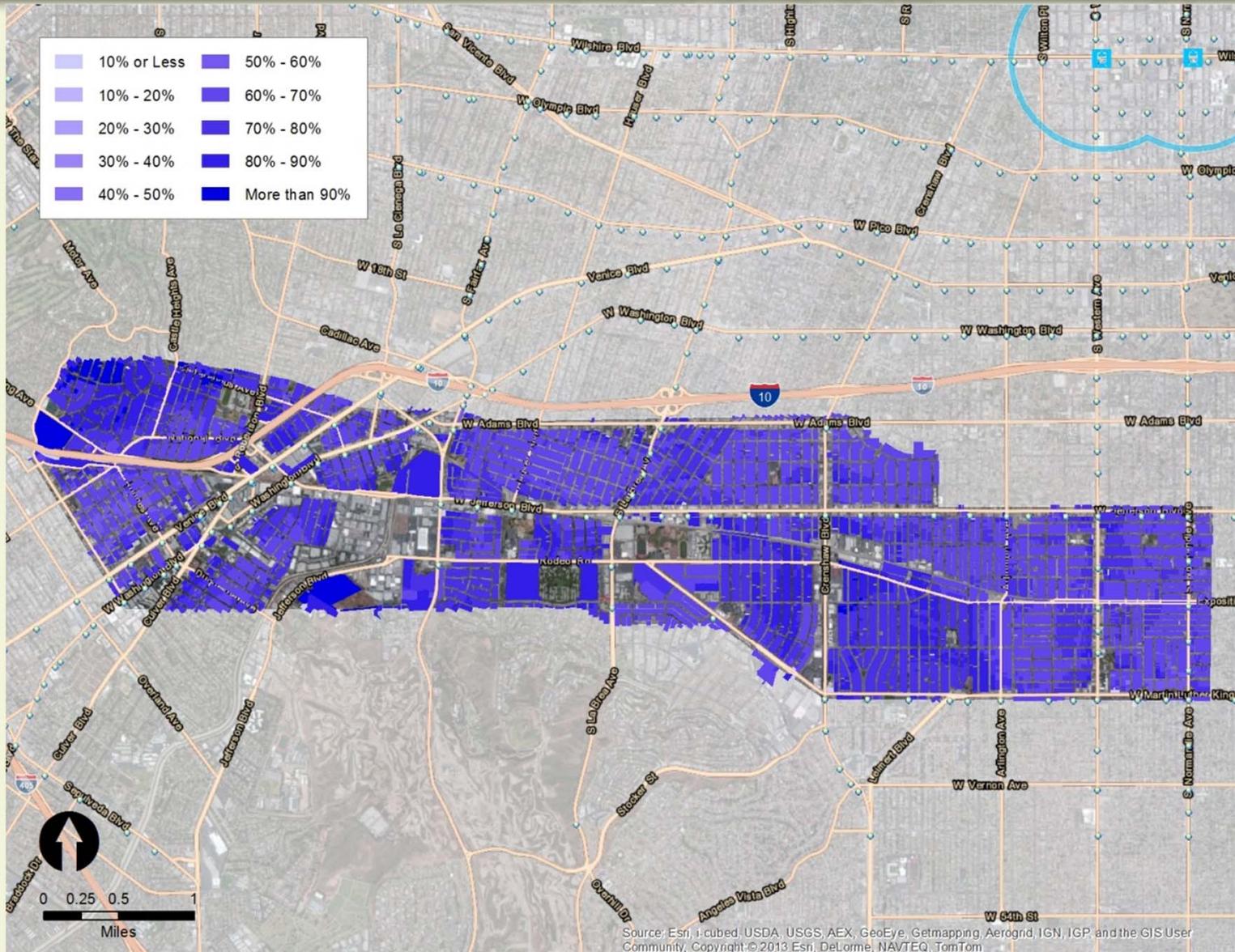


Mode Share Change

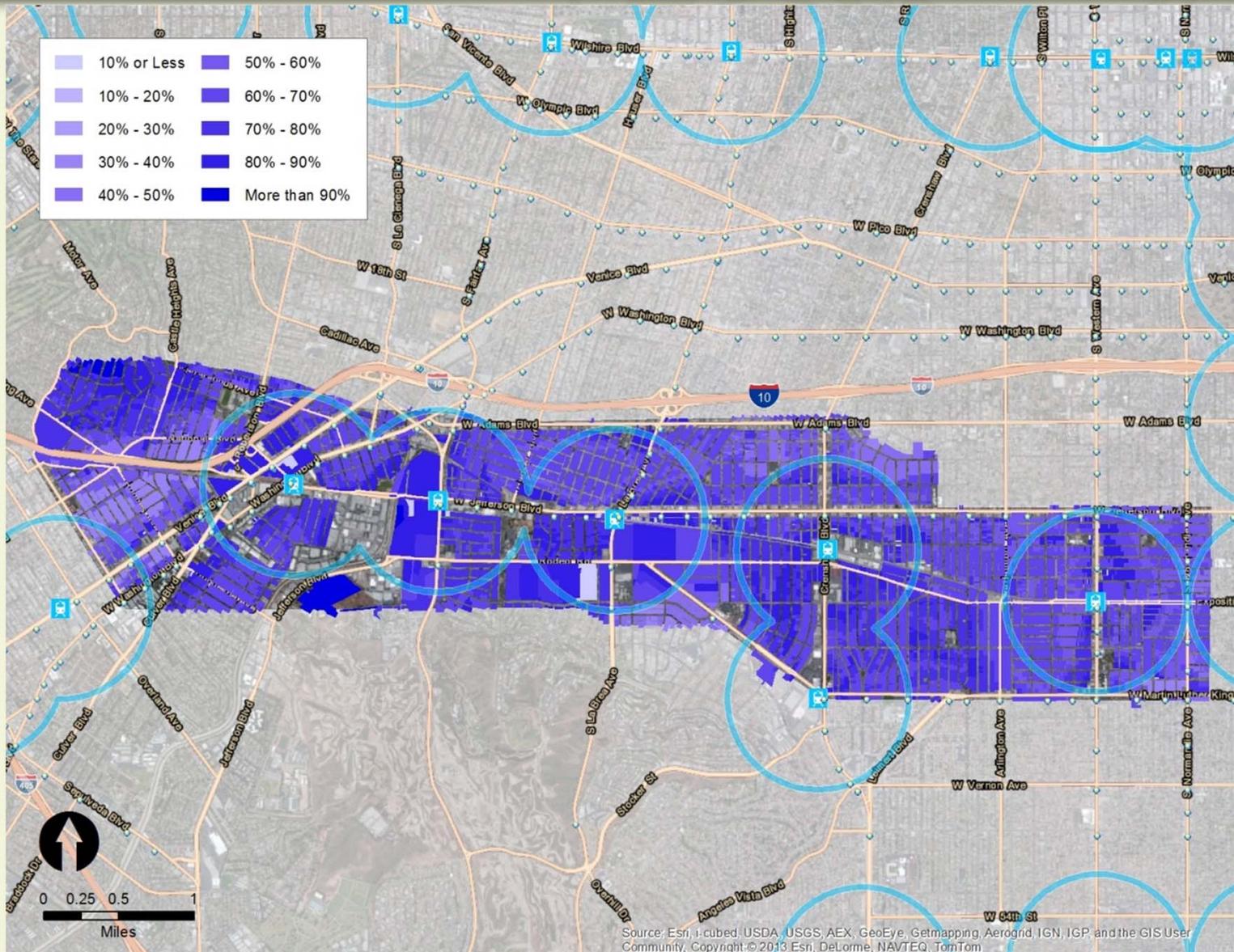
(2008 vs. 2035 Plan)

Mode Share	2008	2035 Plan	Diff
Auto (Driver)	51.4 %	39.4 %	-12 %
Auto (Passenger)	18.9 %	23.2 %	4.3 %
Transit	3.9 %	11.8 %	7.9 %
Non-Motorized	23.6 %	23.9 %	0.3 %
Other	2.2 %	1.6 %	-0.6 %

Mode Share – Auto (2008)

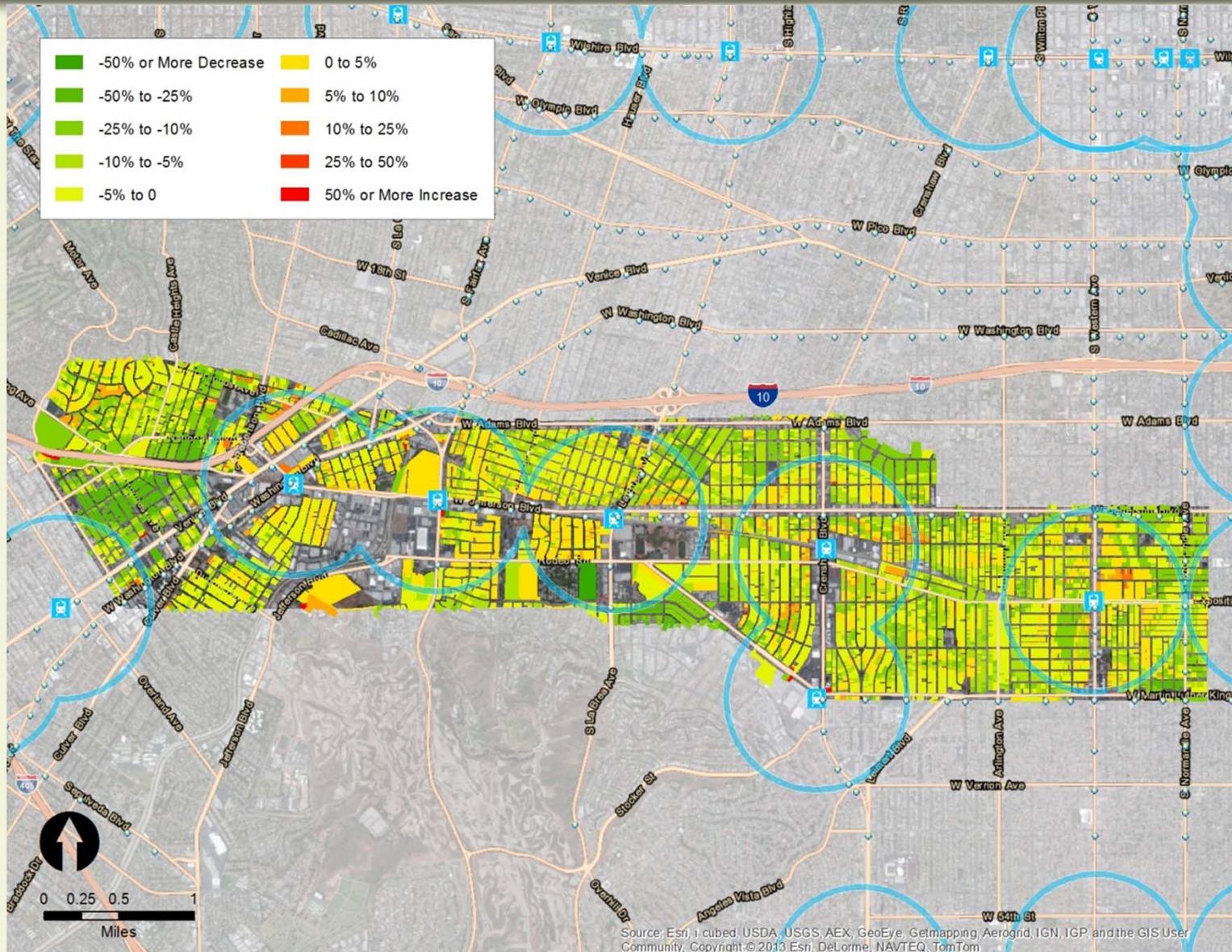


Mode Share – Auto (2035 Plan)

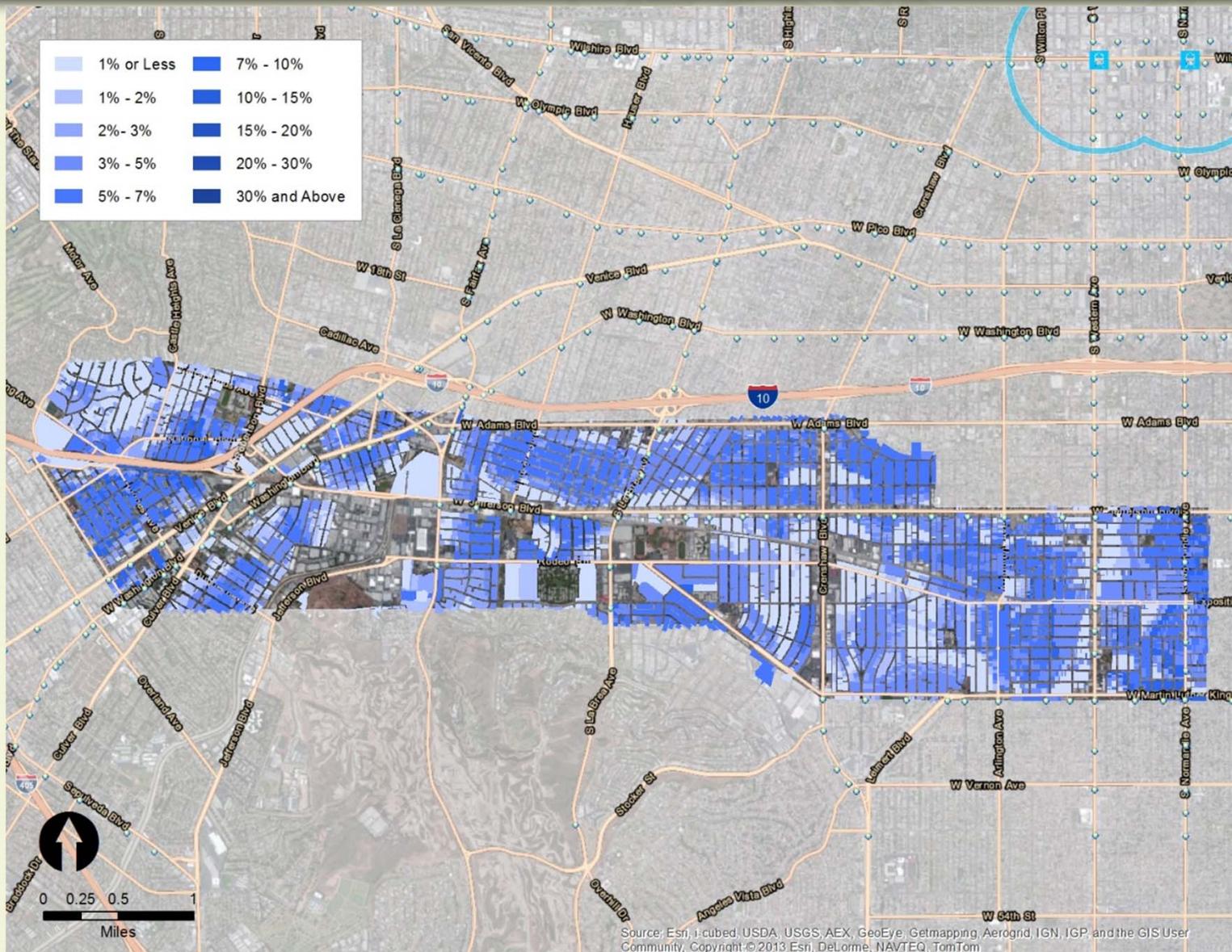


Mode Share – Auto

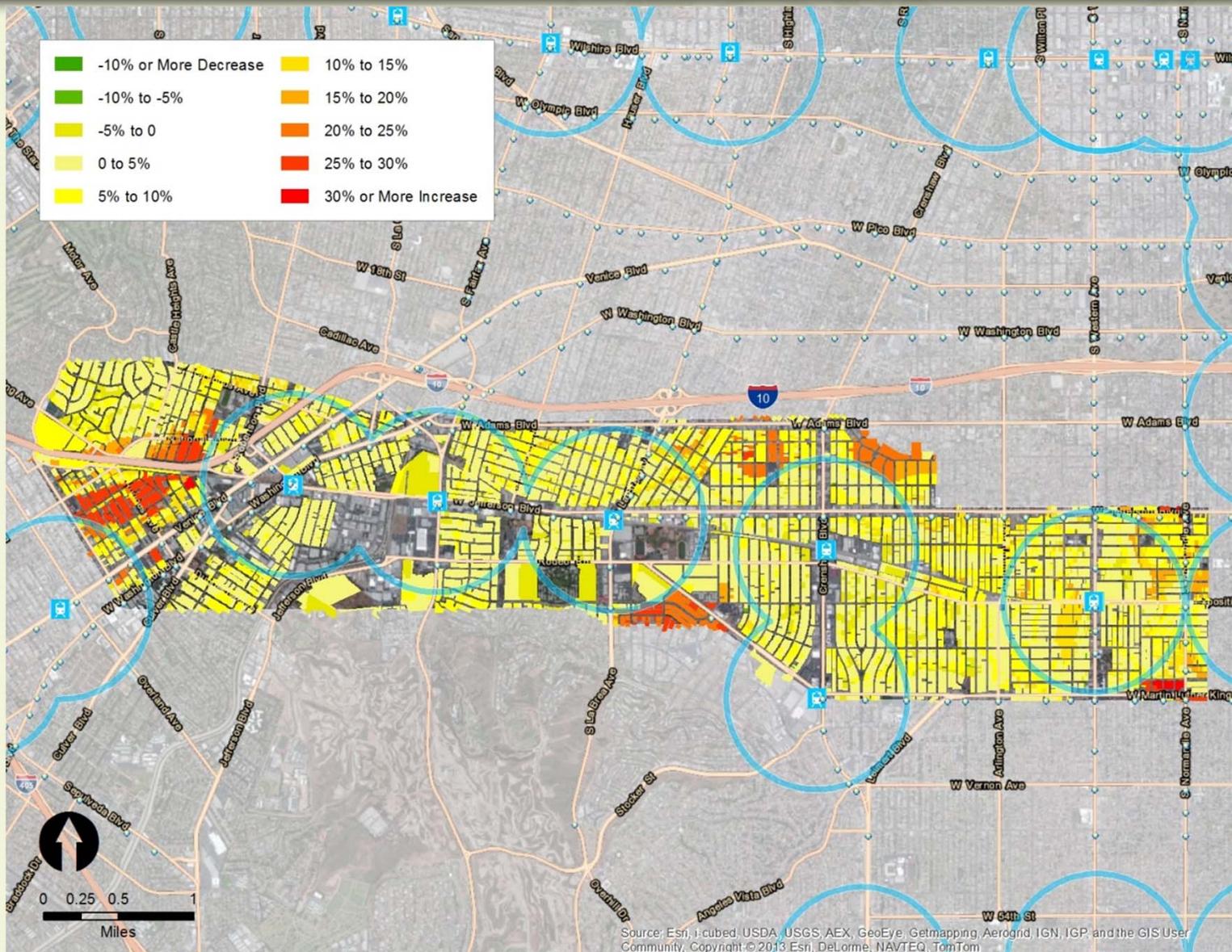
(2008 to 2035)



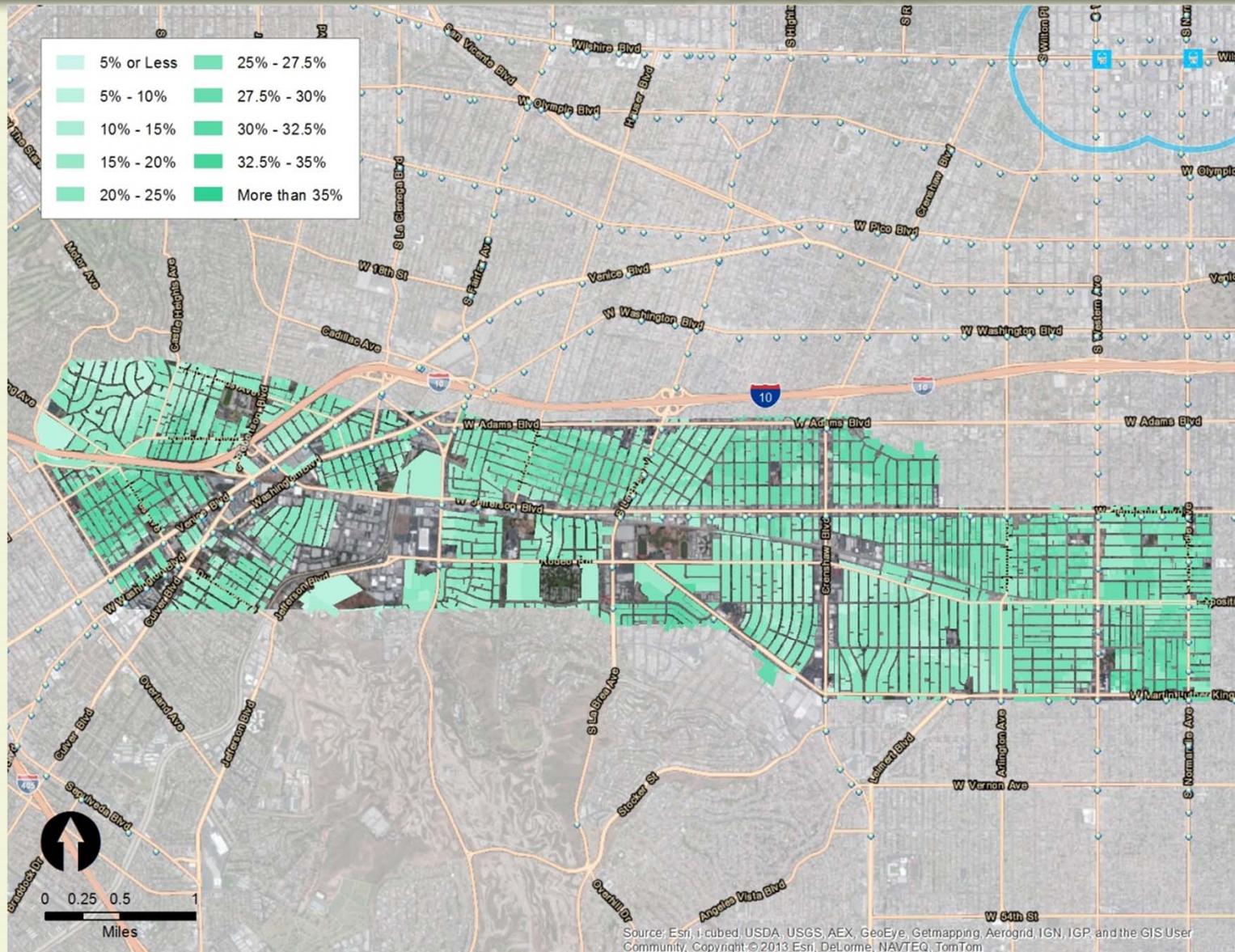
Mode Share – Transit Passenger (2008)



Mode Share – Transit Passenger (2008 to 2035)

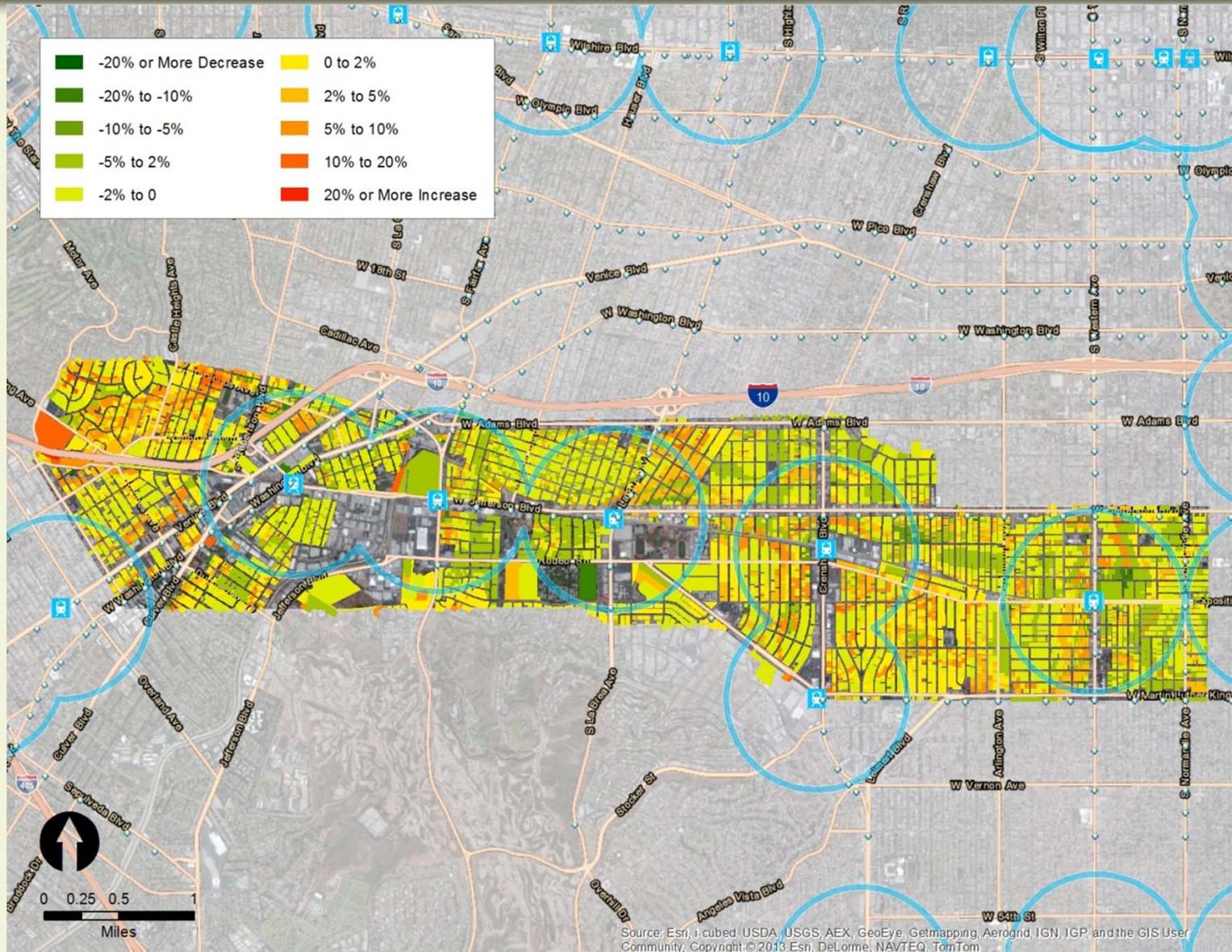


Mode Share – Walking (2008)



Mode Share – Walking

(2008 to 2035)

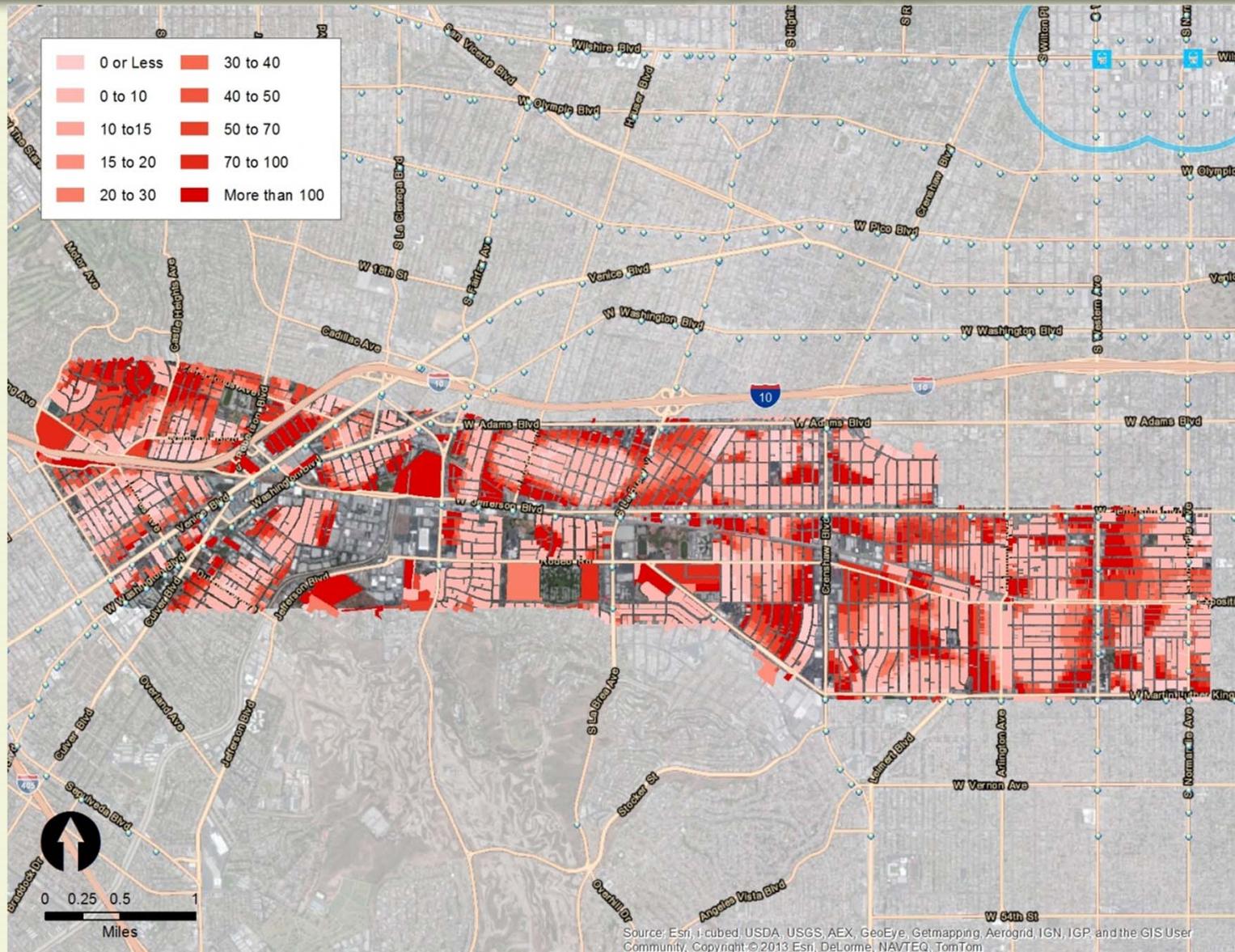


VMT Per Household

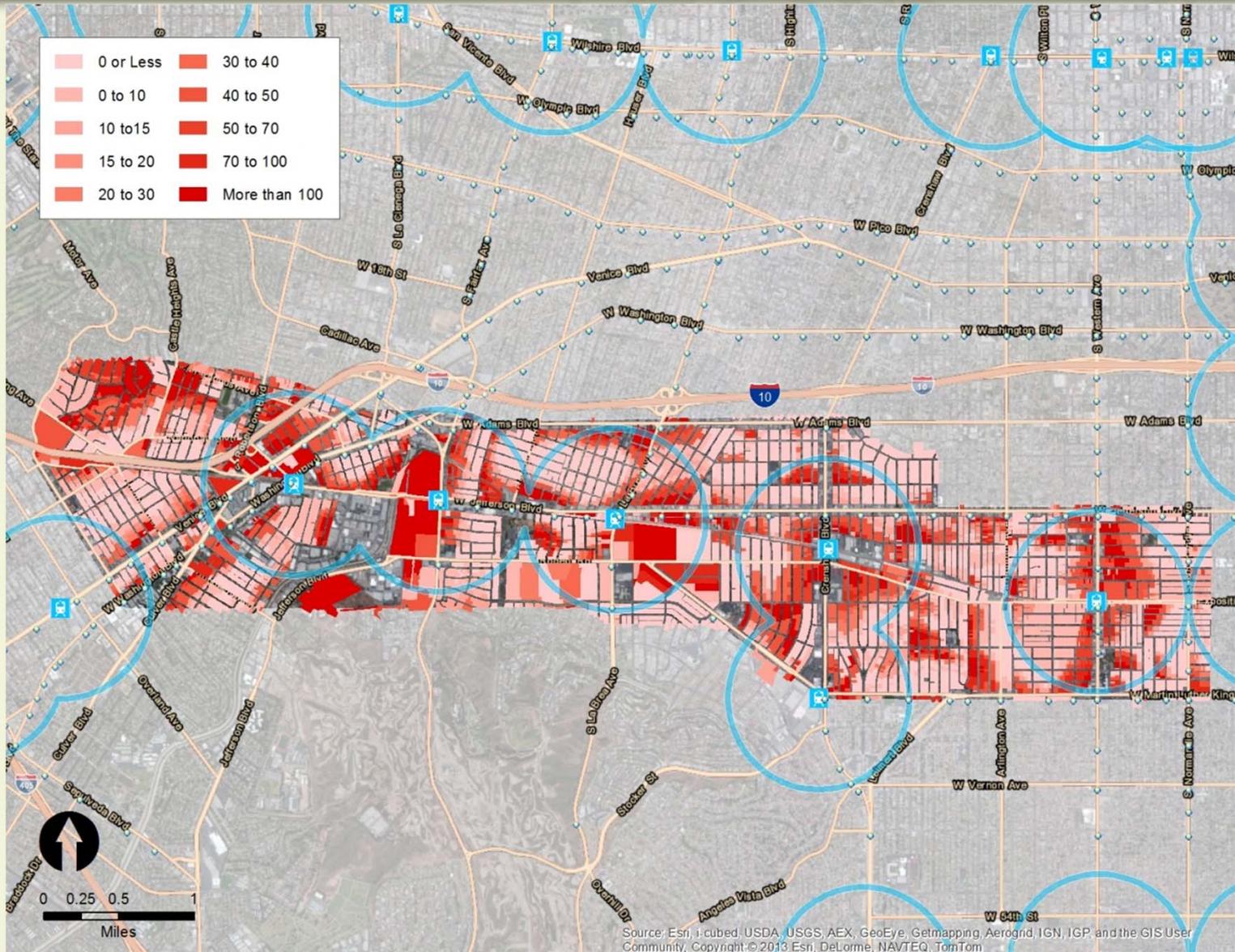
(2008 vs. 2035 Plan)

Study Area	2008	2035	% Diff
VMT Per Household	32.1	22.5	-29.9%

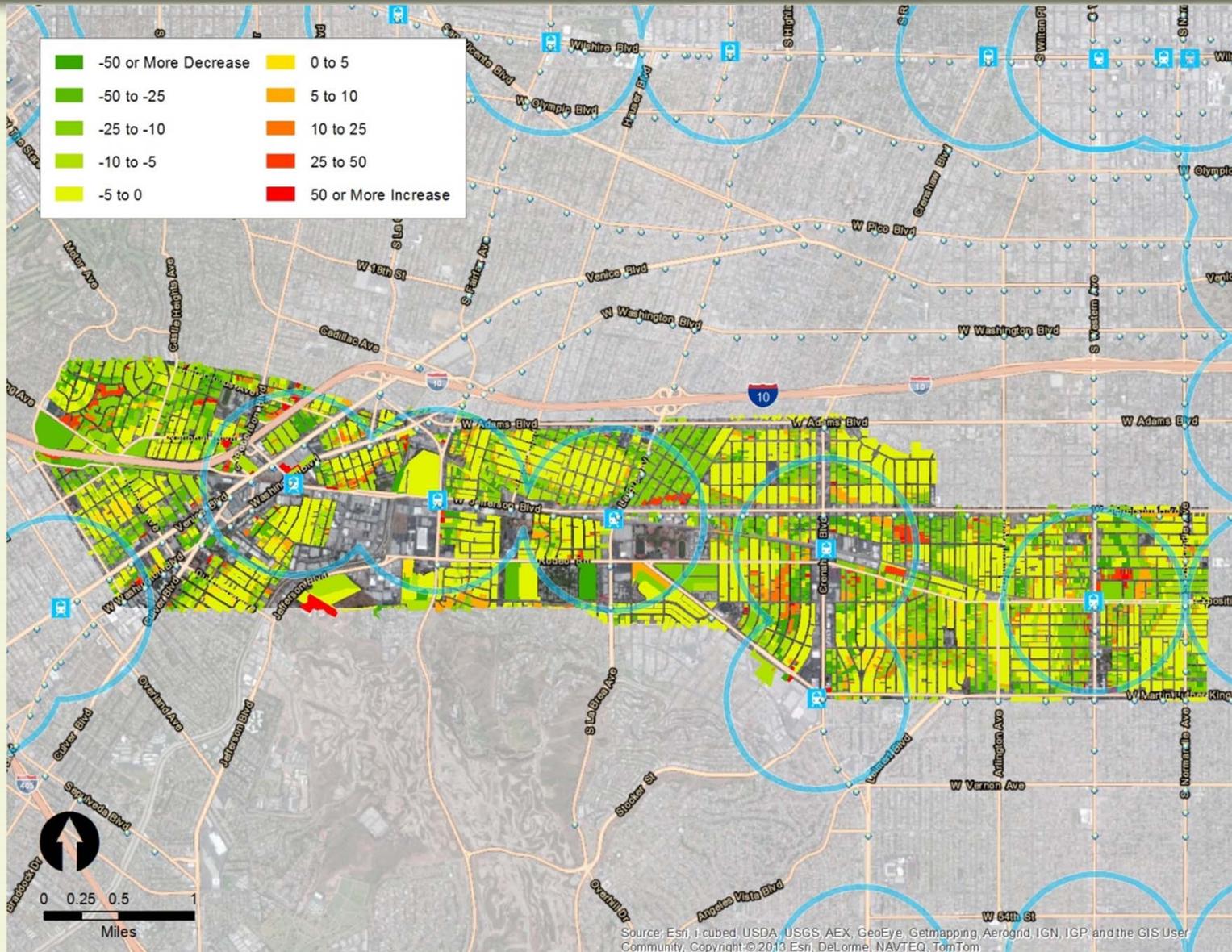
VMT Per Household (2008)



VMT Per Household (2035 Plan)



VMT Per Household (2008 to 2035)



Conclusion

Reasonable Model Results

Impacts of Land Use Scenarios on GHG reduction

Land Use
Scenarios

Travel Behavior
Vehicle Miles of
Travel (VMT)

GHS Emissions

Thank you!

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