



Southeast MI Climate Plans and Energy Equity Analysis and Implementation

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Executive Summary

Local communities in Michigan have been hotspots of extreme weather events due to accelerating climate change, with increasing severity and frequency of precipitation, storm events, and extreme heat (MSU Extension, 2022; Fair, 2023; MDHHS, 2023). Winters in Southeast Michigan have become warmer and less snowy as a result of the overall warming climate pattern (Fair, 2023). For communities that have lacked investment in infrastructures, negative climate impacts hit much harder, which is precisely the case for Detroit. Elevate, a Chicago-based nonprofit that works to provide equitable access to clean and affordable heat, power, and water in communities across the country, collaborated with the Dow Fellows team to identify comprehensive strategies to support local climate planning and resilience building in the face of climate impacts in Southeast Michigan.

The first phase of the project involved conducting a comparative analysis of existing municipal climate action plans and the state-wide Michigan Healthy Climate plan by developing assessment benchmarks, reviewing and evaluating the plans, and interviewing stakeholders to learn how municipalities are planning for community resilience, energy, affordability, health, transportation, partnerships, and implementation. We delivered the assessment results on best practices, areas for improvement, and opportunities for Elevate to step in as a one-pager (Appendix A).

The second phase of this project was part of the Resilience Eastside Initiative (REI) in Detroit, where Elevate is collaborating with Eastside Community Network (ECN) to develop a network of resilience hubs designed to support residents during climate-induced emergencies. The Dow Fellows team developed a framework for defining climate emergencies for the resilience hub network, covering the four most common types of emergencies on Detroit's east side: extreme heat, flooding, winter storms, and air quality. In contrast to most publicly available definitions, we envisioned this to be not only location-based but also to include different tiers of warning for general, healthy adult populations and vulnerable groups under each type of emergency. Since extreme heat, flooding, and winter storms will also lead to power outages, we're also incorporating power outages into the definitions of these three emergencies. We're delivering the framework in four one-pagers, one for each type of emergency, with detailed definition descriptions for tiers of warning and flow charts to actions for local resilience hubs on how to act under what conditions. A map of the distribution of the REI resilience hub network will be prepared as an additional resource.

The Dow Fellows project has supported Elevate's work in Michigan by (1) identifying strategic insights on how Elevate can step in to facilitate the equitable and sustainable implementation of

municipal climate plans; (2) laying the foundational climate definition frameworks for the resilience hub network to utilize in their future emergencies; and (3) advancing six United Nations Sustainable Development Goals, particularly those related to sustainable cities, climate action, and community partnerships.

On the basis of the foundation for the REI network that is completed by our Dow Fellows team, strengthening the relationship among local in-network hubs, defining and documenting operating procedures with the incorporation of local contexts and priorities, and specifically digging into the issue of flooding as well as creating flooding-relevant visualizations will be essential next steps for Elevate and ECN. Moving beyond the climate emergency framework we've presented, more in-depth vulnerability assessments should be incorporated into the emergency definition for the purpose of efficient resource allocation and proactive responses before natural disasters officially strike.

Introduction and Background

Over the last few years, cities, counties, and states have proactively published climate strategies and reports to address the pressing local impacts of climate change and implement both mitigation and adaptation measures. With a focus on reducing greenhouse gas emissions and bolstering resilience, these strategies are crucial for fostering sustainability and combating the immediate challenges of extreme weather events and public health threats. These plans not only serve as a roadmap for policy development and regulation but also engage local communities, enhance public awareness, and drive economic benefits by promoting sustainable practices and clean energy initiatives. In Southeast Michigan, several municipal climate plans are already in place, such as the State of Michigan's MI Healthy Climate Plan and Ann Arbor's A2 Zero Plan, among others. Also, there are other cities and municipalities developing and publishing climate plans: the City of Detroit, Washtenaw County, and Wayne County. Meanwhile, through the Inflation Reduction Act and the Infrastructure Investment and Jobs Act, significant funding is now available, in addition to private philanthropic funds that focus on climate change and clean energy transition. Given this increased backing for climate action in terms of planning and available funding, it is the opportune moment to take action. Traditionally, climate strategies have been fragmented, often marked by regional disparities in resources and priorities. This fragmentation has been a barrier to effective collaboration and coordination. However, with recent federal funding emphasizing climate change and clean energy transition, there's a new opportunity to bridge these gaps.

For this project, our Dow Fellows team collaborated with Elevate, a non-profit organization, to explore how Elevate can significantly contribute to implementing strategies that enhance

sustainable development and climate resilience in the region. Elevate, headquartered in Chicago and operating nationally, is dedicated to fostering climate equity and enhancing community resilience. Their mission is to ensure clean and affordable heat, power, and water in homes and communities, with a particular focus on equity in climate initiatives. In Detroit, Elevate aims to address the gap in providing equitable climate solutions that cater to the diverse needs of local communities. By collaborating with Elevate, we seek to help improve municipal climate strategies, ensuring that our efforts in Detroit contribute effectively to climate resilience and support the unique requirements of the city's residents.

The original scope of our work was to conduct a comprehensive analysis to highlight common elements across different municipal climate plans, with the goal of evaluating the progress towards climate resilience and energy equity. This analysis will serve as guidance for municipalities to improve their climate planning and for Elevate to identify potential areas to step in for future collaboration. Such collaboration, anchored in shared goals and resources, promises significant benefits, including increased efficiency, stronger resilience strategies, and a more sustainable approach to climate change mitigation and adaptation.

Furthermore, our work extended to participate in the Resilient Eastside Initiative (REI) in our collaboration with Elevate and its partner - Eastside Community Network (ECN). We developed a climate emergency definition framework for the most common disasters that strike Detroit and provided a coordinated approach for emergency response in Detroit's East Side neighborhoods. Recognizing the lack of standardized terminology in emergency management, we concentrated on defining and categorizing critical emergency-related terms for four types of natural disasters: 1) Extreme Heat, 2) Flooding, 3) Winter Storms, and 4) Air Quality. This groundwork was critical in creating a shared understanding and consistent language for the emergency response mechanisms, establishing trigger levels, and outlining specific actions for local resilience hubs. By bridging this knowledge gap, our work aimed to streamline communication and decision-making processes for effective emergency response, ensuring that local residents, resilience hubs, and the City of Detroit are better equipped to handle crises. This strategic approach is expected to significantly enhance emergency preparedness, response efficiency, and overall community resilience.

Methods

The first part of our work to examine the municipal climate action plan falls within the original scope of this collaborative project with Elevate: to analyze the disparate climate resilience planning strategies across Southeast Michigan and ideate on how Elevate can be a part of implementing them. The REI project was initiated around the start of our Dow Fellows project in

February, and as agreed by all group members, we decided to also participate in the work for REI, which is the second phase of our project focusing on the climate emergency definition framework.

The first phase of work to conduct a comprehensive review of Climate and Resilience Plans in Southeast Michigan included the identification, review, and benchmark analysis of four climate strategies that ranged from city, county, and state levels. We examined four existing plans - the City of Ann Arbor's A2 Zero Climate Action Plan 4.0 (2019), The State of Michigan's MI Healthy Climate Plan (2022), The County of Washtenaw's Resilient Washtenaw Plan (2022), and The City of Ypsilanti's Climate Action Plan (2012), we also interviewed Ramsay Ritchie, the former Wayne County Climate Director to understand the ongoing planning of Wayne County's climate action plan. These municipal climate plans were chosen because Elevate wanted to understand the priorities and goals of these communities in Southeast Michigan, how these are similar or different from one another, and how Elevate can be of aid in implementing action. However, due to the fact that some municipalities are still in the development phase of the local climate plan, such as the City of Detroit, we only specifically evaluated published plans. The plans were evaluated against a set of benchmarks we selected that we and Elevate thought to be pivotal to the discussion of energy, equity, and resiliency within climate resilience building and future actions. The benchmarking included 8 categories: 1) Community Resilience Building, 2) Energy, 3) Affordability, 4) Health, 5) Transportation, 6) Engagement, 7) Costs and Funds, and 8) Opportunities for Elevate. Each of the eight categories had separate subcategories, which can be found in Appendix B.

After reviewing and analyzing the individual plan by locating and extracting planning goals, actions, and strategies in reference to this benchmarking metric, we synthesized the information and data in a digestible summary of key findings of each plan, including strengths and weaknesses, and created recommendations for Elevate's involvement (Appendix A).

The second phase of work was an essential part of the process development planning for REI, introduced earlier in the report. Elevate is partnering with ECN to develop a network of resilience hubs across ECN's service area on Detroit's east side for REI. Our Dow Fellows team generated a guide with climate emergency definitions to aid community partners and resilience hubs in the REI network on the east side of Detroit. The purpose is to establish a common understanding of what triggers "Climate Emergency" to support network planning as a whole in partnership with the city of Detroit. This phase of work was fulfilled by identifying four types of climate emergencies, gathering local knowledge through meeting with active community members and resilience hubs on the eastside of Detroit, researching and analyzing external climate emergency definitions and data, and then synthesizing these steps to craft a working definition for each emergency. We cover four climate emergencies identified by ECN and

community residents as the natural disasters that most commonly impact residents on the east side of Detroit: 1) Extreme Heat, 2) Flooding, 3) Winter Storms, and 4) Air Quality.

Furthermore, as climate change continues to escalate, these emergencies are anticipated to become more frequent and intense, making them all the more critical to address. Our team worked closely with local residents and resilience hubs on Detroit's east side. This was accomplished by attending two REI Roundtable meetings at the ECN with established and new resilience hubs, as well as one-on-one interviews with four hub leaders from the REI network and Maria Galarza from the City of Detroit's Office of Sustainability. Their valuable insights and knowledge were used to improve our understanding of these climate emergencies, which ranged from daily operations, existing emergency response mechanisms, and the most frequently encountered natural disasters to knowledge of local indicators of extreme weather. Simultaneously, we conducted extensive research and analysis of external climate emergency definitions and data, drawing on knowledge and insights from the Federal Emergency Management Agency (FEMA), the National Weather Service (NWS), and other established sources. By integrating the information gathered from the steps mentioned above, we crafted a working definition and flowchart for each of the four identified climate emergencies. These definitions serve as a crucial foundation for addressing and mitigating these issues for the resilience hubs in the network being developed by ECN and Elevate.

Finally, to supplement the REI work for supporting residents during climate-induced emergencies in Phase 2, we created a resilience hub distribution map for the REI integrated implementation plan and guidebook using ArcGIS and Photoshop. We used a map file downloaded from the city of Detroit's database and labeled the active resilience hubs based on the information provided by Elevate and ECN. A few major greenspaces are also marked in the areas. We created and tweaked the map to meet Elevate and ECN's requirements for highlighting critical information and improving readability.

Deliverables and Recommendations

Three final deliverables are created as a result of this project for Elevate, REI organizations, and local communities.

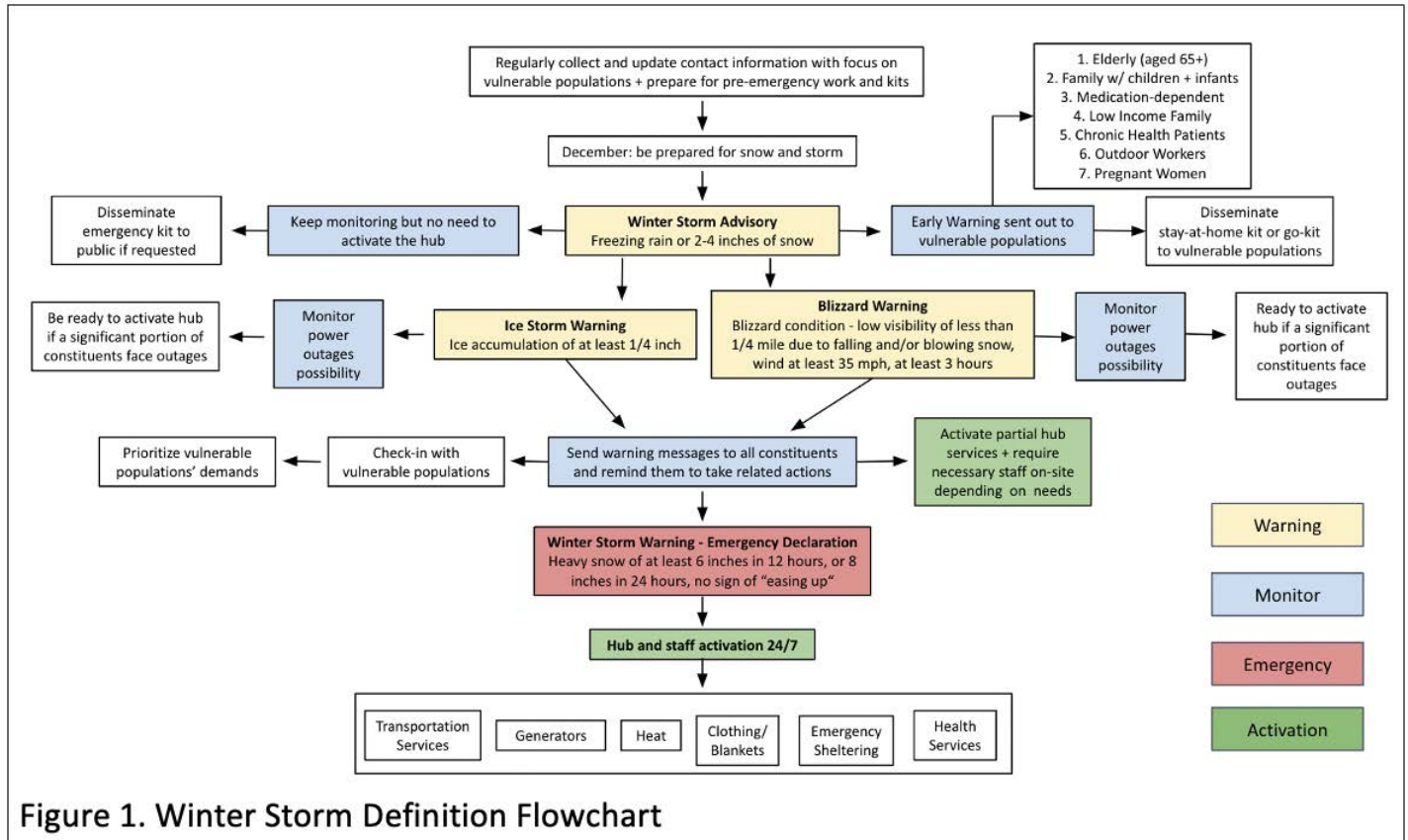
Deliverable 1 - Phase 1

After analyzing the comprehensive landscape of climate and resilience plans in Southeast Michigan, the first deliverable is an educational one-pager (Appendix A) for distribution to partners and a summary of key findings of the plans and opportunities for Elevate to get involved. Detailed benchmarking and analysis results in the Excel spreadsheet can be found in

Appendix B. According to our comparative analysis, the primary goal of all four plans is to reduce greenhouse gas emissions, with two of them aiming for 100% renewable energy. The themes of clean energy and energy efficiency are common. In order to plan more proactively in the face of climate change, there is a need to conduct place-based vulnerability assessments to identify both areas and populations that are most affected by climate threats. Community resilience is mentioned in the plans but lacks the details of the resilience-building processes, such as resilience services, structures, communications, operations, responses, and transportation. Elevate's future opportunities include assisting municipalities with vulnerability assessments, aligning with Michigan's comprehensive adaptation plans, filling gaps in Ypsilanti's equity and resilience strategies, and updating Washtenaw County's action for energy and resilience hubs. The next critical step Elevate should take to facilitate equitable sustainable transformation is to help municipalities incorporate equity elements into every part of the greenhouse gas emission reduction targets and measures.

Deliverable II - Phase 2

The second deliverable is a guide to assist REI resilience hub leaders, ECN, Elevate, and the City of Detroit in defining four "climate emergencies" with four individual one-pagers, specifically for resilience hubs on Detroit's east side. Each one-pager covers the specific description of the triggers of different tiers of warning for general, healthy adult, and vulnerable populations, respectively. And each one also includes flow charts to guide resilience hubs on how to activate services or respond based on the situation of the emergency. All one-pagers can be found in Appendix D to H. Figure 1 below is an example of the winter storm definition flowchart, and we presented this example to the November REI roundtable to help the hubs get prepared since the storm season is right around the corner. As shown in Figure 1, (1) vulnerable populations are identified; (2) key actions are differentiated into four categories: warning, monitoring, emergency, and activation; (3) essential services that should be provided are laid out. All four flow charts were developed in this same model. This is just a starting point of the definition framework, even though we have made the best efforts to tailor the definitions to be Detroit-based. Lacking detailed vulnerability assessment and local indicators, the triggering conditions were still not precise enough. Additionally, since our Dow Fellows team was not familiar with the specific operation of each hub, the activation processes and regular routine preparation work are very broad, leaving plenty of room for the hub network to fill in. A side note here about the definition of flooding: through in-depth research, we realized that the flooding that Detroit experiences is normally what is called "urban flooding", which is different from "flooding". Urban flooding is not what is commonly known by local organizations and residents, so we are still using the term - flooding - in this report. We have drafted separate one-pagers for flooding and urban flooding that are included in the appendix.



Deliverable III - Phase 2

Lastly, a REI resilience hub distribution map will be included for residents in the east side of Detroit as a key resource to seek help before, during, and after major weather events. A screenshot of the most updated version and the link to the original PNG file is included in Appendix C. A high-resolution map will be provided by Elevate and ECN to local resilience hubs and residents. This will be a critical component of the official guidebook or implementation guide that Elevate and ECN plan to send out to local hubs. During the November REI roundtable meeting, local hub leaders identified areas that aren't served or don't have a hub nearby, pointing out future hub establishments and some other layers of information that could be added to the map in the future, such as the service radius of each hub and transportation routes to each hub.

Impact

When reflecting on the potential impact of our team's deliverables and how it can be used by Elevate, ECN, and community partners, the four main opportunities for impact include: (1) helping Elevate understand strategic opportunities for partnership in Southeast Michigan; (2) developing the foundation for defining climate emergencies and triggers for action for developing the resilience hub network as part of the REI; (3) collecting and consolidating resilience hubs' priorities, goals, needs across the east side of Detroit; and (4) increased impacts of six of the United Nations Sustainable Development Goals (SDGs).

Beginning with the deliverables created in Phase 1 during our team's benchmarking of climate plans within Southeast Michigan, our team was able to create a comprehensive Excel sheet with all evaluation details extracted from each climate plan and a concise written one-pager summarizing our findings. With these deliverables in hand, Elevate can understand at a glance the current landscape of climate plans currently in progress within the state of Michigan. Moreover, by having a deep dive into 8 different categories, Elevate can cross-reference our findings with their past and current work in these spaces. More specifically, by having a category dedicated to highlighting "opportunities for Elevate", Elevate has a clear understanding of where its capabilities as an organization can best be applied to assist in the implementation of these plans. The second key impact our work in Phase 1 can have is easier dissemination of information to Elevate leaders engaging in strategic planning and partnerships. More specifically, by translating our findings from the Excel sheet into a more user-friendly summary report and one-pager, Elevate is better equipped to easily communicate the status of climate plans within Southeast Michigan internally within the organization itself to inform strategic planning.

Shifting toward Phase 2 of our project, our team created a framework for defining triggers for the following climate emergencies: extreme heat, flooding, air quality, power outages, and winter storms. As Elevate collaborates with ECN to develop a playbook and "guidebook" for resilience hubs, the findings of our research will be shared directly with resilience hub leaders to serve as a solid foundation for them to further refine and implement when the community is faced with a climate emergency. During our team's interviews with the resilience hubs, a key takeaway gleaned was the current reactive nature of hub activation, where hubs typically provide relief to their community members when they directly reach out for aid. As a result, our deliverables can be used as a guideline for a more proactive approach to hub activation, where hubs can communicate to members ahead of time when a certain "trigger" occurs for a certain emergency. Thus, a key impact of the deliverables created in phase 2 is this foundational step in

the process of activating a network of resilient hubs in Detroit to assist community members historically disproportionately impacted by climate emergencies.

Our project addresses six of the United Nations Sustainable Development (SDG) goals including: good health and well-being, affordable and clean energy, reduced inequalities, sustainable cities and communities, climate action, and partnerships for goals. At its heart, Elevate's historical work has been at the nexus of community engagement and ensuring folks in historically disadvantaged communities have access to clean and affordable heat, water, and power. Thus, any impact our deliverables provide that can support Elevate to continue to expand this meaningful work inherently addresses these SDGs.

Specifically pertaining to the first phase of our project, the SDGs addressed were sustainable cities and communities, climate action, and partnerships for goals. Namely, the deliverables of our work summarized the current efforts being made to create sustainable cities, communities, and counties via comprehensive climate action. Moreover, the educational materials and summary "one-pager" created can assist Elevate in seeking future partnerships with cities and counties as they look to create future climate plans.

For the second phase of our project, the key goals addressed here are good health and well-being, reduced inequalities, and partnerships for goals. With the majority of hubs responding to climate emergencies that endanger the well-being of residents in the community, being able to proactively address and respond to emergencies related to air quality, flooding, and extreme heat will inherently impact the good health and well-being of residents on the east side. Moreover, by having an active and diverse network of resilience hubs able to respond to community needs of a variety of demographics, inequalities can be actively reduced on the east side. Lastly, by incorporating our deliverables into a Resilient Eastside Initiative "playbook" to be distributed to resilience hub leaders, ECN and Elevate are fostering stronger community partnerships centered around climate action.

Future Considerations

Following the completion of this Dow Fellows project, the REI will continue to grow and develop. Much more research could be conducted to supplement this fantastic project, leaving the possibility of having another partnership between the Dow Sustainability Fellows Program and Elevate. The work we present lacks precise local indicators and what services each hub can provide, so it is just an overview of what the framework should look like. The next steps involve deepening Elevate and ECN's engagement with local resilience hubs to focus on refining and expanding upon our emergency definitions. This enhanced clarity in identifying triggering

conditions and varied response mechanisms will not only facilitate more effective collaboration during crises but also aid in the development of more targeted and efficient response strategies. Building on the foundational work already accomplished, more nuanced emergency definitions, accounting for the specific needs and characteristics of each community on the east side of Detroit, will better improve preparedness and also ensure that emergency responses are more accurately tailored to the unique challenges faced by each neighborhood.

Furthermore, assessments of climate and socio-economic vulnerabilities on the east side of Detroit will be another key step forward. The city of Detroit will launch the hazard vulnerability map later this year, where people can identify the aggregate climate vulnerability for each neighborhood. However, the aggregate level of information sheds no light on which type(s) of climate hazard hits the specific neighborhood the most, pointing out the future direction to delve into detailed vulnerability assessment on each type of climate risk in each neighborhood. Employing more advanced spatial analysis and remote sensing skills may be needed to visualize the work as vulnerability maps. This multi-faceted approach will not only contribute to a more comprehensive understanding of local risks but also foster a proactive culture of preparedness, ultimately empowering communities to mitigate and respond to emergencies more effectively.

Last but not least, flooding will be an emergency that requires further in-depth investigation due to its complicated nature. Urban flood risk maps also need to portray other information, such as land cover, the distribution of socially vulnerable and other populations, the location of previous flood problems, and the age, design capacity, and condition of stormwater networks, drainage systems, and roads. Geographic information systems offer one means for integrating these observations with predictions of flood inundation. Such further spatial analysis is of great significance for proactive flooding management, which will be widely adopted since flooding is one of the common disasters that strike across the United States.

A new generation of flood maps and visualizations that integrate predictions and local observations of flood extent and impact is needed to communicate urban flood risk. Improved methods for updating the maps to keep pace with urbanization and climate change are also needed. Federal contributions for such an undertaking include flood hazard analysis (discussed above) and data on flood damage (FEMA), precipitation and climate change (National Oceanic and Atmospheric Administration), social vulnerability (National Science Foundation), population and demographics (U.S. Census Bureau), and information from community development grants (Department of Housing and Urban Development).

Other contributors include public and private organizations developing visualization techniques, especially for flood risks, as existing tools to analyze and portray urban flood hazards in the

United States are incomplete and inconsistent. In many cases, the default tools are FEMA maps and analyses, which were not developed to assess urban flood hazards. For example, FEMA maps and analyses do not include some aspects of pluvial flood hazard, flood hazard in small drainage areas (less than 1 square mile), or flood hazards created by drainage and other urban infrastructure.

Acknowledgments

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We are also grateful to Meghan Richards, Richard Ackerman, and Erin Stanley from ECN, Maria Galarza from the Office of Sustainability at the City of Detroit, and Uolanda Davis-Campbell, Katrina Watkins, Tammara Howard, Aisha Griffin from local resilience hubs for their collaborative support. Their contributions in helping us understand the local contexts and their existing operations and responses have been crucial to formulating clear emergency definitions. Their efforts in supporting the local residents of Detroit demonstrate a deep commitment to community resilience.

Another special note of appreciation goes to our project advisor, Associate Professor Jen Maigret (U-M), who graciously stepped in during a critical moment to undertake the supervising role as a key source of assistance. Her insights have greatly contributed to the progress and success of our endeavors.

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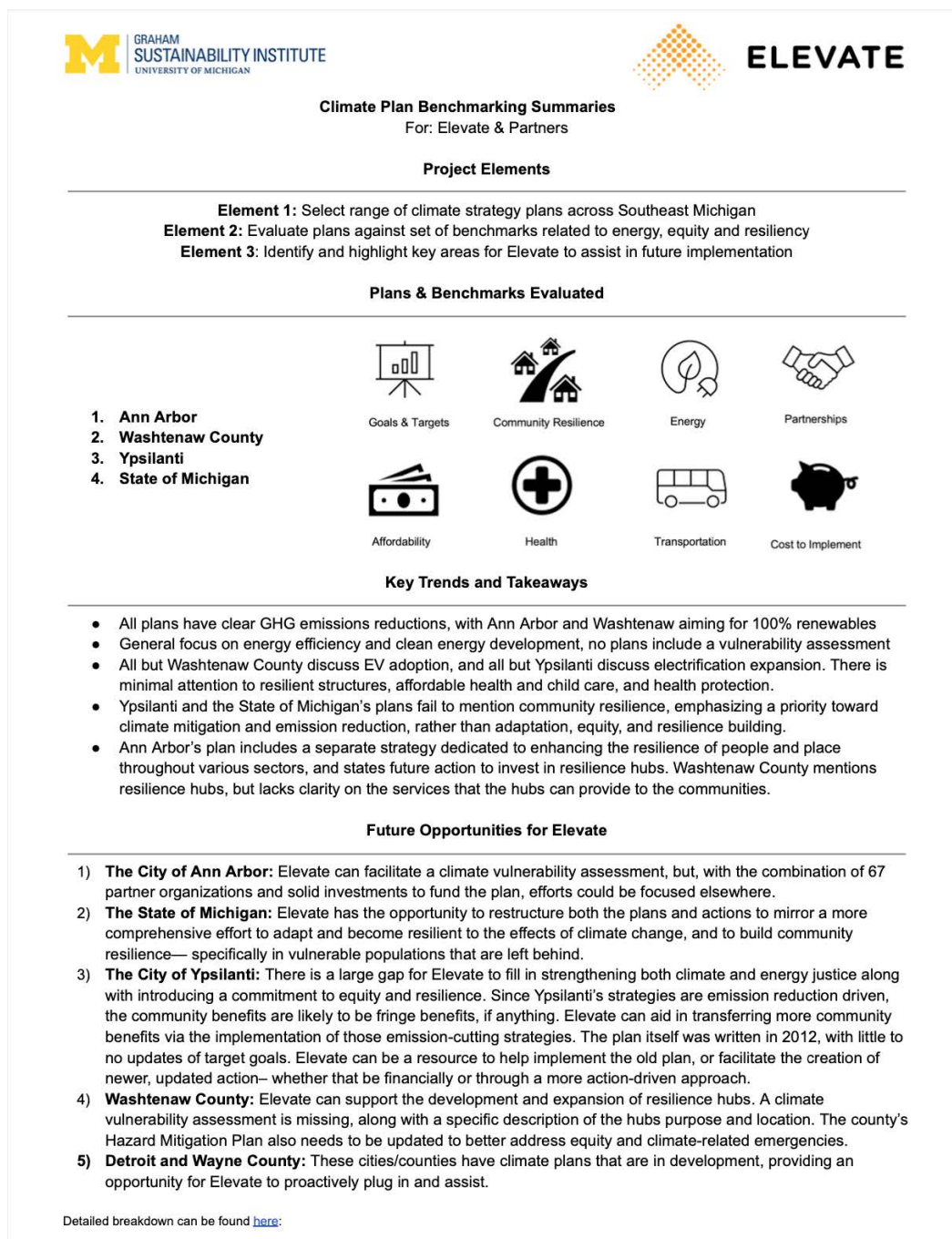
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Appendices

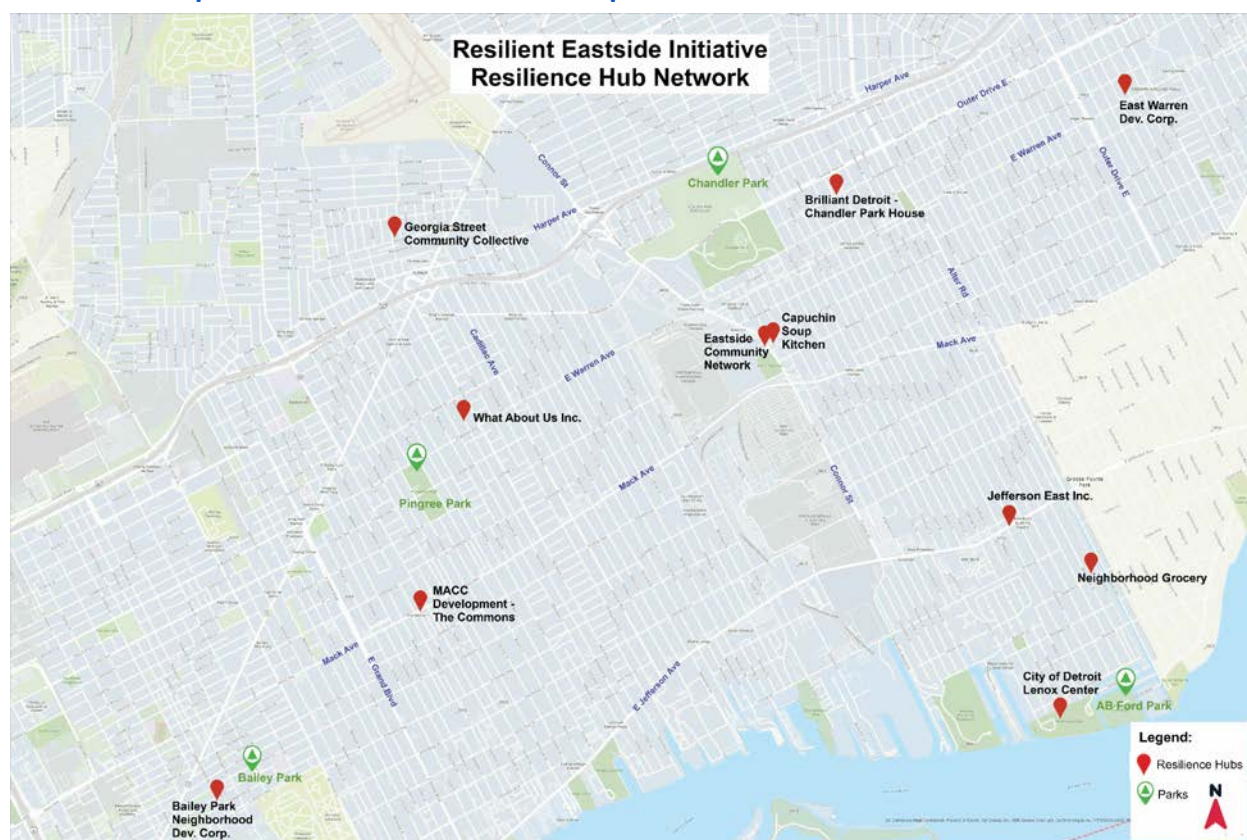
A. [Benchmarking One Pager](#)



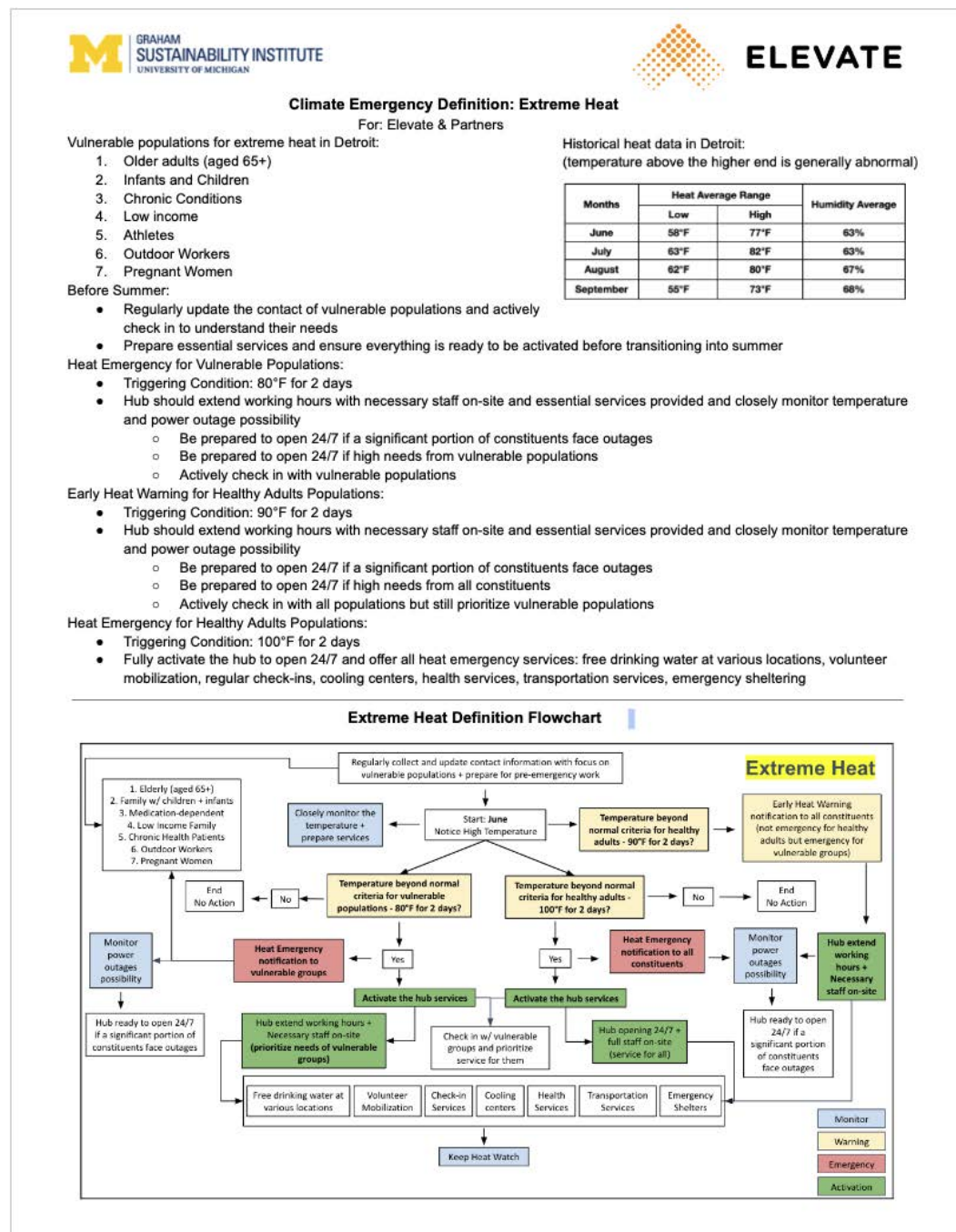
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B. [Detailed Analysis of Climate Strategies within Michigan](#)

C. Most up-to-date REI resilience hub map

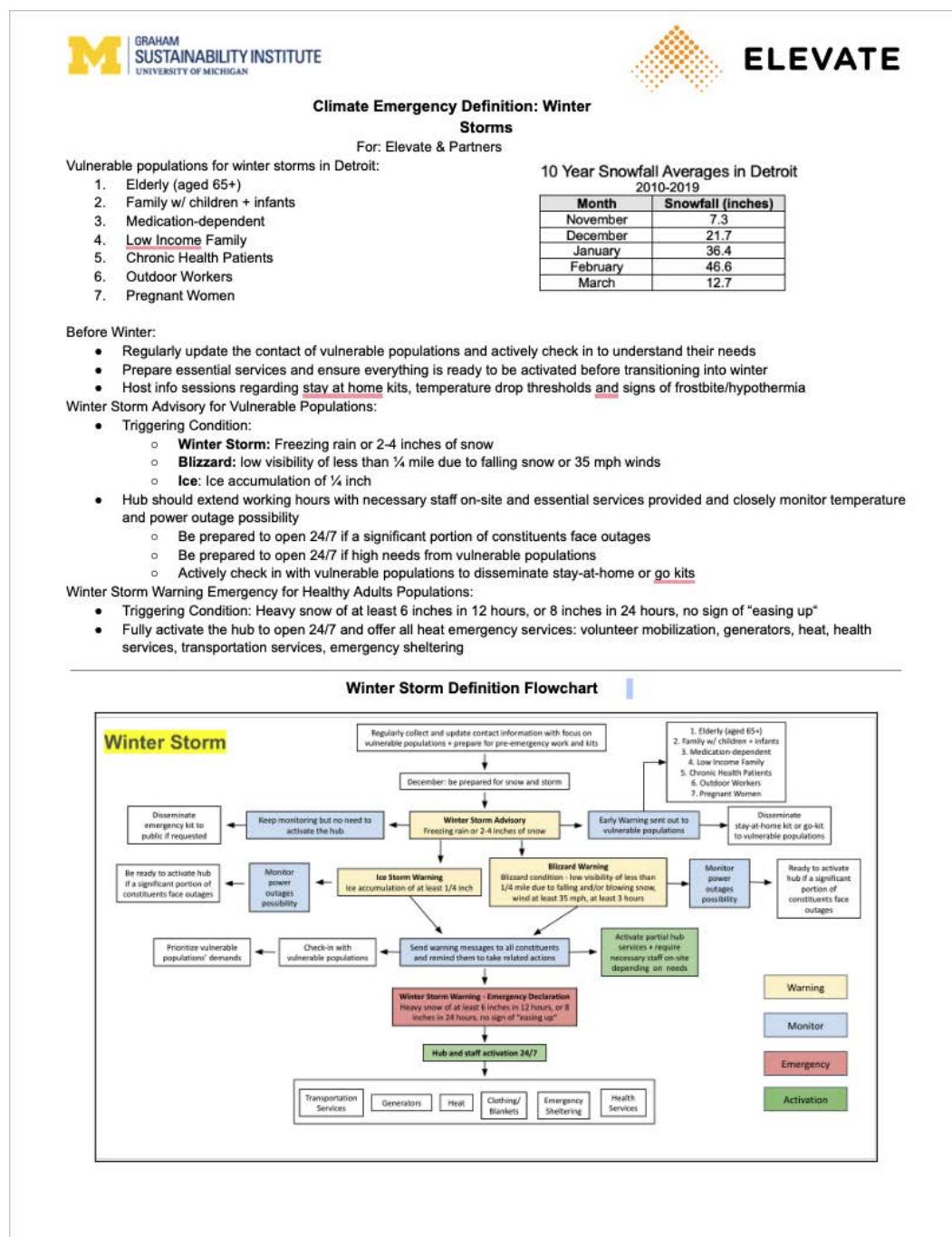


D. Extreme Heat Definition One-pager




(The figure is just an overview of the one-pager - please click the link to the file)


E. Winter Storm Definition One-pager



(The figure is just an overview of the one-pager - please click the link to the file)

F. Flooding Definition One-pager





Climate Emergency Definition: Flooding
 For: Elevate & Partners

Vulnerable populations for flooding in Detroit:

1. Older adults (aged 65+)
2. Infants and Children
3. Mobile Home Residents
4. Renters
5. Low-income individuals
6. Individuals who live on floodplains

Detroit has no particular season where rain and flooding are especially more common. We must continuously regularly update the contact of vulnerable populations and actively check in to understand their needs. Detroit is vulnerable to:

- Flash Floods, or heavy or excessive rainfall in a short period of time, generally less than six hours. Flash floods are usually characterized by raging torrents after heavy rains that rip through river beds, urban streets, or mountain canyons. They can occur within minutes or a few hours of excessive rainfall.
- River flood, water levels rise over the top of river banks due to excessive rain from tropical systems making landfall, persistent thunderstorms over the same area for extended periods of time, combined rainfall and snowmelt, or an ice jam.

Flood Hazard Warnings must be continuously monitored through:

- NOAA Weather Radio All Hazards
- NWS: website provides forecasts, warnings, and identifies where flooding is occurring

Flood Preparation:

- Purchase or renew a flood insurance policy. Homeowner's insurance policies do not cover flooding.
- Learn and practice evacuation routes. Have set shelter plans that are accessible without a car.
- Keep important documents in a waterproof container. Create password-protected digital copies.
- Clean drains and gutters regularly.

Flood Emergency for Vulnerable Populations:

- Flash Flood Watch/Flood Watch from National Weather Service, indicating that flash flooding or flooding is possible within the designated watch area.
- Triggering Condition: no identified triggering condition, wait for 'watch' alert, or observe for heavy or excessive rainfall in a short period of time
- Hub should extend working hours with necessary staff on-site and essential services provided and closely monitor temperature and power outage possibility
 - Be prepared to open 24/7 if a significant portion of constituents face outages
 - Be prepared to open 24/7 if high needs from vulnerable populations
 - Actively check in with vulnerable populations

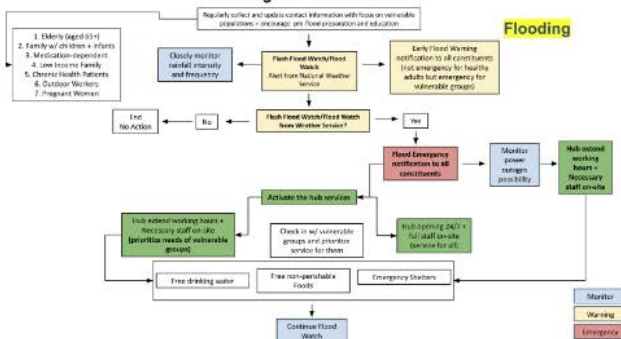
Flood Emergency for Healthy Adults Populations:

- Flash Flood Warning/Flood Warning: Flash flooding or flooding has been reported or is imminent.
- Strongly recommend no driving, walking, or swimming.
- Fully activate the hub to open 24/7 and offer all flooding emergency services: move to higher ground/higher floors, offer volunteer mobilization, emergency sheltering. Be stocked with non-perishable foods and water.

Historical Rain Data in Detroit:

	Days with Rain	Average Rainfall (in)
August	8	2.87
September	9	2.44
October	9	2.64
November	12	2.20
December	13	2.09
January	13	2.05
February	12	2.09
March	13	2.4
April	12	2.99
May	12	3.54
June	11	2.83
July	9	2.83

Flooding Definition Flowchart



(The figure is just an overview of the one-pager - please click the link to the file)

G. [Urban Flooding Definition One-pager](#)



Climate Emergency Definition: Urban Flooding For: Elevate & Partners

What is "Urban Flooding?"

- Urban flooding is (1) caused by rain that (2) falls on [impervious surfaces](#) and (3) overwhelms local stormwater drainage capacity. It includes situations in which stormwater enters buildings through windows, doors, or other openings, water backup through pipes and drains, and seepage through walls and floors.
- Detroit has many buildings and paved surfaces, such as streets, parking lots, and sidewalks. When rain falls on the ground, the water can soak in. But when rain falls on buildings and paved surfaces, it runs off without soaking in. When rainfall does not drain away from low-lying areas, or does not drain away quickly, the accumulated water is called **urban flooding**. Other descriptions used for this type of flooding include stormwater flooding, local flooding, and nuisance flooding. Urban flooding is not the same as flood hazard areas shown on FEMA Flood Insurance Rate Maps (FIRMs)

How does Urban Flooding differ from the Floodplains on FEMA maps?

- Urban flooding has little to do with bodies of water and happens in places that are well outside of the mapped floodplain. It is not the same as flood hazard areas shown on FEMA Flood Insurance Rate Maps (FIRMs).
- Urban flooding can be a problem in any low-lying area, even if there is no body of water nearby. Many low-lying areas are not identified by FEMA as Special Flood Hazard Areas.
- Urban flooding happens more frequently than the severe flooding that inundates the areas shown on FEMA maps.

Factors that Lead to More Frequent Urban Flooding

- Aging and Inadequate Drainage Systems:
 - Many older communities still rely on stormwater, water supply, and wastewater systems that were designed for conditions that existed decades ago and comprise infrastructure that has significantly deteriorated or is undersized for contemporary standards.
- Increases in Local and Regional Runoff:
 - Failure to make infrastructure improvements as changes occurred in increased rainfall and developments (paving land over), increased runoff within the communities.
- Sewage and Stormwater Backups
- Failure to Maintain Drainage Systems
 - All stormwater collection systems require continuous maintenance. Drain blockage, the collapse of pipes, or restrictions in channel capacity, retention, and detention storage can substantially reduce the function of a stormwater system and create flooding in the affected areas.
 - Example: because of a lack of funding, the city of Detroit has been unable to routinely clean its 95,000 catch basins since 2010; where basins are blocked, streets flood. The city reports that 75% of the drains citywide are covered by debris or have a blockage. In 2018, it began [a three-year program](#) to inspect and clear 30,000 of these catch basins. Complaints over street flooding have [been reduced by 70%](#) since the program started.

Insurance in Reference to Urban Flooding:

- Damage caused by urban flooding might be covered by National Flood Insurance Program (NFIP) policies. NFIP policies can be purchased for buildings that are not in the Special Flood Hazard Areas shown on FEMA maps. The coverage has some limitations, including what is covered in basements and other subgrade areas
- NFIP policies pay claims when damage is caused by a "general condition of flooding," which is defined as flooding that covers two or more acres of normally dry land area and affects two or more adjacent properties. The NFIP offers flood insurance coverage for all buildings in communities that participate in the program.
- Building owners can purchase policies to cover flood damage to buildings, contents, and personal property. Unit owners and tenants can purchase policies to cover flood damage to contents and personal property. Most standard property insurance policies available from private insurance companies do not cover flood damage.

Other Resources that could be helpful:

- [The Growing Threat of Urban Flooding: A National Challenge](#)
- FEMA: [What Building Owners and Tenants Should Know About Urban Flooding](#) (specifically the checklist on page 4)
- [Urban Street Stormwater Guide](#)
 - A guide from the National Association of City Transportation Officials is a collaboration between city transportation, public works, and water departments to advance the discussion about how to design and construct sustainable and resilient streets in reference to urban flooding.
- C40: [Flooding: How to increase your city's permeability, How to reduce flood risk in your city](#) |

(The figure is just an overview of the one-pager - please click the link to the file)

H. Air Quality Definition One-pager



Climate Emergency Definition: Air Pollution

For: Elevate & Partners

Vulnerable populations for air pollution in Detroit:

1. People reported living with lung and heart diseases
2. Older adults (aged 65+)
3. Pregnant Women
4. Children

At "Moderate" level (AQI 51-100):

- Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people for those unusually sensitive to fine particles (such as those with heart or lung conditions).
- Action: send out warnings to community members who reported sensitive to fine particles by phone calls, text, email or visits

At "Unhealthy for Sensitive Groups" level (AQI 101-150):

- Although the general public is not likely to be affected, the vulnerable population are at a greater risk from exposure to ozone and presence of particles in the air.
- Action: send out warnings to all community members by phone calls, text, email or visits and activate other hub services for vulnerable populations, by providing N95 masks and shelters with filtration.

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
When the AQI is in this range:	...air quality conditions are:	...as symbolized by this color:
0-50	Good	Green
51-100	Moderate	Yellow
101-150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Maroon

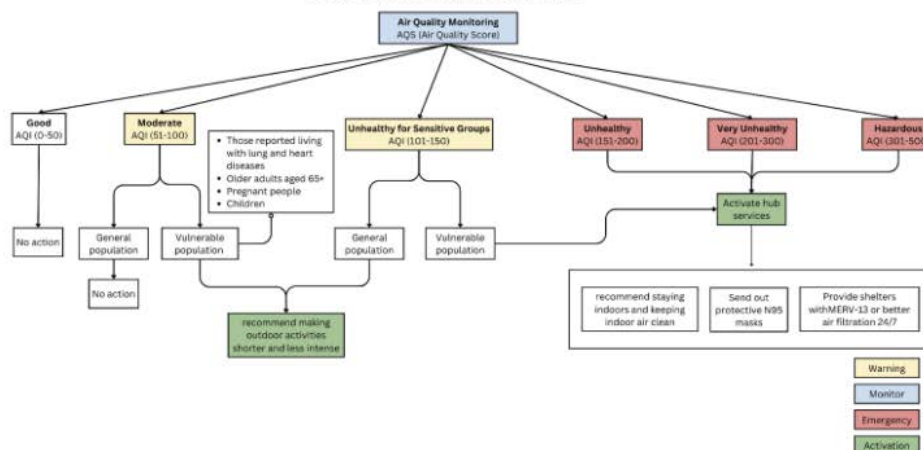
At "Very Unhealthy" level or worse (AQI 201 - 300):

- This would trigger a health alert signifying that everyone may experience more serious health effects.
- Action: send out warnings to all community members by phone calls, text, email or visits and activate other hub services for vulnerable populations, by providing N95 masks and shelters with filtration.

At "Hazardous" level or worse (AQI 301 - 500):

- This would trigger health warnings of emergency conditions. The entire population is more likely to be affected.
- Action: send out warnings to all community members by phone calls, text, email or visits and activate other hub services for vulnerable populations, by providing N95 masks and shelters with filtration.

Air Pollution Definition Flowchart



(The figure is just an overview of the one-pager - please click the link to the file)

I. All Emergency Definition Flowcharts