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## USA NSF Civic Innovation Challenge

- The National Science Foundation (NSF) supports community-university partnerships to solve a community identified problem in 12 months.
- Residents on the Eastside of Detroit, MI experienced dramatic flooding in 2021 primarily from sewer surcharge and road flooding.
- In the planning stage, REFURB joined efforts to build community capacity to mitigate future basement flooding.
- In Stage 1, researchers co-produced solutions with the East Side Resident Task Force (n=25) & pilot tested technology (e.g., mitigation map & non-invasive detection of damaged sewer pipes by comparing ground penetrating radar with video scoping in 5 homes).
- This grounded REFURB in community needs & resident-led solutions to improve health & well-being, access to data, information, technology, communication, & infrastructure.



Fig. 1 Flooding on East Side of Detroit. Photo by City of Detroit 2021.

## Pilot Vision

REFURB's vision is to ensure that communities who have faced racial and economic discrimination have the information and resources needed to prepare for and respond to climate change induced flooding.

## Research Questions

### RQ1: Critical infrastructure for Climate Change Mitigation

- What is needed to adapt a given critical infrastructure to environmental variations the community is experiencing due to the changing climate?

### RQ2: Trauma-Informed Case Management in Resilience Hubs

- RQ2: How can the partnering community improve resilience of its built, natural, and social environment—in particular community services—to prepare for and minimize the threat of increased climate variability as well as rapid-onset or slow-developing hazards?

### RQ3: Early Warning System

- RQ3: What are the best early-warning, response, and preparedness communication technologies that can reach vulnerable residents despite wide disparities in internet and phone connectivity?

## Funding Acknowledgement & Partner Logos



National Science Foundation Award #2228584



Jefferson East, Inc. Go East.

Scan the QR Code or [click here to hear from our East Side Resident Task Force.](#)



## Partnerships

### Civic Partners

- Eastside Community Network
- Jefferson East, Inc
- United Way for Southeast Michigan
- Detroit Water and Sewerage Department (Stage 2)
- Blue Cross Blue Shield Foundation of Michigan (Stage 2)

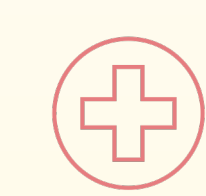
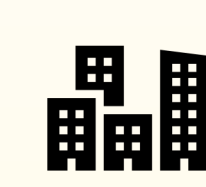


Fig. 2: From left to right: Arlene Garner (Eastside Climate Action Coalition [ECAC]), Shaton Dockery (ECAC), & Erin Stanley (Eastside Community Network Climate Equity Director & WSU School of Social Work & Anthropology PhD Candidate) brainstorm climate action advocacy points at the Stoudamire Wellness Hub. The ECAC meets monthly on issues of air quality and climate change mitigation. The NSF CIVIC grant supports the East Side Resident Task Force. Photo by ECN, 2022.

### Research Disciplines from Wayne State University

- Social Work & Anthropology
- Communication
- Civil & Environmental Engineering
- Soil Science & Hydrology
- Geophysics (Stage 1)

## Results & Takeaways

### Field Pilot



Fig 3: From l to r: Social Work students Casey Lee, Jennifer Muscat, Arreana Jackson join William Shuster (Professor Environmental & Civil Engineering) in Jefferson Chalmers to observe groundwater and sewer conditions that lead to floods. Photo by Smith 2022.

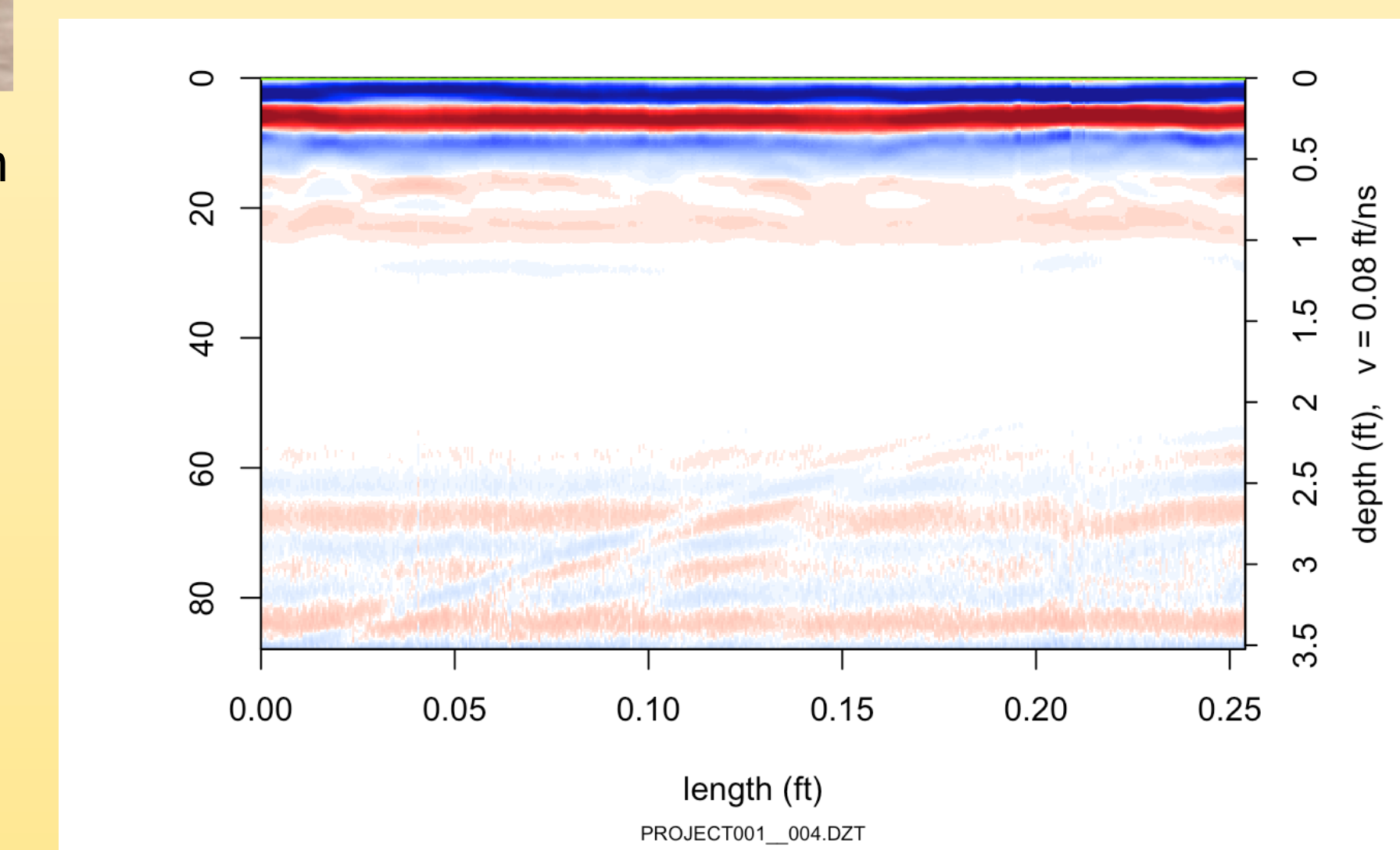


Fig 4. Example of 200 MHz ground penetrating radar scan.

- The diagonal pattern l to r indicates possible location of downward sloping pipe.
- GPR is used for commercial construction, but may not be cost effective for urban residences—especially those with backyard obstructions.
- We concluded video scoping is more cost effective and could potentially be used to estimate groundwater infiltration.
- Test homes had GSI but wanted more solutions.

### Stage 2 Plans

- In Stage 2, the East Side Resident Task Force, community partners, & research team plan to...
- Monitor water levels in canals, sewers, and basements.
  - Train staff and volunteers in outreach to impacted residents and offer trauma-informed services.
  - Develop an early warning system to detect & mitigate future flooding.

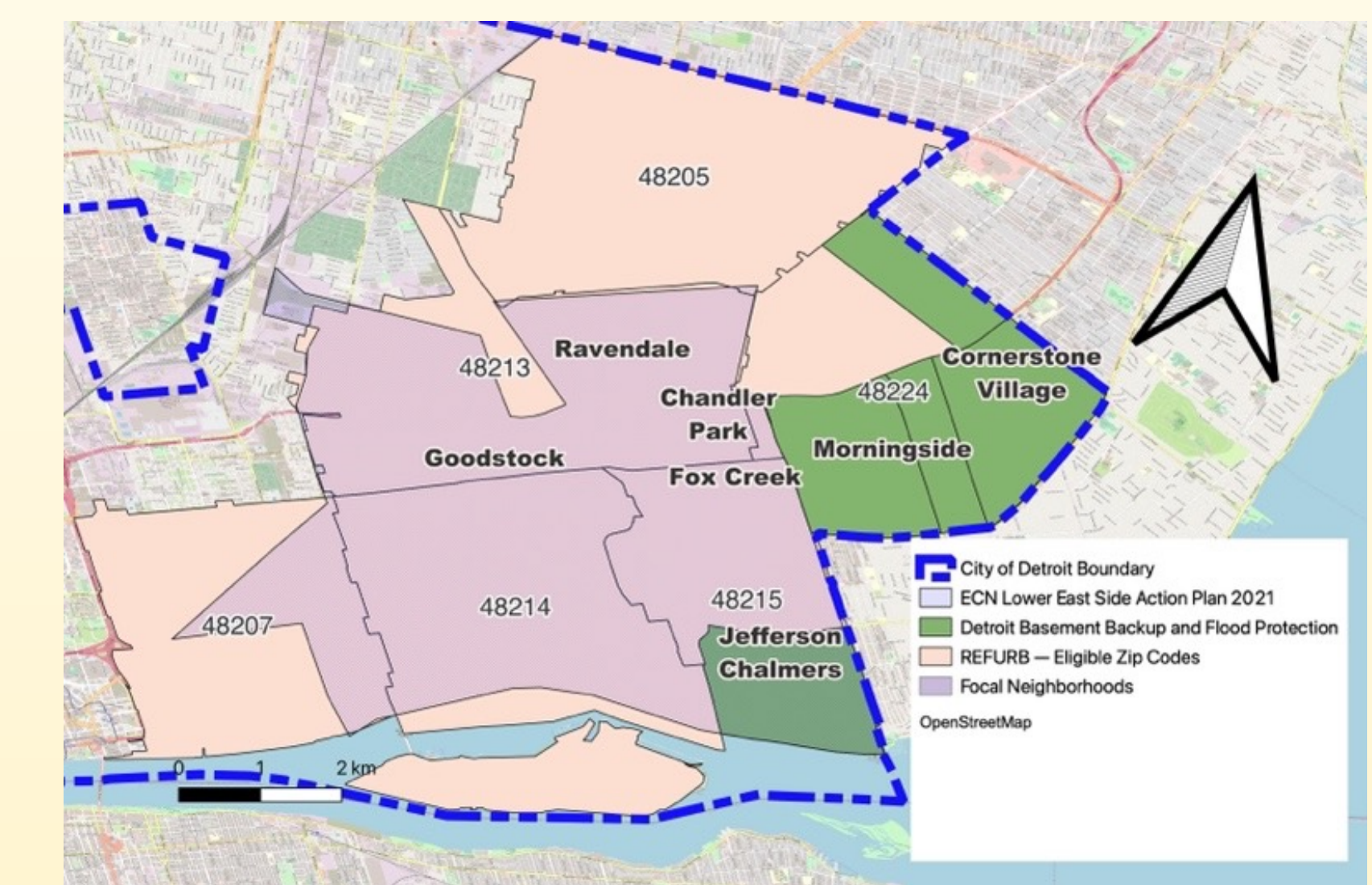


Fig 5: REFURB Focal Area in Detroit, MI with emphasis on the Lower East Side Action Plan area.

### Causes of Flooding

1. Overbank Flooding of river and canals
2. Groundwater (GW) Inflow/Infiltration (I/I) into basements
3. Septic backup due to system surcharge
4. Direct inflow of stormwater runoff
5. Freezing pipes

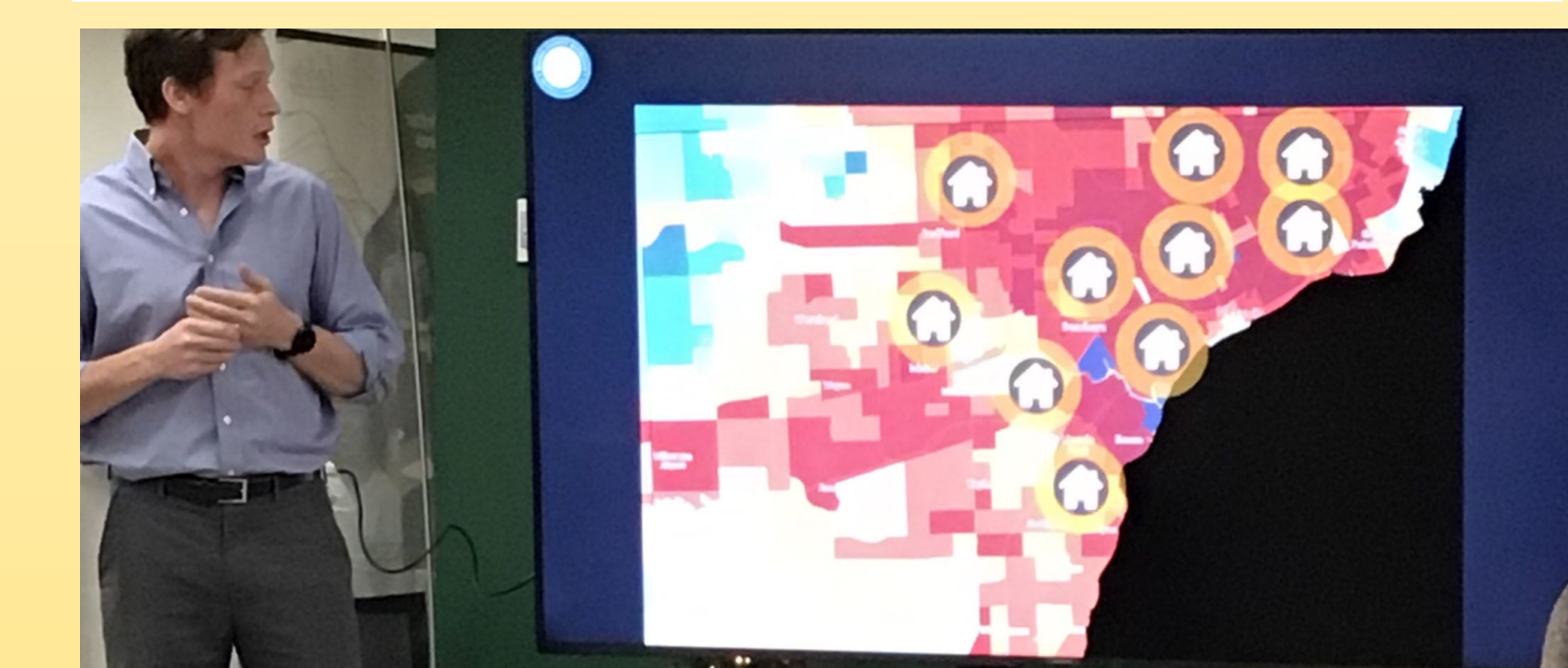


Fig 6. Ramsay Ritchie of Wayne County Sustainability Program shows potential location of Resilience HUBs. Fig 7. City of Detroit Town Hall on Disaster Recovery. Photos by Smith, 2022.

