

Vulnerability Assessment

City of Southfield

2025 CLC Fellowship

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THE TEAM



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As a municipality, what does it mean to serve your community?

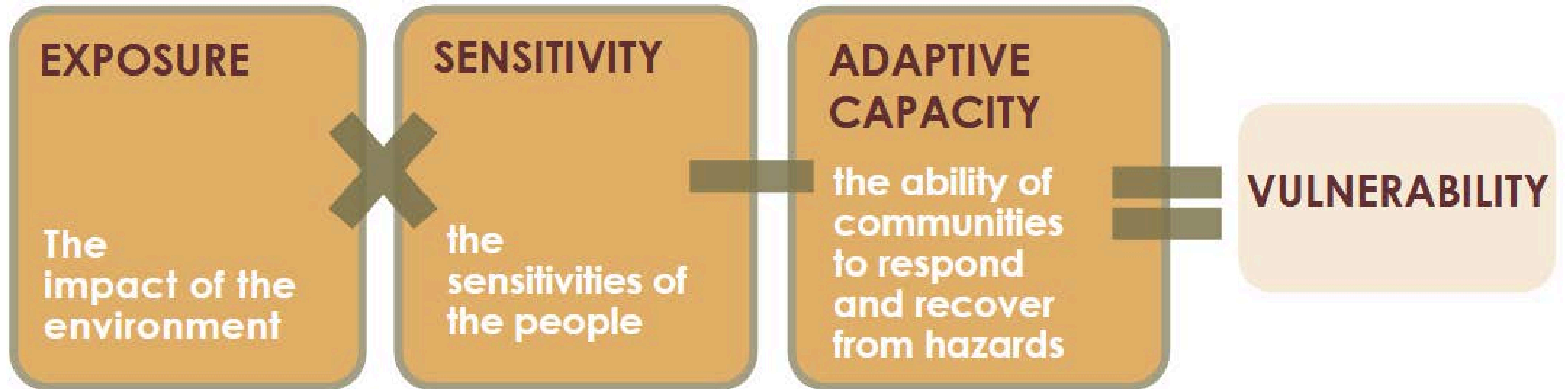


WHAT IS VULNERABILITY?

Conditions determined by physical, social, economic and environmental factors that **increase the susceptibility of a community to hazards.**



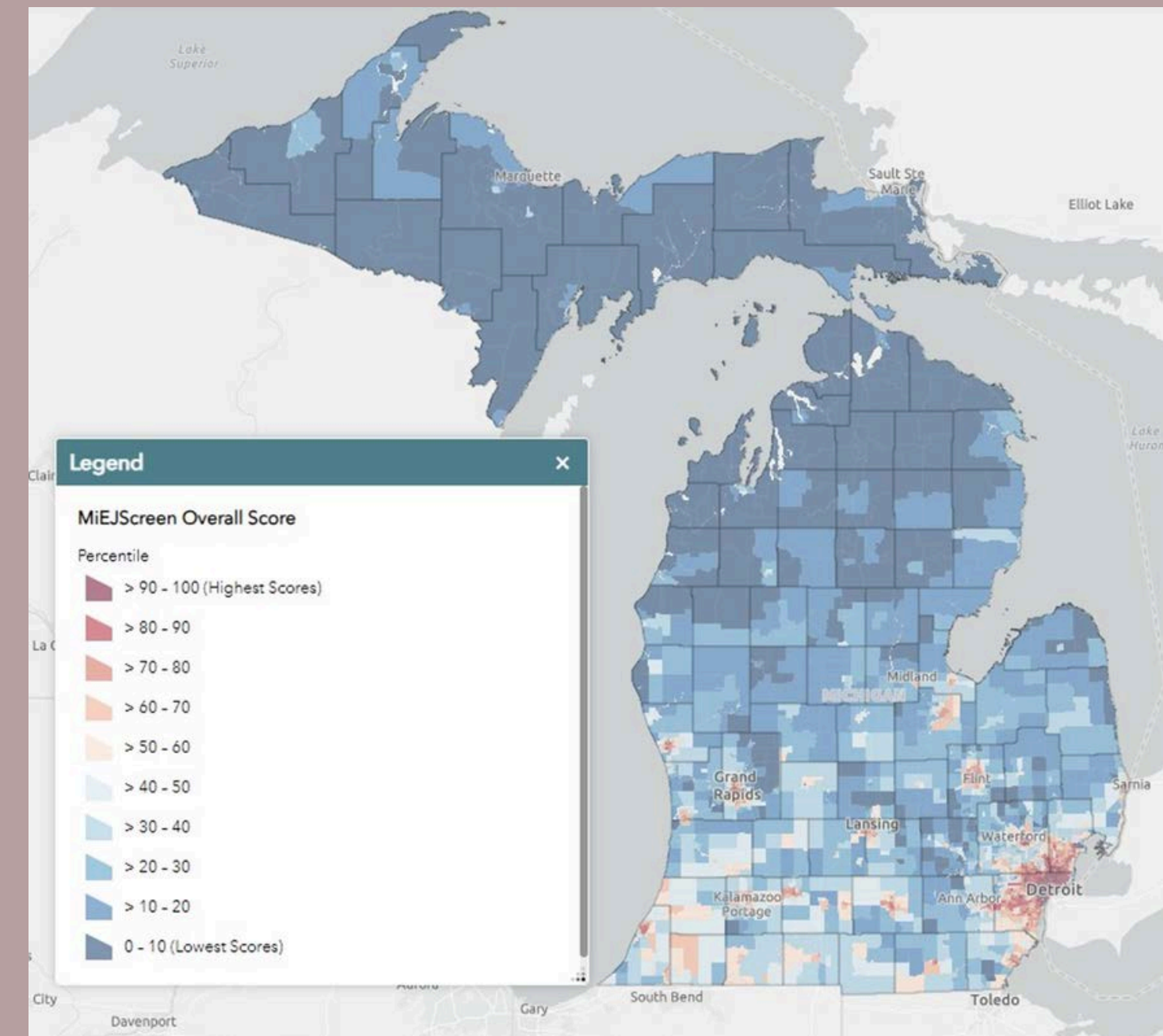
Framework for Vulnerability



Data Tools and Collection

Environmental justice screening tools are geographic information system (GIS) tools that identify communities who may be disproportionately impacted by environmental hazards.

- Utilize percentiles to gain a relative understanding of vulnerability
- Provide a big picture understanding



Map of Overall Vulnerability Scores (MiEJScreen)

Data Tools and Collection

➔ Climate and Economic Justice Screening Tool (CEJST)

- Identified disadvantaged census tracts as a part of the Justice40 Initiative
- Initial data source



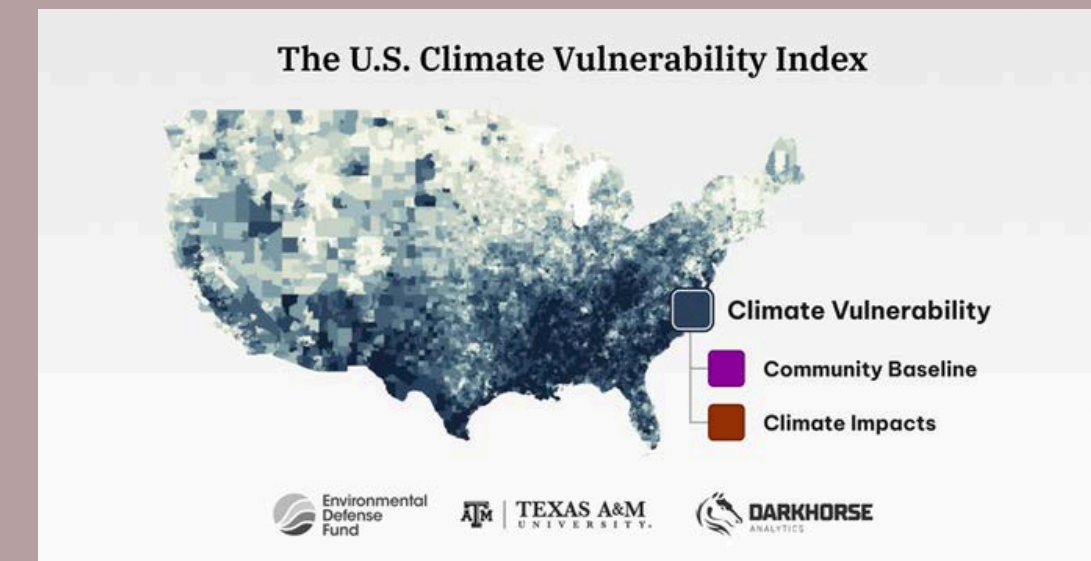
➔ MiEjScreen

- **Statewide** percentiles
- Primary data source



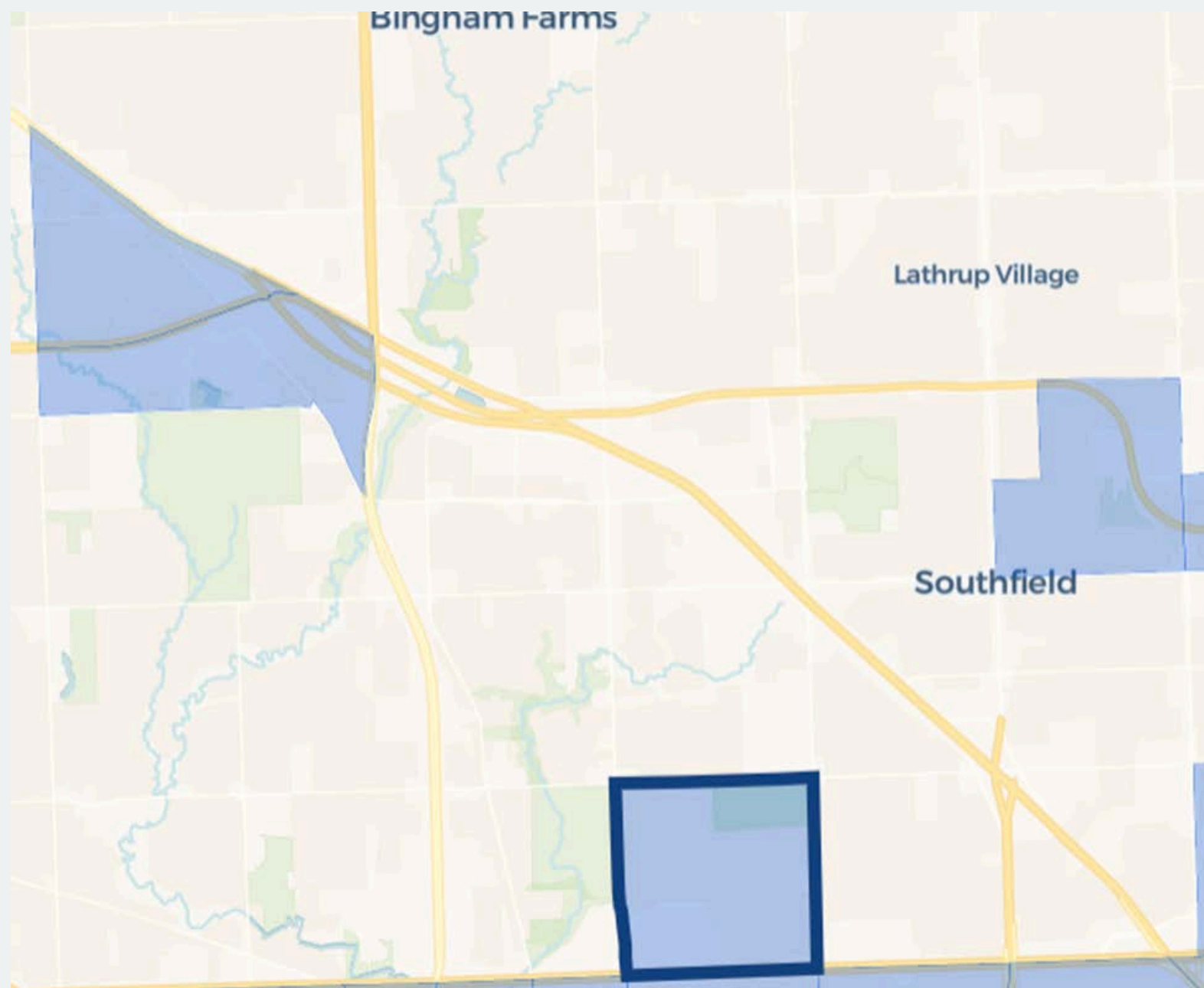
➔ Climate Vulnerability Index

- **Nationwide** percentiles
- Secondary data source

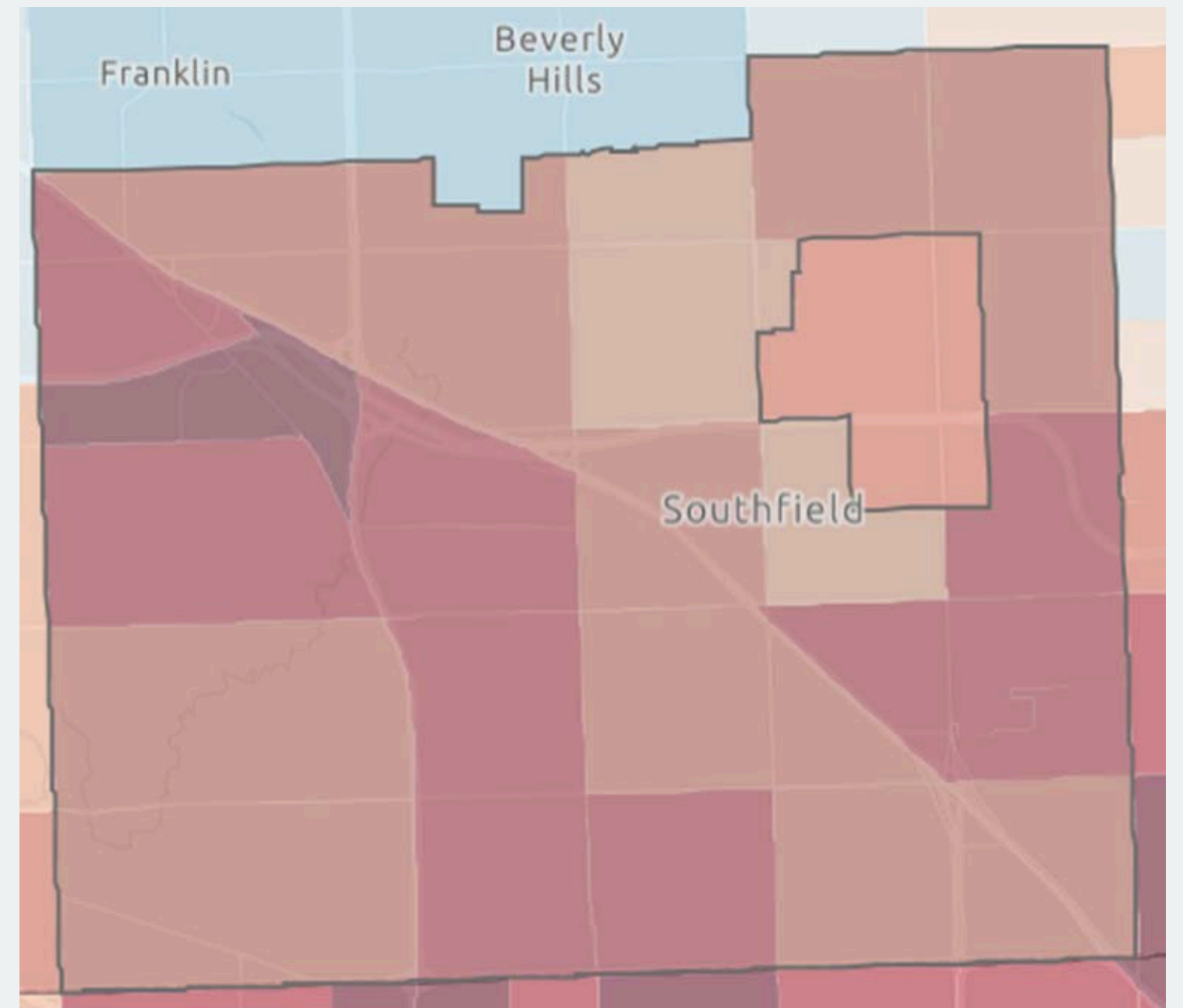


Vulnerability moves beyond boundaries

Justice40 Disadvantaged Tracts (CEJST)



MiEJScreen Vulnerability Map



Data Tools and Collection

- ➔ **Southeast Michigan Council of Governments (SEMCOG)**
 - demographic data sourced from the American Community Survey
- Demographic Emphasis Areas
 - compiles important demographic indicators of vulnerability
- Community Profiles
 - detailed reports of demographic data and analysis

All data utilized in this report was collected at the census tract level.

Report Outline

01 INTRODUCTION

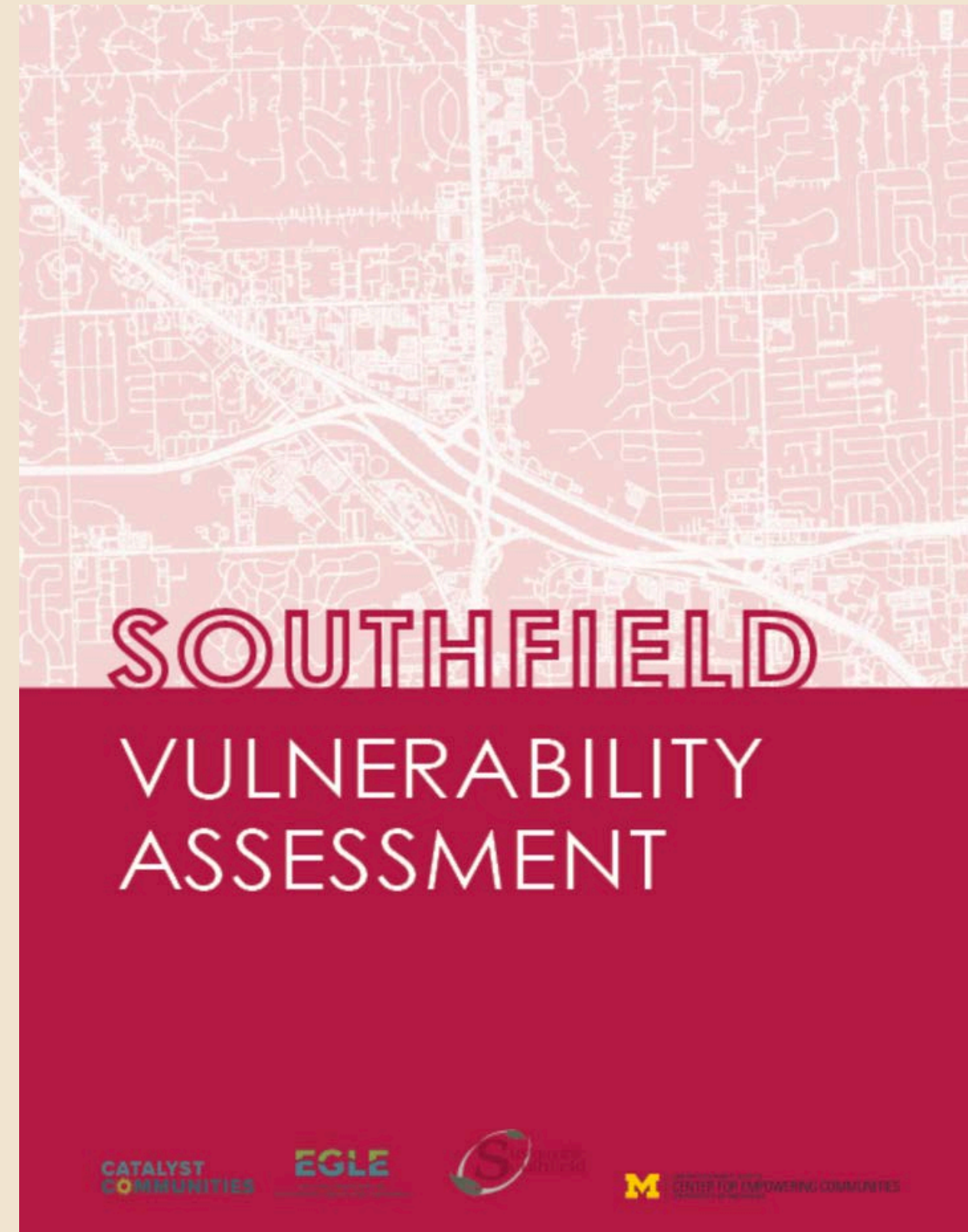
02 CONTEXT

03 EXPOSURE

04 SENSITIVITY

**05 AREAS OF
ESPECIALLY HIGH
EXPOSURE**

06 RECOMMENDATIONS

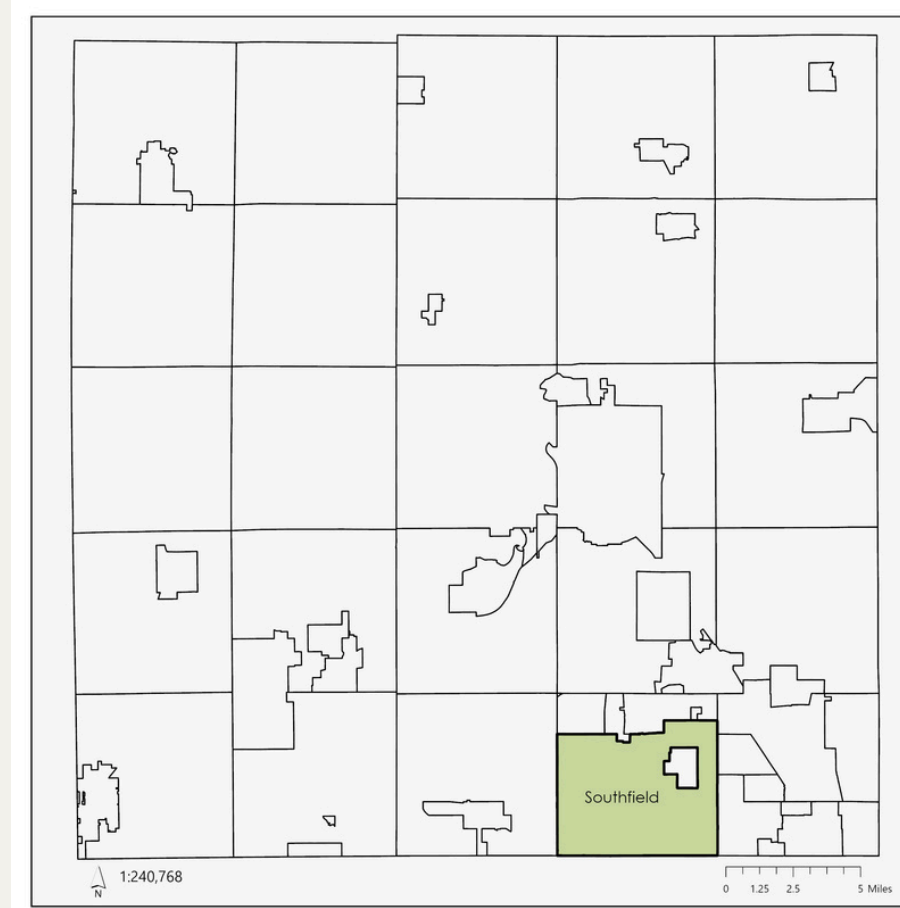


CONTEXT

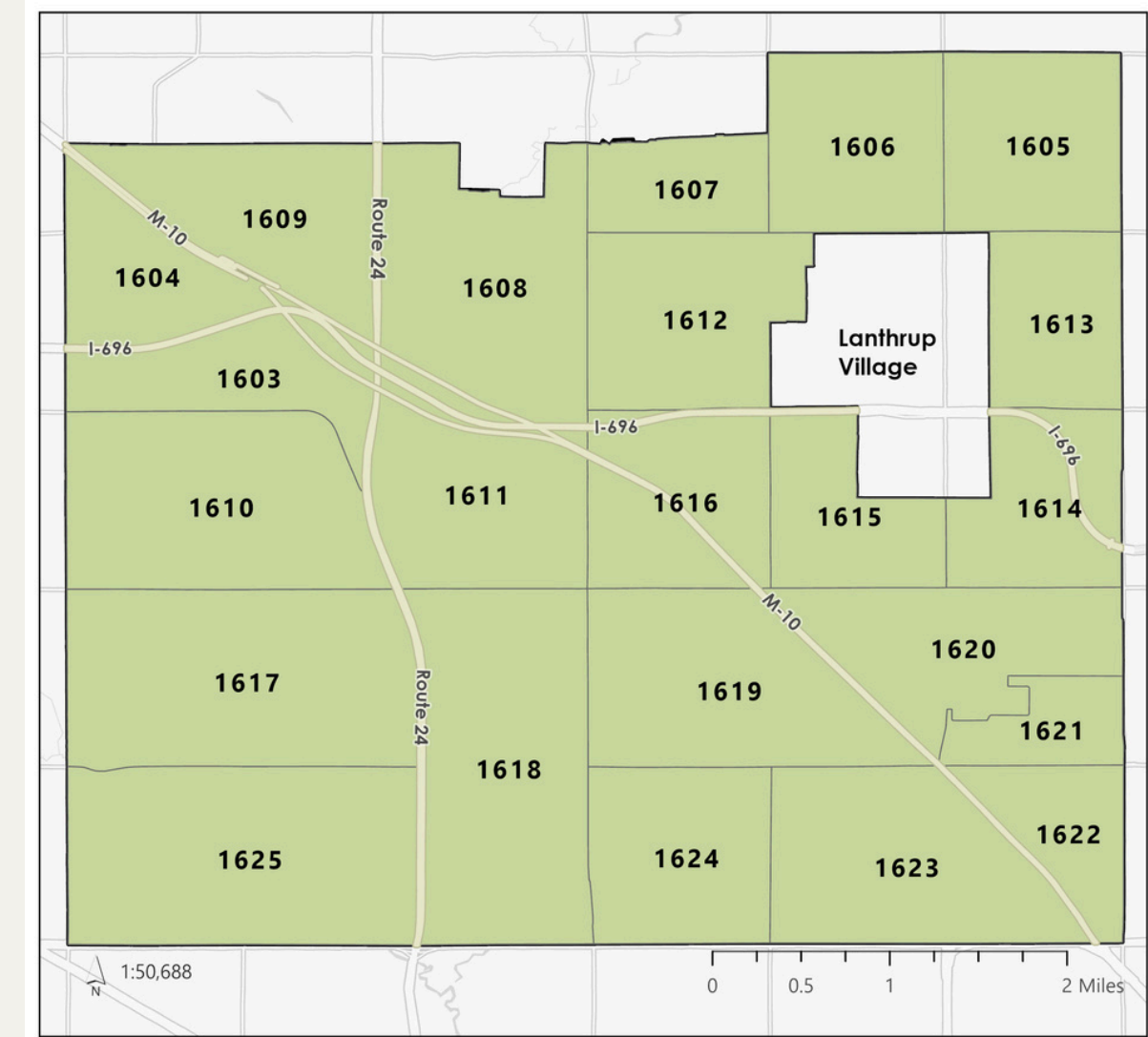
The City of Southfield

Why is context important?

- Familiarization
- Setting the stage



Map of Southfield in relation to Oakland County



Census Tracts in Southfield, MI

Residential Population: 76,618
23 total census tracts
Majority-minority city

Major Highways

- I-696
- M-10
- Route 24

“The Center of it All”

- 800 acres of parkland
- 7 colleges and universities
- Large business district

EXPOSURE

how much or little individuals, communities, and populations experience a certain hazard

Examples:

- Exposure to Particulate Matter (PM) 2.5
- Proximity to hazardous waste facilities

SENSITIVITY

the physiological, socioeconomic, and community design factors that increase susceptibility to hazards

Examples:

- Rates of Asthma
- Housing Burden
- Unemployment

EXPOSURE INDICATORS

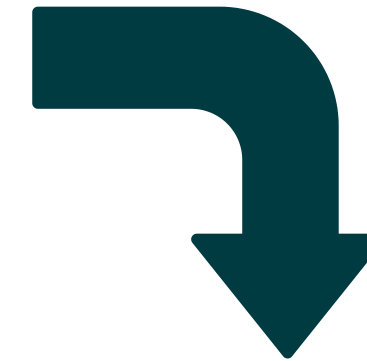
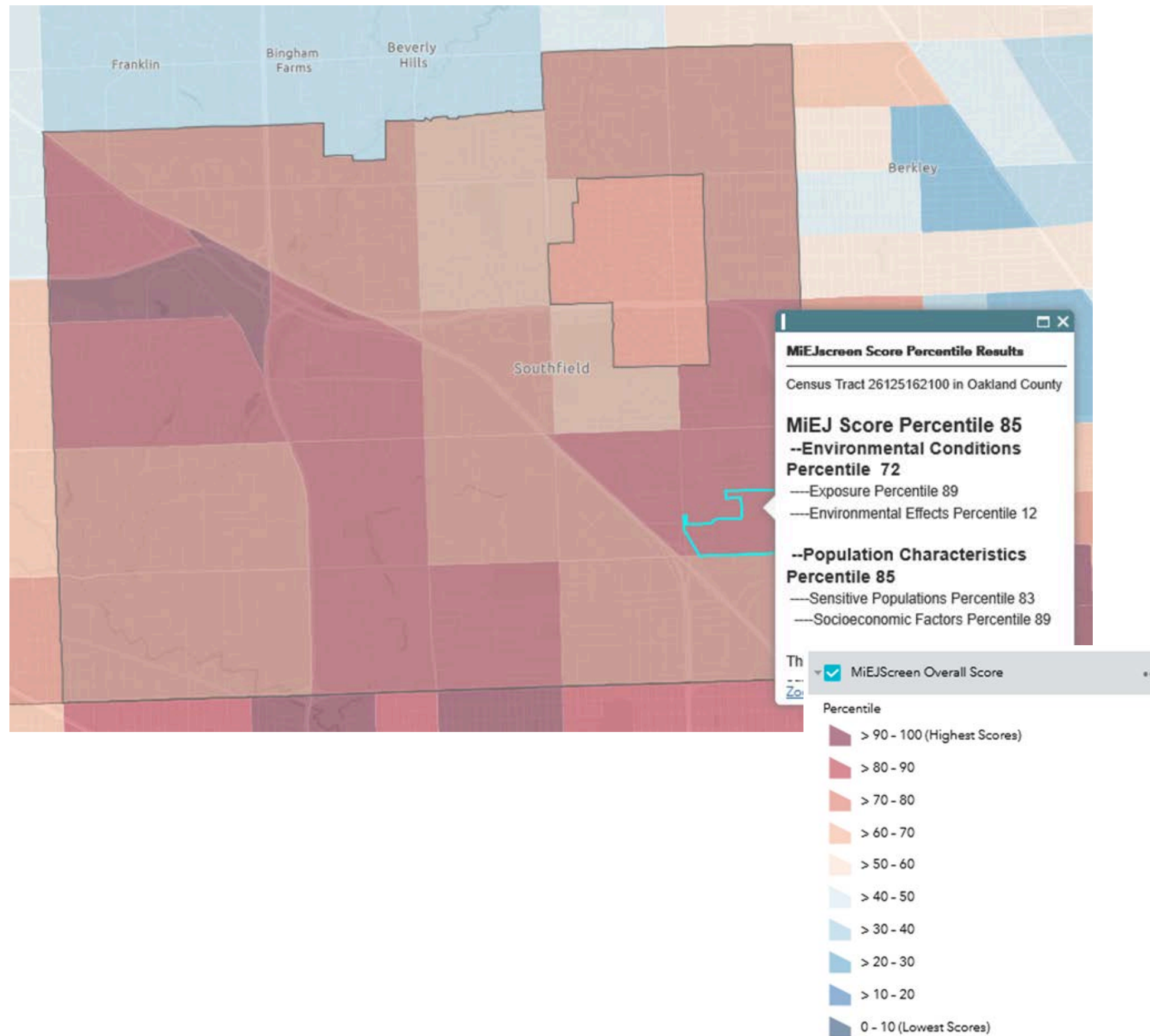
Environmental Exposure	Environmental Exposure
NATA Air Toxics Cancer Risk	Proximity to Cleanup Sites
NATA Respiratory Hazard Index	Proximity to Hazardous Waste Facilities
NATA Diesel Particulate Matter	Impaired Water Bodies
Particulate Matter (PM 2.5)	Proximity to Solid Waste Sites and Facilities
Ozone	Lead Paint Indicators
Traffic Density	Proximity to RMP Sites
Vehicles Miles Traveled*	Wastewater Discharge Sites
Vehicle Proximity and Volume*	Proximity to TSCA Facilities*
Noise Pollution*	
Pollutants that Impact Liver Health*	
Pollutants that Impact Developmental Health*	
Pollutants that Impact Reproductive Health*	
Pollutants that Impact Kidney Health*	
Pollutants that Impact Immunological Health*	

SENSITIVITY INDICATORS

Sensitive Populations	Socioeconomic Factors
Asthma	Low-Income
Cardiovascular Disease	POC
Low Birth Weight Infants	Educational Attainment
Blood Lead Level	Linguistic Isolation
Life Expectancy	Population Under Age 5
Diabetes*	Population Over Age 64
Stroke*	Unemployment
High Blood Pressure*	Housing Burden

*Marked indicators are sourced from CVI. All other indicators are sourced from MiEJScreen.

Data Synthesis



High-Level Vulnerability:
within the 80-99th
percentile

Mid-Level Vulnerability:
within the 75-80th
percentile

Low-Level Vulnerability:
under the
75th percentile

Indicator: Particulate Matter 2.5

Step 1: Compile PM 2.5 exposure scores for each census tract

Step 2: Calculate degree of vulnerability

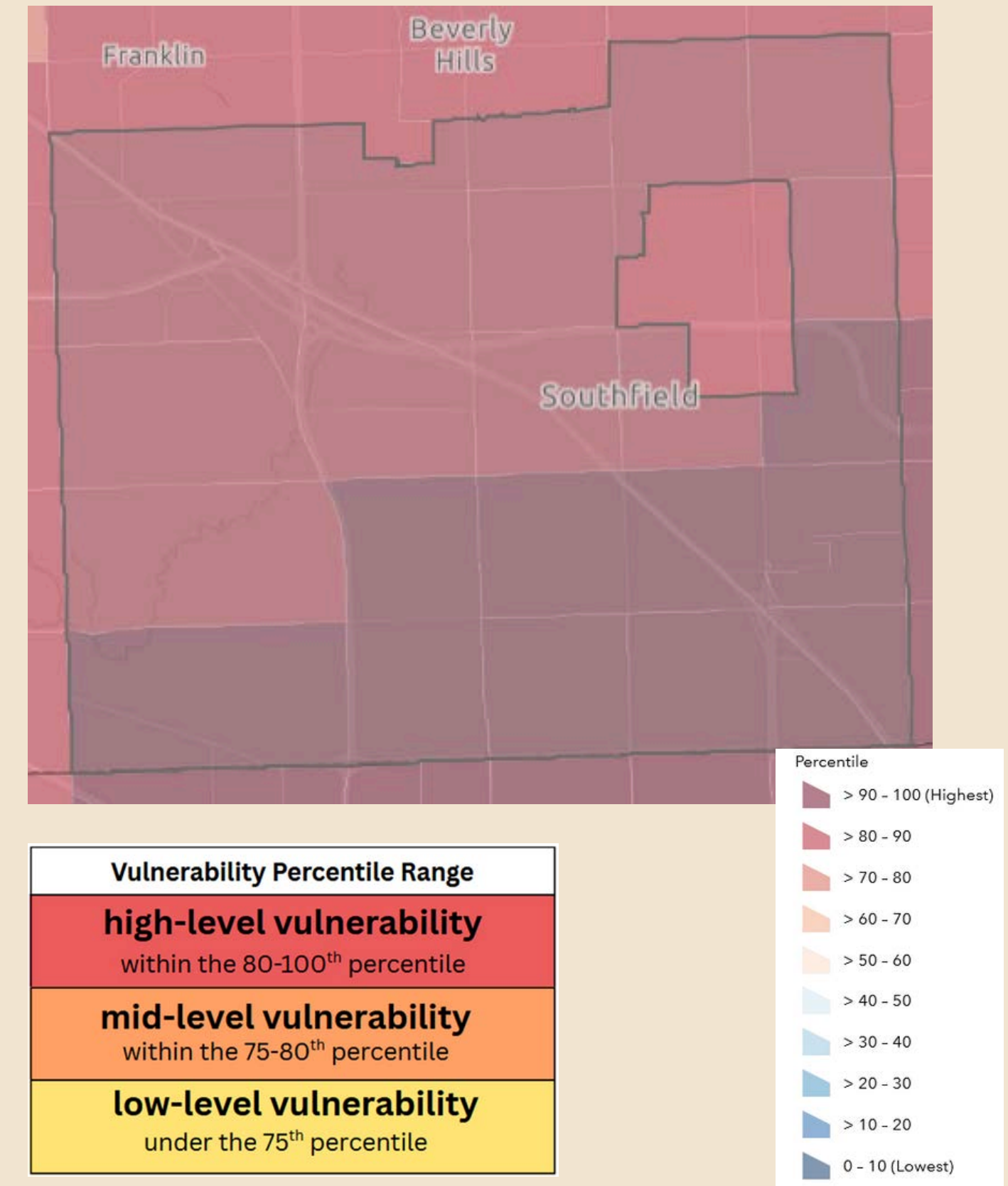
- How many tracts in high, medium, low vulnerability?

Step 3: Determine significance

- Is a significant portion of the population experiencing vulnerability?

Census Tract	PM 2.5
1603	86
1604	84
1605	88
1606	88
1607	87
1608	87
1609	85
1610	87
1611	89
1612	88
1613	90
1614	91
1615	90
1616	90
1617	89
1618	92
1619	93
1620	93
1621	93
1622	94
1623	94
1624	94
1625	91

PM 2.5 Exposure Map



EXPOSURE

- Air Pollutants
- Health Effects
- Proximity to Traffic

SENSITIVITY

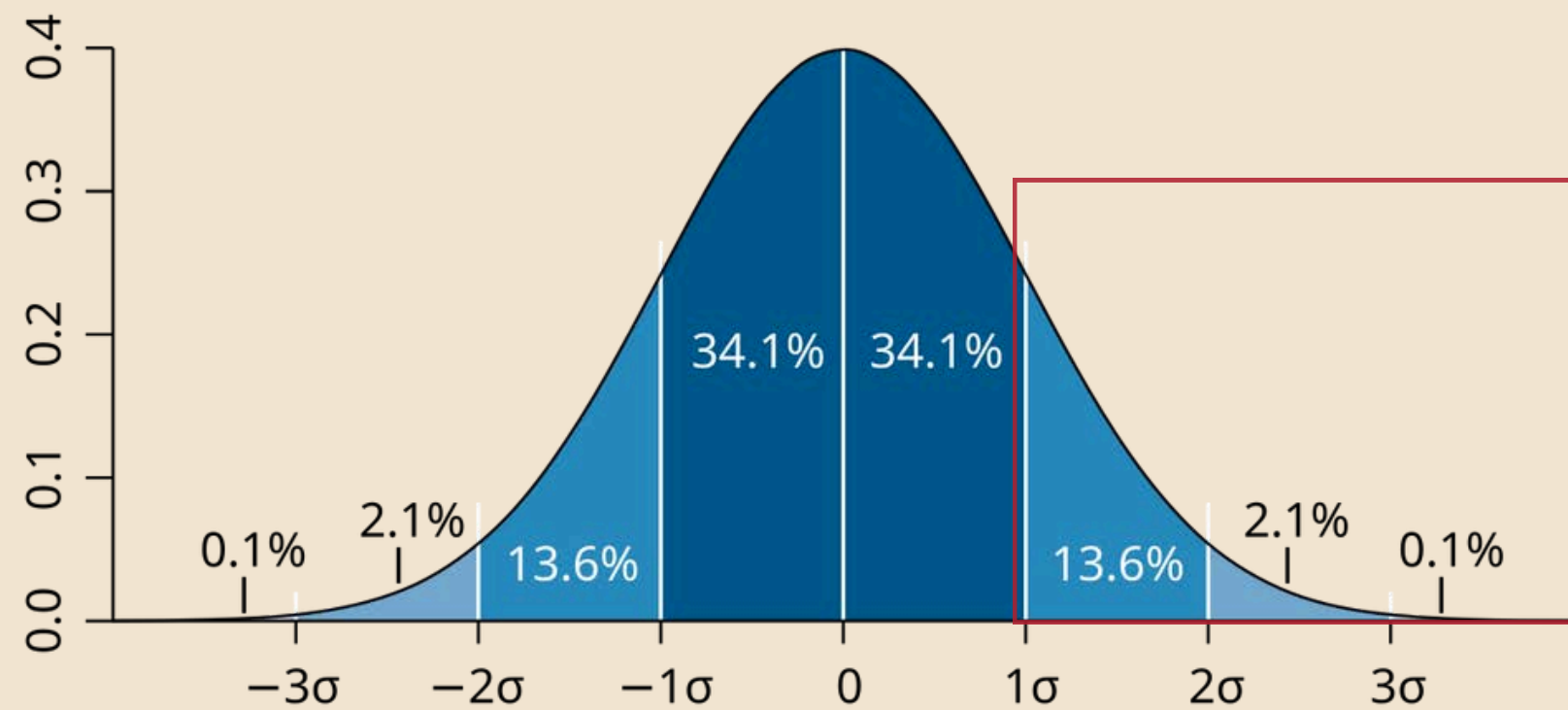
- Health Risks
- Elders and Disabled Populations
- Linguistic Isolation
- Housing Burden and Unemployment

AREAS OF ESPECIALLY HIGH VULNERABILITY

census tracts that display high vulnerability across multiple indicators

How were these areas identified?

- 1 Identify *heightened exposure or heightened sensitivity*
Indicator scores **above one standard deviation of the mean** of all scores for a given indicator



Census Tract	Environmental Exposure	NATA Cancer Risk	NATA Respiratory Hazard	NATA Diesel Particulate Matter	PM 2.5
1603	78	79	86	83	86
1604	76	72	82	87	84
1605	84	78	86	89	88
1606	75	74	78	82	88
1607	71	72	74	76	87
1608	79	72	77	83	87
1609	78	74	82	89	85
1610	76	75	82	82	87
1611	88	84	96	96	89
1612	80	74	78	82	88
1613	89	78	88	91	90
1614	94	89	97	96	91
1615	90	83	95	97	90
1616	91	88	97	97	90
1617	75	73	84	87	89
1618	82	80	94	96	92
1619	88	83	97	98	93
1620	90	83	95	98	93
1621	89	85	96	98	93
1622	94	88	98	98	94
1623	91	89	97	97	94
1624	81	80	95	97	94
1625	77	73	81	88	91

HEIGHTENED EXPOSURE

Indicators most frequently identified:

- ➔ Pollutants Impacting Developmental Health
- ➔ Pollutants Impacting Immunological Health
- ➔ PM 2.5

Census Tract	Number of "Heightened Exposure" Indicators
1605	3
1611	3
1614	7
1616	5
1618	3
1619	5
1620	4
1621	5
1622	7
1623	5
1625	4

HEIGHTENED SENSITIVITY

Indicators most frequently identified:

- ➔ Cardiovascular Disease
- ➔ Low Birth Weight Infants
- ➔ Housing Burden

Census Tract	Number of "Heightened Sensitivity" Indicators
1603	5
1604	7
1610	4
1611	5
1614	6
1622	3
1623	3
1624	4

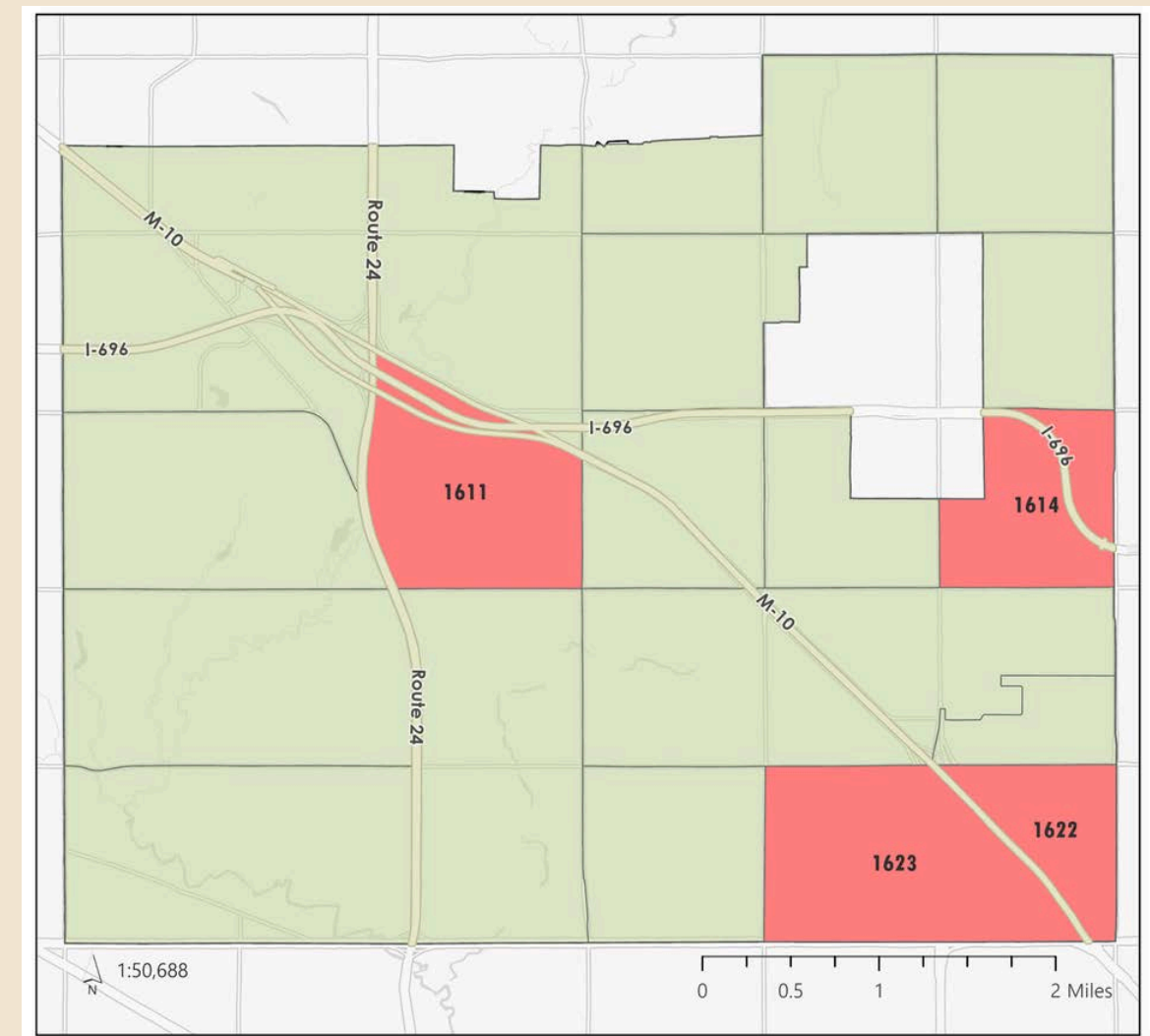
- 2** Identify **census tracts that display especially high vulnerability**
Census tracts with **three or more indicators displaying heightened exposure** **AND**
three or more indicators displaying heightened sensitivity

Total of 4 census tracts were identified as especially vulnerable:

1611, 1614, 1622, 1623

Additional considerations from
the SEMCOG Demographic Emphasis Areas

- Transit Dependence
- No-car Households
- Households in Poverty

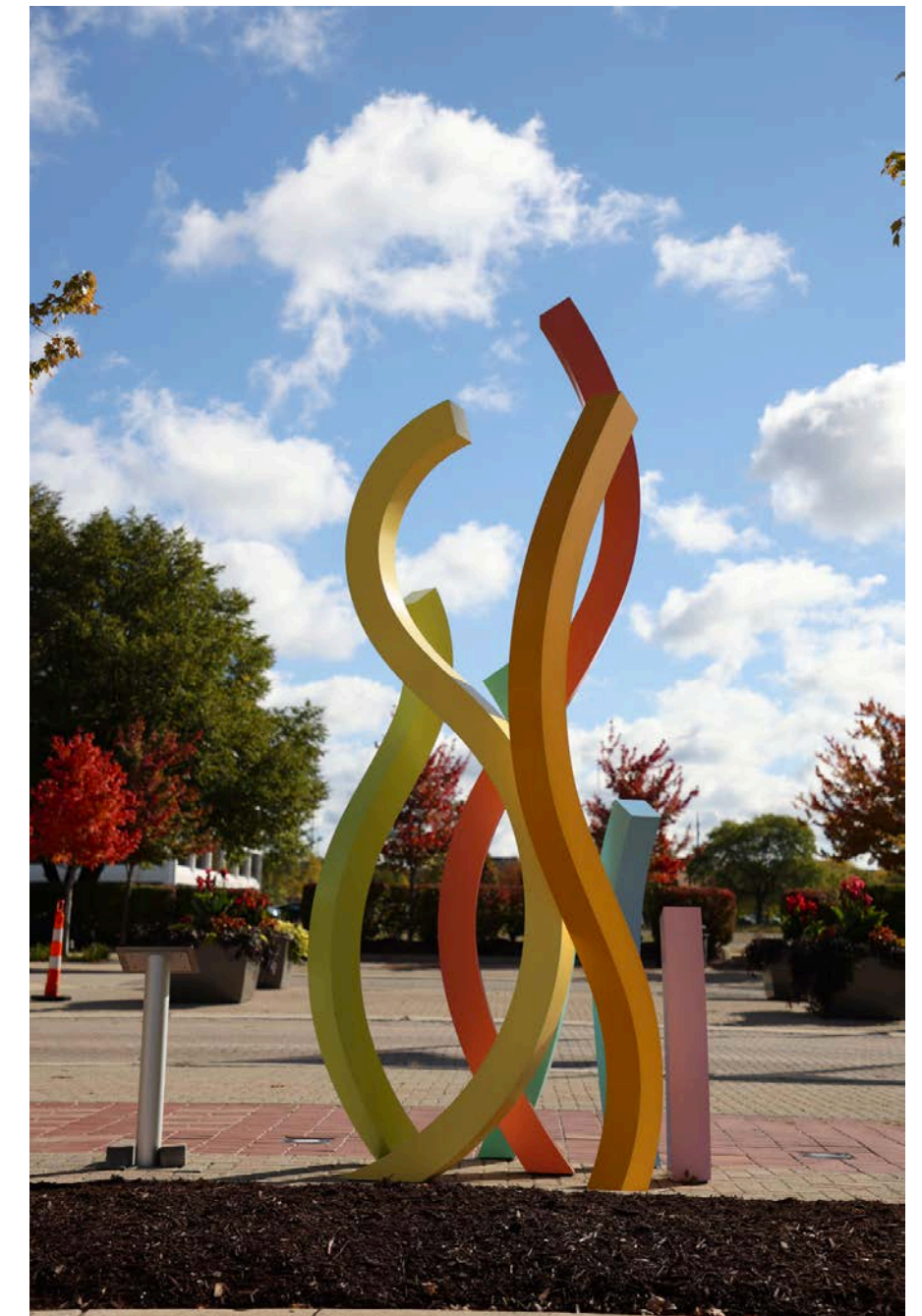


Tips for Writing Recommendations

- Highlight gaps in data collection or knowledge
- Pursue further investigation
- Reinforce actions currently taking place

Recommendations for Southfield

- Follow up on findings with supplementary studies
- Conduct Adaptive Capacity study



THANK YOU!

