How did we get here?

Climate Change

- There has been a push for green solutions.
  - GSI includes use of native plants and soils to reduce run off (DS08)
  - Natural flooding deterrents beautify the community (DS08)
  - Climate minded solutions can promote environmental justice (DS05)
  - A number of community and neighborhood associations in Detroit have been active in building community with environmental justice and advocating in City Council and advocating successfully for environmental justice (DS05)
  - Detroit wants to be a leader in green storm water management (DS08)
  - Goal is to have clean water from groundwater, surface water, to Great Lakes (DS05)
- Climate change has been causing an increase of rainfall.
  - Sea levels rising = heavy rains = flooding (DS01)
  - rapidly changing water levels (Climate change) causing issues (DS01)
  - "Research shows that, as the climate warms, precipitation is also increasing, bringing heavier storms with higher rainfall." (DS02)
  - Direct link between current issues and Climate change (DS04)
  - Global issue but unclear to what degree (DS11)
- Climate Change is rapidly altering the environment which is making it more difficult to make decisions.
  - Periods of drought followed by heavy rains only worsen floods
    - Periods of drought worsens floods when they happen (DS11)
    - Droughts giving the water supply/infrastructure whiplash (DS01)
    - Huge water gradient (DS10)
  - Hard to know what infrastructure to build with climate change changing everything (DS02)
    - Climate impacts are become increasingly complicated and response needs to adapt (DS11)
  - Climate change changing the flooding zones - not knowing (SH01)
    - Need to figure out what projects to act on (DS04)
    - Need to prioritize the most important water projects first (DS04)
  - Need approval from the government and public for new systems (DS09)
    - Experts say simplest solution is the best one (DS09)
- Because of how rapid the flooding has been, citizens have been fearful.
  - Large storms will cause a water crisis (DS01)
    - Rain so heavy that the flooding happens quick (DS06)
  - Fear of what will happen during continuous rains (DS06)
    - Storms happening to frequently to be properly dealt with (DS03)

Current Structure and Design

- "Population changes and new developments are affecting the amount of flooding."
  - New developments are affecting natural flood deterrents (DS08)
  - Population changes increasing issues (DS01)
  - People will not leave = infrastructure must improve (DS02)
    - Natural areas absorb rainfall and slow runoff, back up/divert pressure, absorption. This leads to runoff, causing flooding, sewer overflows, and toxic pollution (DS08)
    - The status quo of enriching the same places and pursuing the same projects needs to change. (DS04)
- Due To Detroit's Unique design and other factors, the water issue becomes more complex/
  - The main issue is the design of our infrastructure (DS09)
    - Problems are lack of funding/investment, age, and design of infrastructure (DS09)
  - Lobbying groups impact local water regulations (DS10)
  - Detroit - combined sewer system (DS02)
- The Infrastructure was not built to accommodate such extremes and its old.
  - "Your system is not designed to respond to something like that." (DS02)
    - Aging system is being pushed farther than its limits, new bipartisan infrastructure funding (DS02)
  - Infrastructure designed to last 75ish years is old (DS01)
    - Systems are static and not built for extreme ends of weather (DS09)
    - Not built to be resilient to extreme/rare weather (DS09)
  - "And our outdated system is completely unprepared for this century's challenges of intense heat, drought and flooding." (DS01)
  - Huge amount of the infrastructure was built in the 50s-60s (DS08)
- The fracturing of water industry is causing problems.
  - Municipalities runs these water systems but doesn't have demand for planners and engineers (DS09)
    - "The massive scale and variety of national water infrastructure means and not simply due to a lack of funding, leads to a balancing of responsibilities and the traditional lateral nature of water infrastructure." (DS02)
  - Lack of water staff limiting abilities (DS04)
  - 50,000 plus utilities that operate the infrastructure (DS04)

Damages

- In the immediate aftermath of flooding, there is very little that can be done beside hope that the infrastructure to help drain the water.
  - Citizens waited at least 5 hours for tow trucks (DS07)
  - Officers not able to help due to many cars flooded (DS07)
  - Streets look like rivers (DS07)
  - Citizens affected by not being able to work (DS07)
  - People Trapped (DS06)
    - Resident accidentally drove into heavy water from how dark it was (DS07)
    - Water took hours to recede (DS06)
  - Not being able to gauge how deep the water is (DS07)
- Floods are an emotionally taxing and difficult time filled with distress and fear.
  - Sewage in peoples basements (DS03)
  - Emotional distress of losing personal belongings (DS02)
  - Long-term property damage (SH01)
    - Distress caused by needing to deal with a flooded home (SH01)
  - Fear of contaminated waters (SH01)
- "Huge amounts of homeowners being effected along with other person property.
  - "40,757 properties are already at risk of flooding in Detroit, and in 30 years, about 42,688 are predicted to be at risk." (DS03)
    - People had to abandon their cars from floods (DS06)
  - Old or new homes have equal chance of flooding (DS03)
    - Lots of damage to cars (DS07)
- Well documented that the wealthy better recover after times of crisis
  - Wealth inequality (being able to afford a pump)
    - Being lower income households, we don't have the money or cushions to burn higher flood rates and other environmental impacts, while the wealthy and other leaders have been able to withstand it. (DS06)
  - Those with less capital will suffer more (DS10)
    - Citizens missing work due to flooding (DS07)
    - Longer lasting effects in lower income areas (DS11)
    - "Issues around Detroit's water infrastructure are deeply rooted in the city's history of racial injustice, with poor and minority communities often being the most affected by infrastructure investment. These communities have been disproportionately excluded from flowing and by upgrades from homes." (DS02)
- Due to someone from contaminates with waste water run offs. there has been significant investments in Detroit
  - Concern with waste/run off water getting into the river (DS08)
    - "$55 million to help communities tackle toxic contaminants like PFAS." (DS05)
  - Detroit has made significant investments into storm water treatment (DS08)
  - Flood Waters pulling up all types of muck (DS06)
- There are many dangers where rapid flooding occurs
  - Floating cars can be very dangerous (DS07)
    - Accumulation has been found between floating and sediment residence times, suggesting that accumulation of floating pollutants may be enhanced by sediment trapping and release processes. Floating pollutants, such as plastics, may act as a vector for the transport of persistent organic pollutants to freshwater bodies, and to freshwater and marine food webs. (DS05)
  - Falling power lines during floods = danger (DS06)
  - Floating cars (DS06)
    - "Power poles flattened on the road" (DS06)

Change

- Education (Communication and Media)
  - It is difficult to conceptualize the problems with the water infrastructure because the average person cannot see all of the water infrastructure.
    - There is a need for Mass Media to better cover weather to prepare citizens.
      - Media should highlight how underserved communities are disproportionately affected (DS11)
      - "I think sometimes these terms often are hard to relate to, and I think we have to make it very, very aware, very real. We do cause flooding, we do cause, you know, weather, we have these terms and these breaks, generally, I mean it's very real." (DS11)
      - Dangerous oversimplifications in news reports (DS11)
      - "Unfortunately I think the latest paper that a group of us did was way too timely and relevant, and I wish it wasn't." (DS03)
      - Translating weather predictions into action (DS11)
      - The press needing to be involved in reporting on water infrastructure (DS10)
    - Not thinking of infrastructure until it doesn't work (SH01)
    - People often don't see the infrastructure so they don't really know about it (DS10)
    - Communication: is big because people don't know about it when having drill on the rich so many people are turning to local community instead of official sources
      - Citizens not being informed of which roads were flooded (DS07)
      - Communication challenges need to educate more (DS10)
      - Warning the resources that are available to be more findable (SH01)
      - People need to be more educated (DS10)
      - Coastal Leadership Academy gives community members a voice (DS05)
      - Government website is hard to navigate (SH01)
- The rapidly changing situation does not have a clear solution and would be incredibly expensive
  - There is a huge backlog of work, however repairing the water system can be affordable if congress acts fast.
    - Need congress to fund more and better (DS10)
    - each $1 of federal grants can save taxpayers $6 (DS05)
    - Solutions should be affordable if congress allows it (DS10)
    - Estimates for nationwide repair are over 1 trillion (DS01)
    - More Data is needed to see exactly what plans should be implemented and there are a lot of potential solutions
      - Needing more data of updates weather patterns (DS01)
      - AI could be involved in Smart Systems in the future. (DS09)
      - Smart Systems would be various in these new infrastructure plans to tell us the flow of water through the pipes (DS09)
      - From droughts to floods to wildfires, water leaders respond in real-time and plan for future weather costs, rather than planning in advance and striving for greater resilience over time. (DS06)
      - Weather predictions are being over-inflated (DS11)
  - Flooding has cost millions of dollars in damages.
    - Flood damages cost Detroit $4.6 million in 2021 (DS03)
      - "$210 million to repair dams in Midland and Gladwin counties and $100 million in Detroit to address the repair, renovation, or abandonment of dams statewide" (DS06)
    - $550 mil for water infrastructure in 2022 is not enough (DS01)
    - Detroit has been making good progress in the past few years despite everything.
      - Despite everything, the US does a pretty good job with water (DS10)
      - Since 2021 there has been an increase in investment (DS05)
      - Great progress is expected with the Building Michigan Together Plan 2022 (DS05)
      - Michigan government is implementing funding plans for communities (DS05)
      - The city created a post-construction stormwater ordinance, and all new development projects manage stormwater generated from their sites. (DS06)
      - Detroit changing the way drainage is changed to matched stormwater run off (DS08)
- Slow to come improvements.
  - Even when not in times of crisis, water infrastructure isn't doing to good
    - Decades of underinvestment has increased issues (DS04)
    - "The city's resistents experience household flooding even when rainfall is within normal limits" (DS03)
    - 2021 American Society of Civil Engineers gives C- rating to infrastucture
    - Dam failures in Edenville and Sanford shows the consequences of underinvestment (DS06)
    - "The deluge overwhelmed the city's aging stormwater management infrastructure, causing widespread residential flooding." (DS02)
    - Major floods in Woodhaven reported by Local 4 (DS06)
  - While there has been new funding, many have yet to see results and stronger decisions need to be made.
    - Seeing the street drains not working properly (SH01)
    - Have heard of improvement plans but has not seen improvement yet (SH01)
    - Iffy faith that infrastructure money will be spent correctly (DS02)
    - Those with decision power need to listen to solutions (DS03)