

West Oakland Air Pollution Studies

AB617 Steering Committee Kick-Off
Oakland City Hall
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100×100 Study: A West Oakland Community Air Quality Study

Chelsea Preble

Julien Caubel

Troy Cados

Thomas Kirchstetter



UC Berkeley

Study Team



UCB/LBNL

- Thomas Kirchstetter
- Julien Caubel
- Troy Cados
- Chelsea Preble
- Carter Keeling
- Shannon Chang
- Annie Rosen
- Jonathan Slack
- Kelly Archer

BAAQMD, Steve Randall, Phil Martien

WOEIP

- Margaret Gordon, Brian Beveridge

EDF

- Ramon Alvarez, Millie Chu Baird
- Fern Uennatornwarangoon
- Cassandra Ely, Maria Harris

UT Austin, Josh Apte

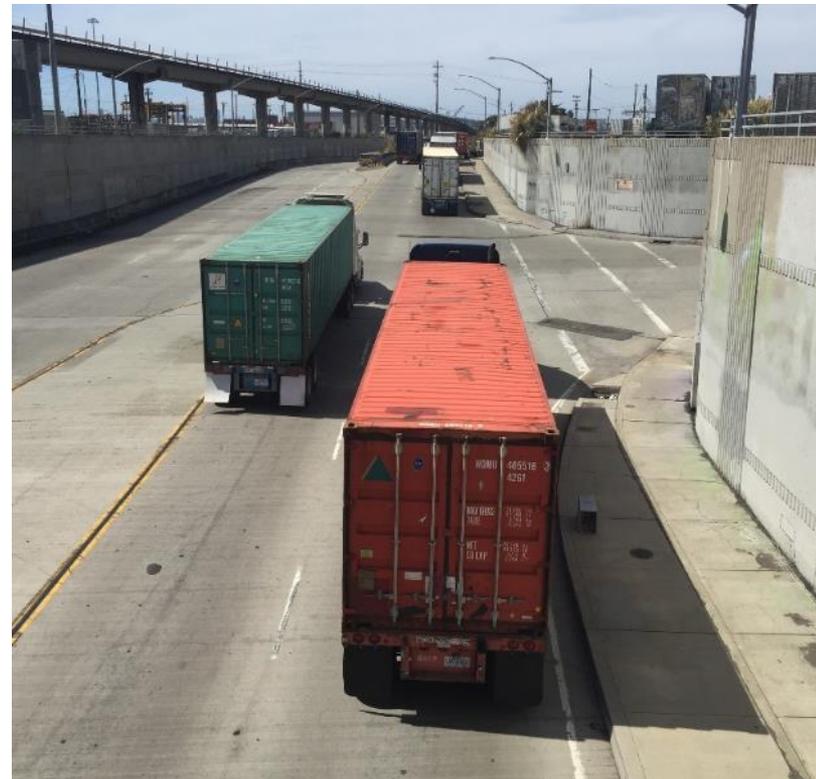
Port of Oakland

- Tim Leong, Troy Hosmer

Black Carbon: Sources & Impacts

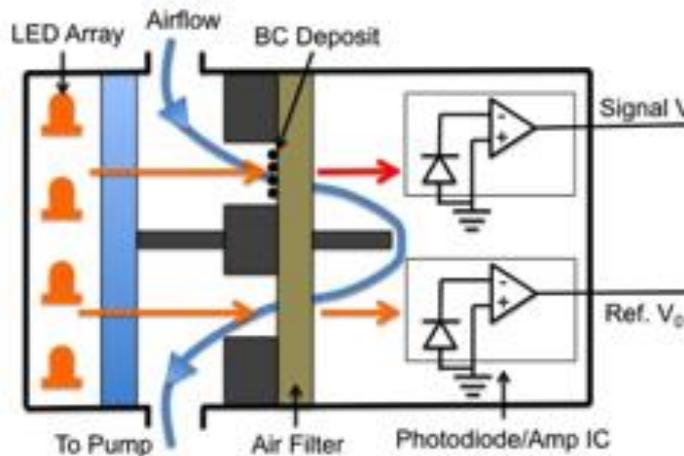
Trucks play a vital role in moving freight, but black carbon (BC) soot emitted from diesel engines is of concern

- Emitted close to people, associated with adverse health outcomes, including cancer, cardiovascular and respiratory disease
- Short-lived climate pollutant, contributes to global warming



UCB/LBNL Low-Cost BC Sensor

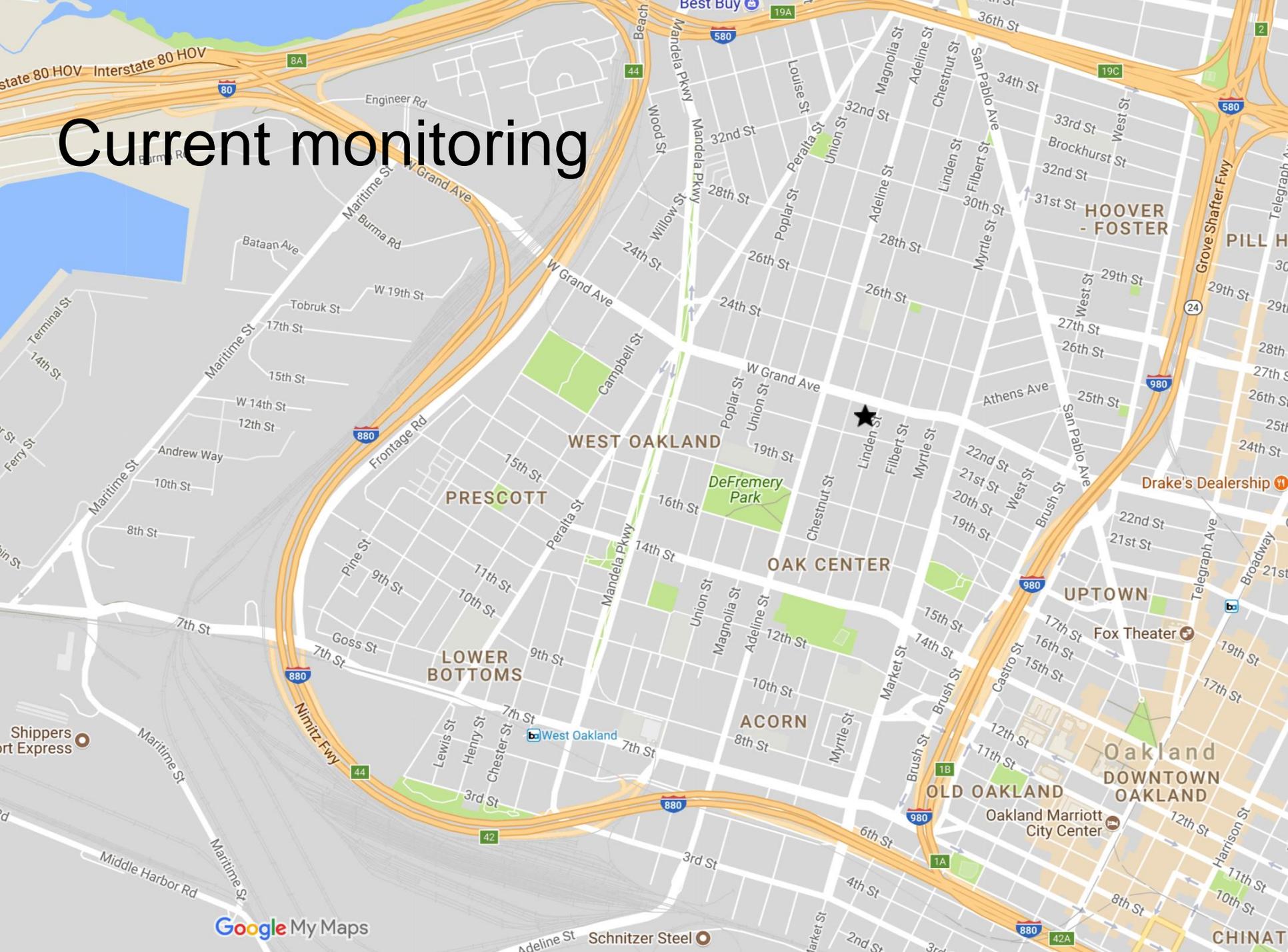
We developed a low-cost BC sensor with similar measurement principle as commercial instruments

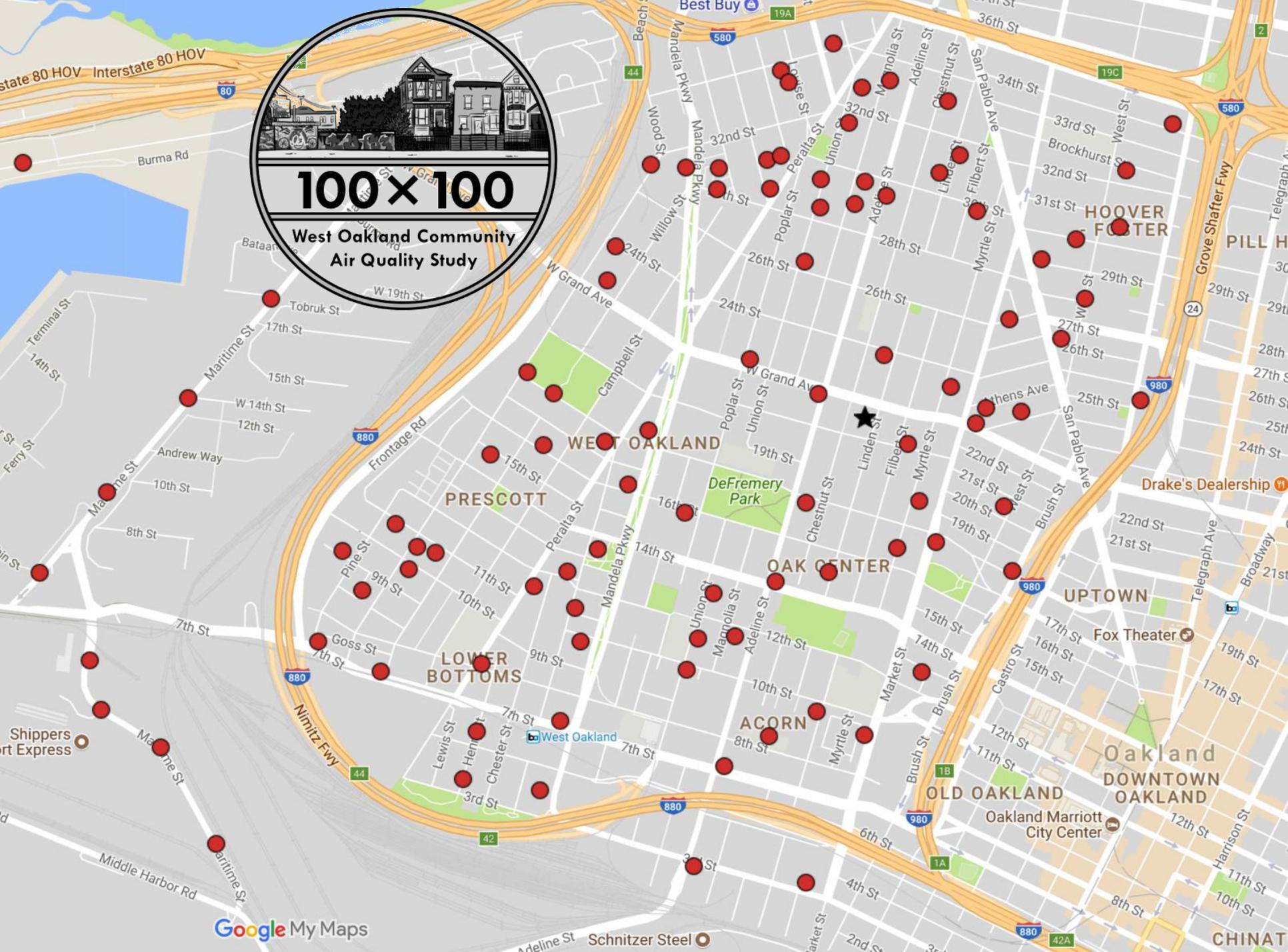


Assembly of the 100×100 network at homes and businesses across West Oakland

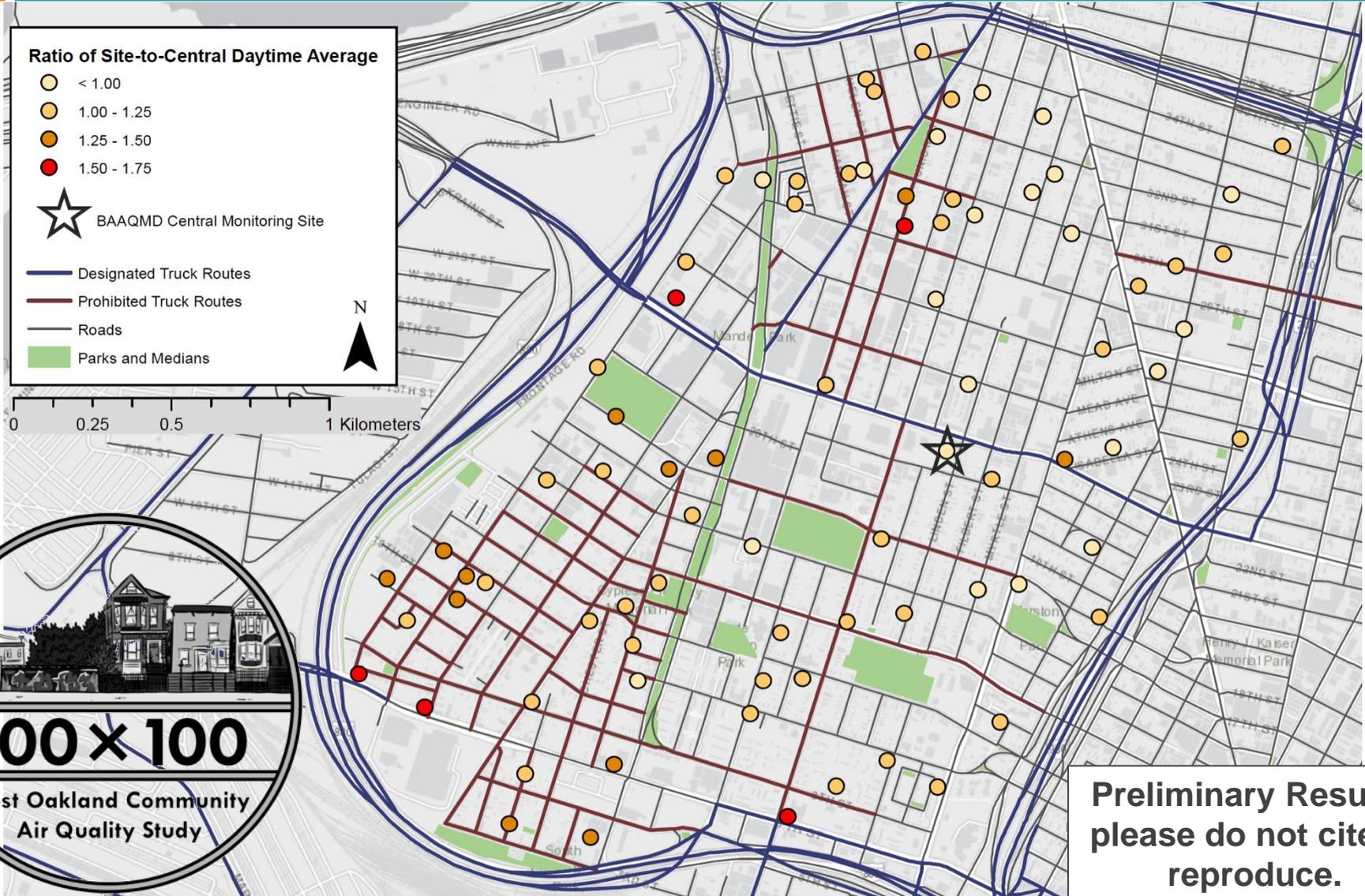


Current monitoring





Black carbon concentrations vary with location: some up to 75% higher and some lower than central monitoring site



STUDY 2: HIGH RESOLUTION AIR POLLUTION MAPPING WITH GOOGLE STREET VIEW CARS

www.edf.org/airqualitymaps



EDF
ENVIRONMENTAL
DEFENSE FUND
Finding the ways that work

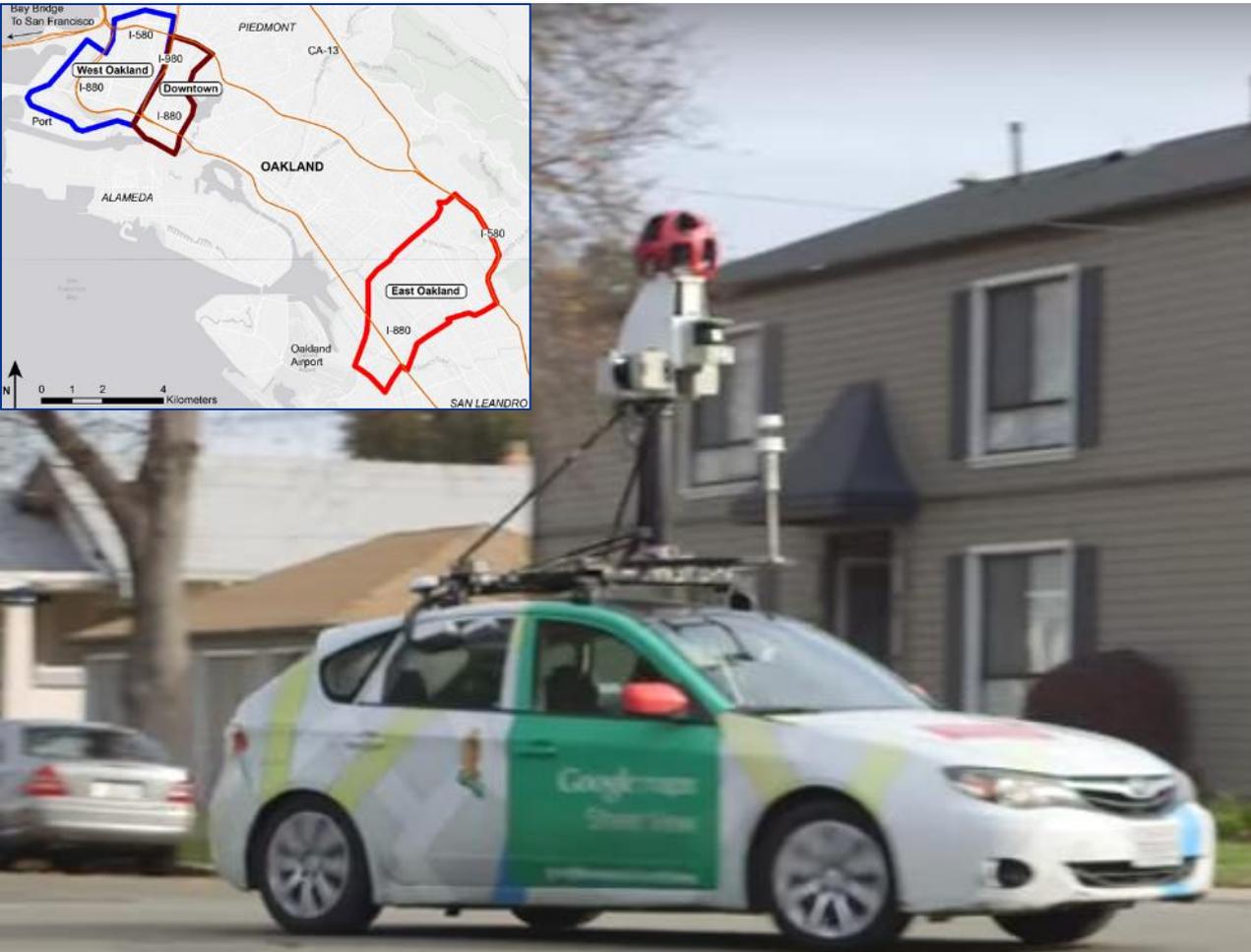
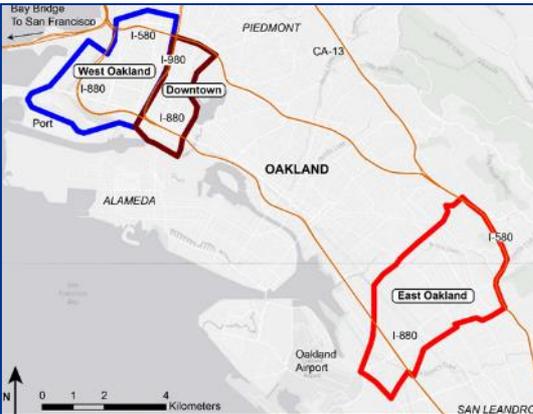
Google Earth Outreach

 **TEXAS**
The University of Texas at Austin

 aClima.

Mobile Monitoring with GSV

www.edf.org/airqualitymaps



DATA COLLECTION

Black carbon, nitric oxide (NO), nitrogen dioxide (NO₂)

1Hz sample rate

Daytime, 150 days over 1 year (mid 2015 – mid 2016)

**400+ unique miles of roads.
14,000+ miles driven total.**

Each road/highway segment sampled 30+ times

Each road segment (30 m) has ~100 observations

3×10⁶ data points

Air pollution is unevenly distributed

West Oakland – Black Carbon www.edf.org/airqualitymaps



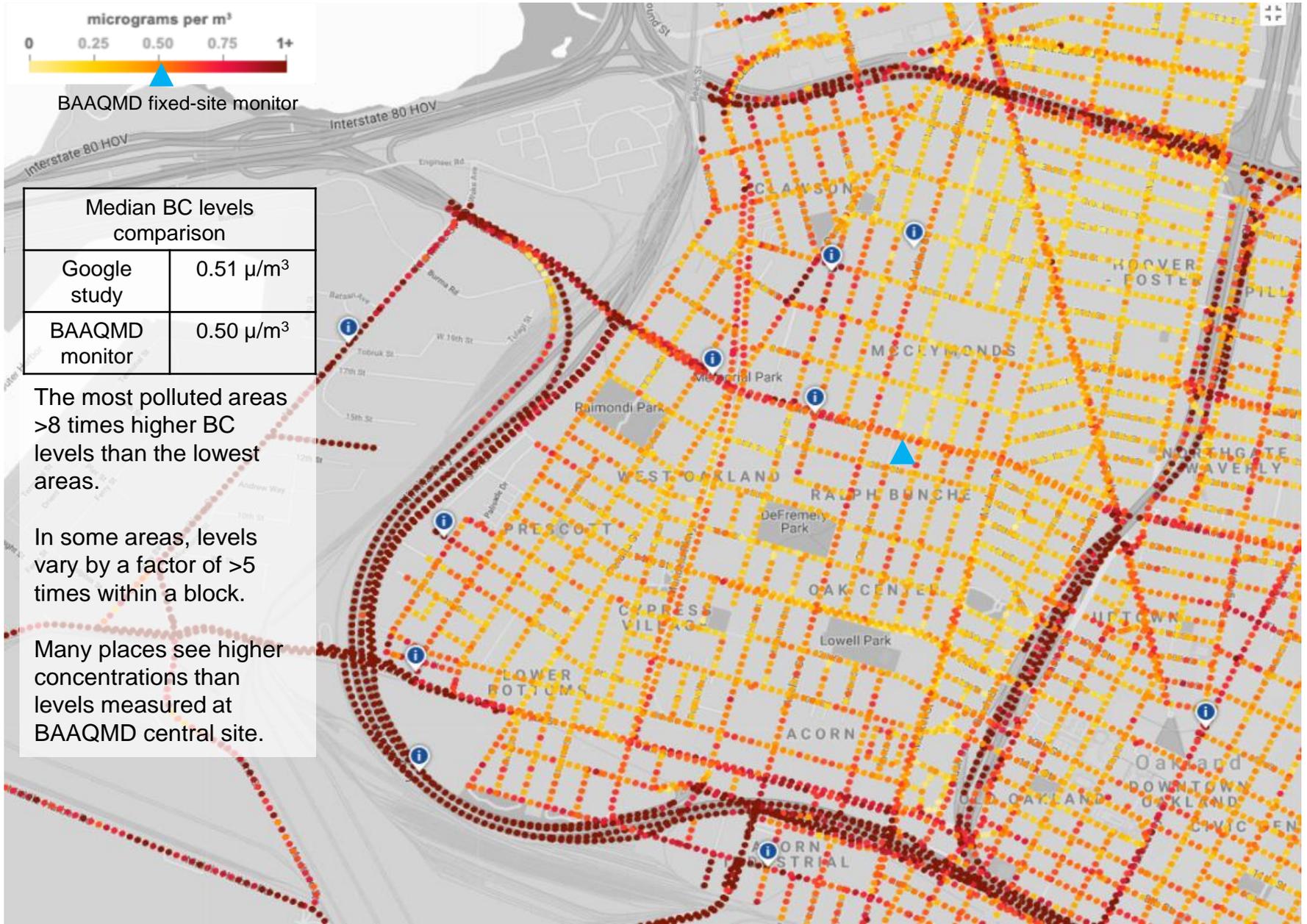
BAAQMD fixed-site monitor

Median BC levels comparison	
Google study	0.51 μm^3
BAAQMD monitor	0.50 μm^3

The most polluted areas >8 times higher BC levels than the lowest areas.

In some areas, levels vary by a factor of >5 times within a block.

Many places see higher concentrations than levels measured at BAAQMD central site.



We found multiple hotspots/areas of high pollution

Example: Metal recycler on Peralta/Poplar and 28th st. Black carbon levels here are almost 4x the median for WO.



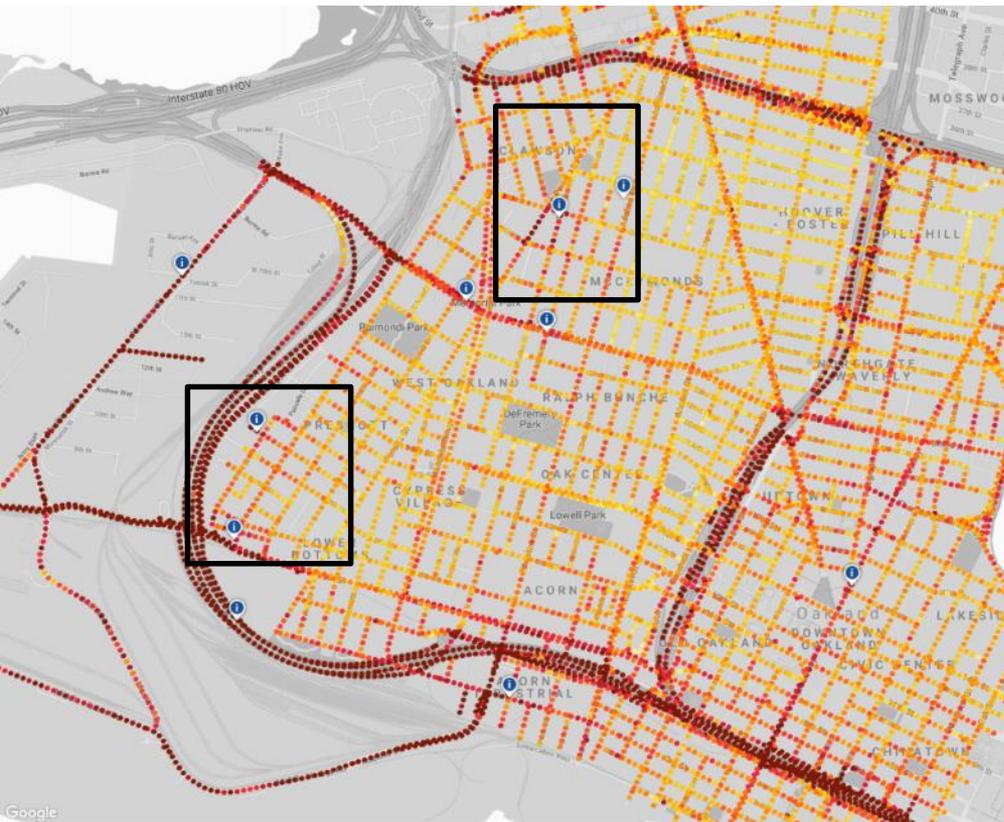
Newly built children's playground across the street from the recycler.



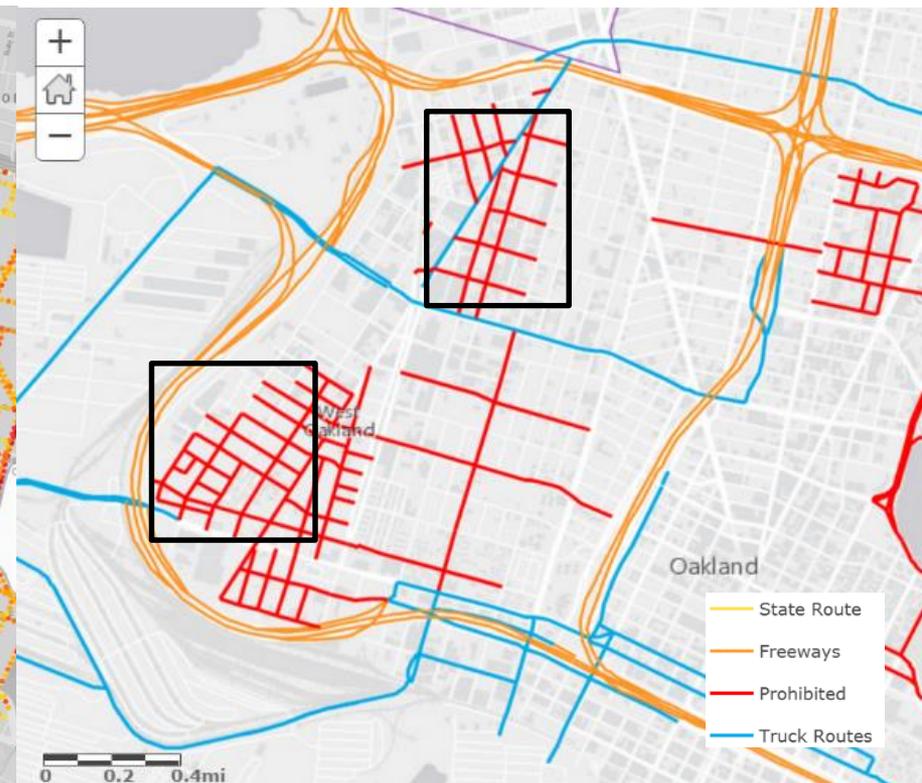
Street View and aerial imagery of metal recycling cluster show frequent visits by heavy duty trucks at the facilities.

Air pollution high on some prohibited truck routes

EDF Black Carbon Map



Oakland Truck Routes and Truck Prohibited Streets



STUDY 3: AIR POLLUTION AND HEALTH RISK

Do people living in areas of Oakland with higher pollution have higher cardiovascular health risks?



Data: 3 million air pollution measurements using fast response sensors on Google Street View cars over 1 year. Mapped at 30m resolution.



Data: Electronic medical records of 41K people insured by Kaiser Permanente health care, linked with air pollution at residential address.

Results

Elderly residents (age 65+) living in areas with higher NO₂ and BC had an increased risk of heart attack, heart disease-related surgery, or death due to heart disease.

- A 3.8 ppb higher NO₂ concentration outside the homes of the elderly living in Oakland study area is associated with
 - 20% increased risk of having a heart attack
 - 12 % increased risk of having either a cardiovascular event or dying from a heart attack
- A 0.17 µg/ m³ higher BC concentration outside the homes of the elderly living in east west or downtown Oakland is associated with
 - 15% increased risk of having a heart attack or having a heart attack and dying

Air pollution's impact on the heart in the elderly (65+)

Estimated traffic pollution-related health risk

At or below average pollution-related risk of heart attack, heart surgery, and/or death due to coronary heart disease (for this study)

Up to 12% higher risk

12%-26% higher risk

26%-42% higher risk

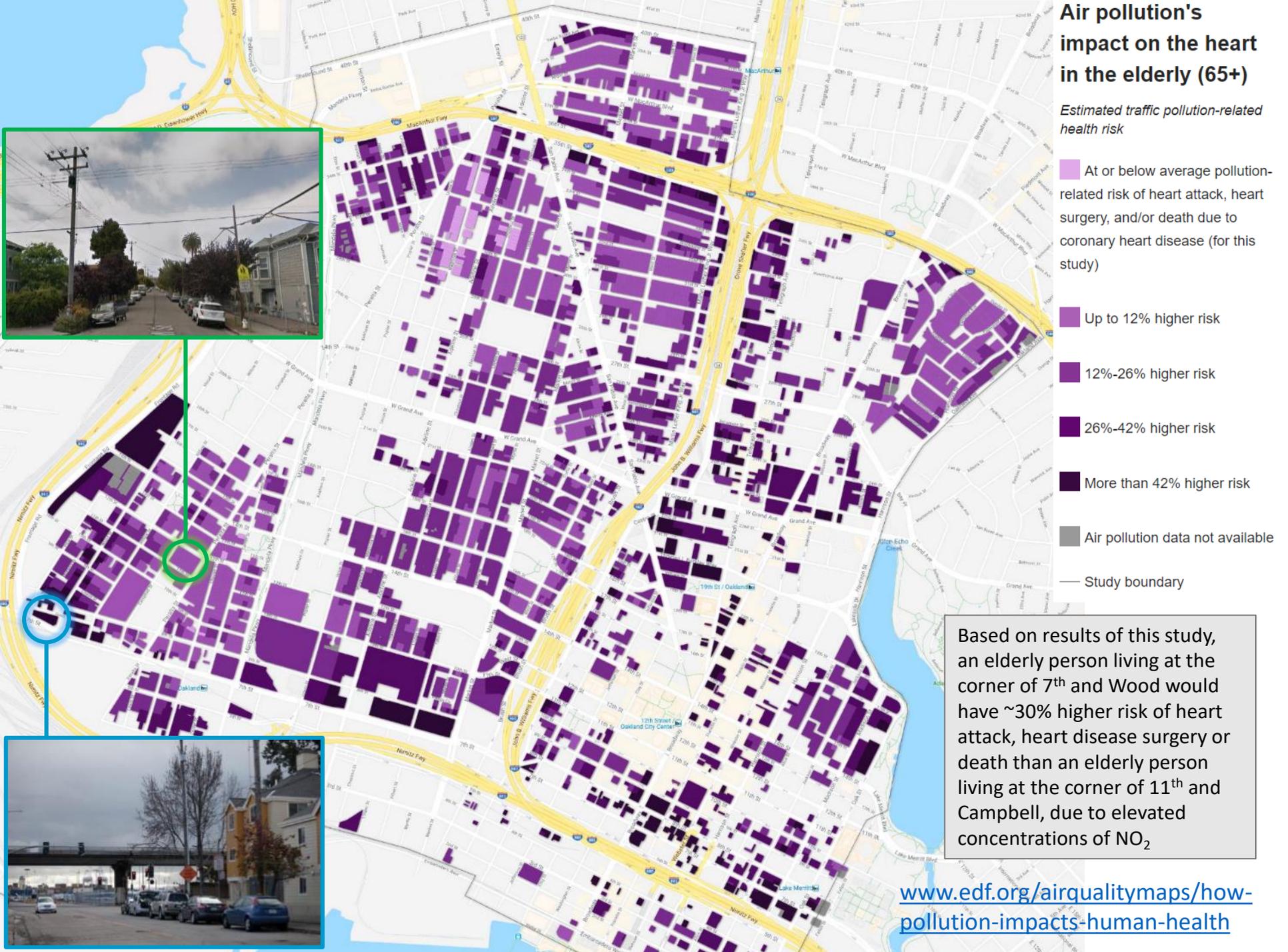
More than 42% higher risk

Air pollution data not available

Study boundary

Based on results of this study, an elderly person living at the corner of 7th and Wood would have ~30% higher risk of heart attack, heart disease surgery or death than an elderly person living at the corner of 11th and Campbell, due to elevated concentrations of NO₂

www.edf.org/airqualitymaps/how-pollution-impacts-human-health



Thank you

www.edf.org/airqualitymaps

Fern Uennatornwarangoon
T 415 293 6162
fernu@edf.org

Environmental Defense Fund
123 Mission Street, 28th Floor
San Francisco, CA 94105
www.edf.org



Community Air Protection Program (AB617)

Goal: Reduce Emissions and Exposure in Over Burdened Communities

Implications: Lower Health Risk and Improved Health Effects

MAQIP 2030

- Reduce emissions from existing technologies
- Adopt cleaner technologies; invest in zero emission equipment & infrastructure

Truck Plan

- More enforcement officers; proper training
- Truck signage; truck driver education
- Improved truck routes

City Planning, Land Use, Zoning, Ordinances

- Conditional Use Permits: sunset industrial uses near residential areas
- Provide alternative locations and incentives/ financial support for businesses to move out of residential areas