



HOUSEHOLD FLOODING IN DETROIT

A SNAPSHOT OF CITYWIDE EXPERIENCES, IMPLICATIONS FOR PUBLIC HEALTH, AND POTENTIAL SOLUTIONS

JUNE 2021



ABOUT THIS REPORT

Many residents of Southeast Michigan have had their basement or neighborhood flood. Often, this is a *stressful event or series of events that can lead to financial hardship, health concerns, and even displacement.*

It is well known that these flooding issues are likely occurring due to:

- aging water and wastewater infrastructure,
- more severe & frequent rain events (largely due to climate change), and
- various other household and neighborhood factors—several beyond any one person or household's ability to control.

Our team of community leaders, consultants, and researchers prepared this brief report to:

- 1) provide an overview of this under-acknowledged public health issue,
- 2) share key findings from a related door-to-door survey, and
- 3) discuss potential solutions that may begin to address this widespread issue & underlying inequities.

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In a recent study,

43%

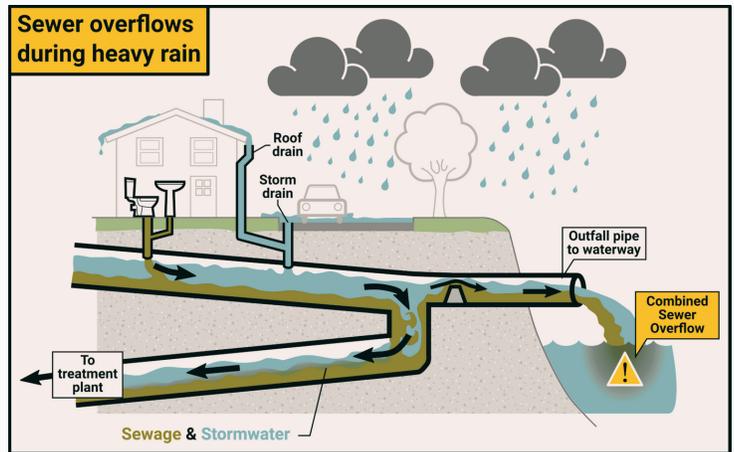
of 4,667 Detroit households surveyed between 2012-2020 reported household flooding.



WHAT DO WE ALREADY KNOW ABOUT FLOODING IN DETROIT & BEYOND?

There are different types of flooding, for instance, from overflowing rivers (fluvial) or surface flooding from excess rain (pluvial). Flooding may also occur when water or wastewater infrastructure is inadequate, overflows, breaks, clogs, or malfunctions.

Detroit is one of the 860 cities across the U.S. with a combined sewer system. During heavy rainfall, the system's capacity can be exceeded and untreated sewage is frequently discharged into the Rouge River and Detroit River. Household and neighborhood flooding may entail exposure to sewage.



Adapted from ECOSS

Flooding affects physical & mental health in many ways, including but not limited to:

- Injuries or death (e.g., from electrocution or drowning)
- Respiratory issues due to mold or other microbes
- Gastrointestinal issues
- Skin rashes
- Eye irritation
- Psychological distress

Flooding is costly:

- Missed school & work
- Displacement
- Recovery costs (e.g., health care, home repair, trash removal, or mold removal)

A recent study concluded that the increased intensity of rain events has contributed to \$75 billion in flood-related damages in the U.S. between 1988 and 2017 (Davenport et al., 2021).

Michigan's Changing Climate

In the Midwest U.S., the amount of precipitation falling in the 1% heaviest rain events has increased by 37% since the mid-20th century, according to the National Climate Assessment.

Regional climate change models project increasing **frequency, duration & severity** of rain events with rising water levels over the next 25 years.



In August 2014, Metro Detroit experienced record-breaking rainfall—more than 6" in 4 hours—which resulted in a federal disaster declaration.

A matter of environmental justice:

"Low-income communities and people of color are bearing the brunt of the COVID-19 pandemic, as well as the long-term impacts of a changing climate. In this context, resilience must mean more than enduring the unendurable, or bouncing back to "normal." Real resilience demands that we recognize structural racism and rectify the injustices that rob black and brown people, and poor people, of agency and power. It demands that we rethink our responses to climate change and COVID-19, by remaking the systems that have harmed us."

*- Jalonne White-Newsome,
Empowering a Green
Environment & Economy*

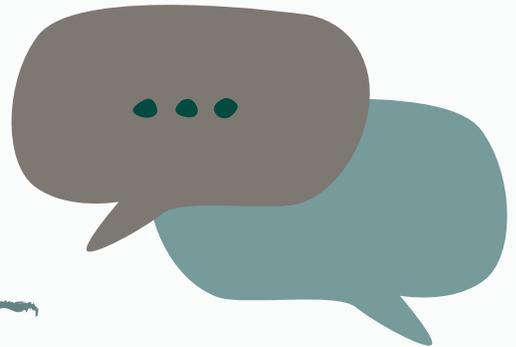
WHAT DO WE ALREADY KNOW ABOUT HOUSEHOLD FLOODING IN DETROIT?

In an online Detroit Office of Sustainability survey published in 2018, residents reported that they experienced flooding **very often (13%)**, **somewhat often (23%)**, and **occasionally (32%)**.

A cross-sectional study published in 2016 of 164 homes in Detroit's Warrendale neighborhood indicated that **64% of homes experienced at least one flooding event** in the past year, with many experiencing three or four events (Nassauer et al., 2016).

Navigating repeated or severe flooding is STRESSFUL. In a series of interviews (Sampson et al., 2019), many Detroit residents described the stressful experience of recurrent household flooding as shared here:

*So I used to enjoy hearing the sound of rain, it was very calming, relaxing, and helped put me to sleep. Now it's the **source of great anxiety**. It rained yesterday and the day before and the first thing I do is look in my basement, or if it's pooling in the streets, because if it's pooling in the streets then the system is not acting right and potentially could be a problem.*



*A lot of loss...And I was just like—at this point—I was just beyond the anger point. I mean, I've replaced two water heaters. I've replaced the washer and dryer. I've had numerous furnace issues, and all of those things just outright replace them. There's no grant. That's my own income coming to be diverted from other things to replace them because you have to have them. Just the toll of going through things that have been exposed to sewage and having to discard it, move it from a basement ... I would probably say at this point in the tens of thousands. **There are so many unaccounted-for costs**. I really don't know what's happening in my basement, and I'm concerned that I'm going to have to move considering how many floods I have and so close together, considering that the costs have been insurmountable.*

*I got this feeling of 'Okay, it happened. We're sorry. This is why it happened. Okay, fill out this paperwork and go about your day.' Until a person lives there and knows what it is like to smell raw sewage or knows what it's like to slip and fall and break a bone and be lying in raw sewage, you can kind of disconnect from those stories and be like okay, just do this and get your money back. But it's much more than just money that's needed to mitigate the situation. It's just, what are you doing to prevent it? **Because you can't pay me for the stress I feel every time I see a heavy rain happen. There's no paying for that.***

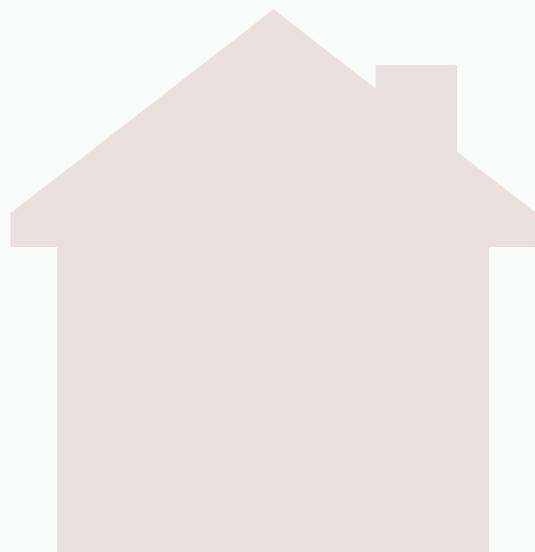
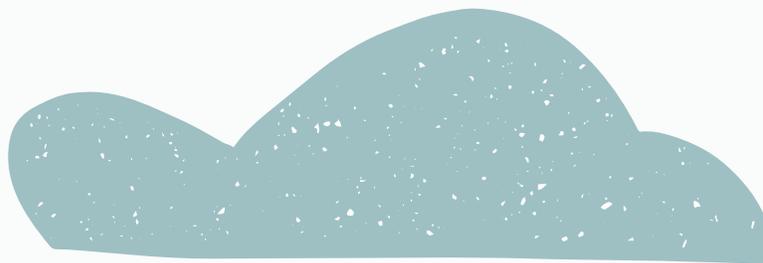
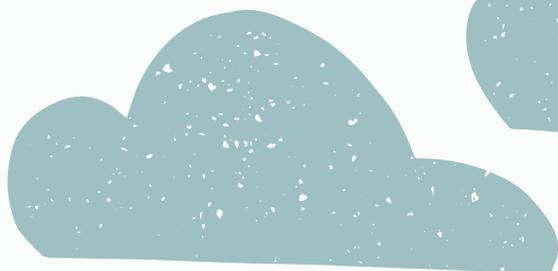


Only flush toilet paper. No types of wipes, hygiene products, or paper towel should ever be flushed.

Disposable wipes (also known as 'flushable wipes' or 'baby wipes') are causing MAJOR damage to our local sewage system. Between 2015 and 2018, about **70 tons** of debris coming from Oakland and Macomb counties was removed from the Northeast Sewage Pumping Station in Detroit. In 2020, another **270 tons** of debris had to be removed.

Wipes and grease combine to create blockages, which have been dubbed 'Fatberg' and 'Ragball,' and may contribute to flooding in the region.

WHAT CAN WE LEARN FROM AN ONGOING 'HOME SAFETY ASSESSMENT' SURVEY IN DETROIT?



About the Survey

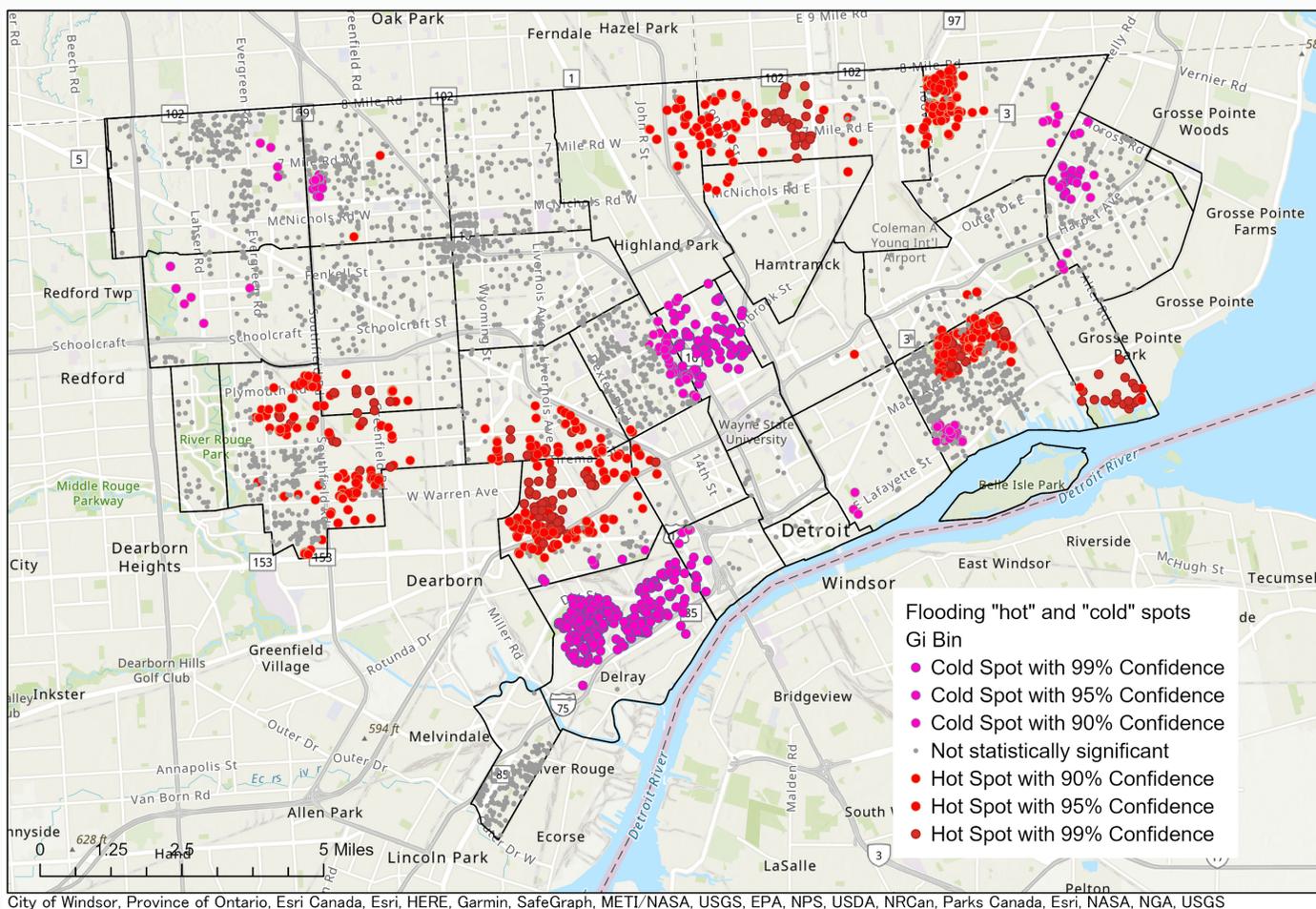
In 2012, *Home Safety Assessments* (HSA) began through a joint effort between: AmeriCorps, Wayne State University's Center for Urban Studies, Federal Emergency Management Agency, the Detroit Fire Department, Clear Corps, and the Kohl's Injury Prevention Program through the Children's Hospital of Michigan.

The HSA is a household survey designed to support residents in assessing if their home has hazardous conditions such as asthma triggers, moisture/vapor intrusion, fire hazards, and exposures to chemicals such as carbon monoxide, lead, or radon. Residents are also asked to report if their household had flooded in the recent past.

Key Takeaways

- **Renters were 1.7x more likely to report household flooding** than homeowners.
- Neighborhoods with a larger proportion of renters (compared to owners) and homes built before 1939 were more likely to experience household flooding.
- Households were more likely to flood when experiencing the following conditions:
 - Window & plumbing leaks,
 - Basements in disrepair,
 - Uncapped sewer outlets, &
 - Occurrence of previous sewer backups.
- Household flooding and conditions associated with flooding were also **associated with adult and child asthma**.
- Primarily **Black communities were found to be at high risk for household flooding** even when controlling for household and neighborhood factors. Flooding in Detroit contributes to negative health outcomes for residents and disproportionately impacts communities of color and those who lack the resources to recover from flooding events.

ACCORDING TO A 'HOME SAFETY ASSESSMENT' SURVEY, WHERE IS FLOODING COMMON IN DETROIT?



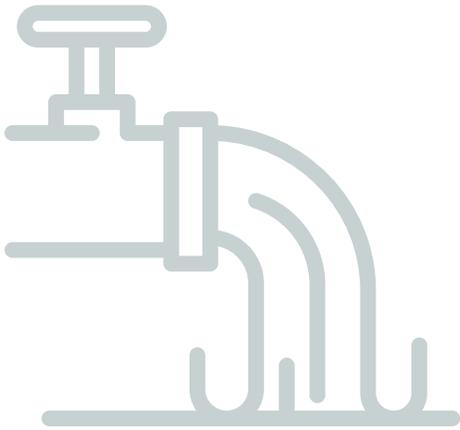
Hot and cold spots of flooding using the Getis-Ord G_i^* statistic. Red dots represent "hot" spots at 90, 95 and 99% confidence levels, or locations of statistically significant clusters of homes that experienced flooding. Purple dots represent clusters of homes that did not report flooding

This map reflects responses from a sample of 4,667 Detroit households who participated in the *Home Safety Assessment* survey between 2012 and 2020. Among these households, **2,546 (42.75%) reported household flooding.**

Note: This was a cross-sectional study with self-reported data. This means we can report associations but not causation. There may be additional hotspots missed due to study limitations. Additional research can further clarify findings. Even so, one thing is clear: household flooding in Detroit is widespread.

For more details about this study see: Larson et al., 2021.

WHAT CAN BE DONE TO PREVENT HOUSEHOLD FLOODING?



Major infrastructure updates: To fully address repeated citywide household and neighborhood flooding, government agencies and regional authorities must implement system-wide solutions. *Funding for green and grey infrastructure must be prioritized to protect neighborhoods experiencing disproportionate adverse social, health, and economic impacts of flooding.*

Grey infrastructure typically refers to the human-engineered approaches to stormwater management, such as pumps, pipes and treatment facilities. In many cities, this increasingly includes systems of 'smart' sensors to control flow.



Green stormwater infrastructure (GSI) typically refers to the vegetation designed to mimic nature and capture rainwater where it falls. When built strategically, GSI can capture thousands of gallons of stormwater, which takes pressure off of the whole system (Steis Thorsby et al., 2020). Not all flooding issues can be addressed with GSI alone though, and in some instances well-intentioned but poorly designed interventions can worsen flooding. Decisions about amount, type, and location of infrastructure should not only consider features of the physical environment but also resident preferences to best promote well-being and prevent inequities (Nassauer et al., 2021).

Prioritized maintenance of vacant lots & flood-prone areas: City leaders must prioritize maintenance of flood-prone areas and vacant lots, including the 1000's owned by the Detroit Land Bank Authority. This requires coordination across agencies to track and analyze flood-related reports and claims.

Unmaintained structures or lots can affect flooding. For instance, if storm drains are not cleared, this may contribute to flooding. In a recent survey of 171 residents in Northwest Detroit, more than **1/3 of residents (38%)** reported spending **nearly 3 hours per week** caring for neighborhood properties that were not their own (Nassauer et al., 2020). This burden often goes unnoticed or uncompensated, and this caregiving may be an added stressor for residents (Sampson et al., 2017).

Learn more about flood risks across the U.S. and find your community's 'flood factor':

www.firststreet.org/flood-factor

Learn about more technical & financial resources for community & government leaders to manage floods:

www.navigatetheflood.org

WHAT CAN BE DONE TO PREVENT HOUSEHOLD FLOODING?

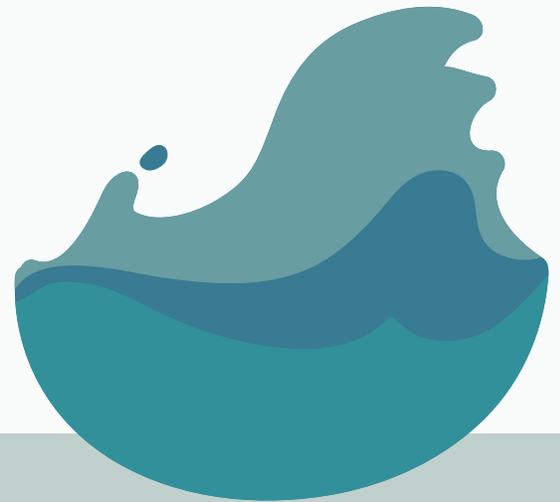
Improve process for flood-related claims & ensure equity in settlements: Currently, there are systems for reporting emergency water and sewer issues and making claims to Detroit Water and Sewerage Department for sewage back-ups on commercial and residential properties. These claims can lead to compensation for some residents, but the process is not always transparent or efficient. Given that these decisions have major economic and health implications for residents, an evaluation and transparent claims process is warranted.

Also, it is unclear if and how these data are currently used to inform infrastructure decisions. By tracking flood hotspots using reporting data, basic analyses could assist in prioritizing infrastructure updates or technical assistance in ways that address social, economic, and health inequities.

Address remaining research & policy questions: What type of flooding is happening in hotspots (e.g., sewage back-up, stormwater overflow)? How do the following affect household flooding:

- the city's demolition efforts?
- household type (e.g., ranch, duplex)?
- time of year? season? topography?
- additional neighborhood factors (e.g., population density, vacancy rate, presence/type/amount of green stormwater infrastructure)?

Although research can further clarify who is most vulnerable to which types of flooding and the multiple causes of this flooding, this can sometimes take years. Immediate solutions are necessary in the meantime to protect public health.



Who's who?

- **Detroit Water and Sewerage Department (DWSD):** DWSD is a public utility and the branch of city government that provides water and sewerage services for Detroit. In addition to Detroit, it also owns the assets that provide water and sewerage services across seven Michigan counties: Genesee, Oakland, Macomb, Washtenaw, Wayne, St. Clair, Lapeer and Monroe.
- **Detroit Board of Water Commissioners (BOWC):** The BOWC is DWSD's governing body comprised of seven commissioners who are Detroit residents and appointed by the Mayor.
- **Great Lakes Water Authority (GLWA):** Since 2016, (GLWA) has served as the wholesaler responsible for the management of water and wastewater production in several communities in Southeastern Michigan. GLWA is considered a regional authority. It has a 40-year lease with DWSD for the facilities that it operates.

This document describes the roles, responsibilities, and relationship between DWSD and GLWA:

www.glwater.org/wp-content/uploads/2018/06/GLWA_DWSD-Roles-and-Responsibilities_FINAL-210331.pdf

- **Office of the Water Advocate (OWA):** The OWA "accepts and investigates complaints and concerns related to drinking water within the State of Michigan."

WHAT CAN BE DONE TO PREVENT HOUSEHOLD FLOODING?

Hold landlords accountable for flood prevention and response: Enforceable policies are needed to ensure landlords conduct basic household maintenance and flood prevention, including guidelines for assessing and remediating mold. Renters can learn more about their rights in this brochure on the City of Detroit's website: [Detroit Guide to Landlord-Tenant & Fair Housing Laws](#). For more information, contact the Fair Housing Center of Metropolitan Detroit at 313-963-1274.

Develop grants & technical assistance programs to support household flood-related maintenance:

Programs are needed to fund and provide technical assistance to homeowners. Flooding can have many different causes. A trusted plumber can often tell where problems are coming from. There are a range of preventative strategies for households to consider — from relatively affordable to incredibly costly. For renters, some may not be possible without a landlord's support or resources. Some require technical or physical abilities when attempting do-it-yourself approaches. Also, some are more effective than others depending on the type and cause of flooding:

- Install a flood sensor that can detect excess humidity or moisture in the air (\$10-\$200+)
- Clear clogged lateral sewer pipe (\$150+)
- Repair gutters (\$200+)
- Build a rain garden &/or grade your lawn away from your home (\$200+)
- Repair foundation drainage plumbing (\$700+)
- Seal up foundation cracks & apply coating & sealants (\$600-\$10,000+)
- Install a battery-powered sump pump (\$1,000-\$5,000)



Many Detroit-based organizations are helping residents manage stormwater and reduce flooding on their property by providing technical support or resources for disconnecting downspouts and installing rain gardens or rain barrels, for instance. To learn more, check out these organizations and their many partners:

- Detroit City Council's Green Taskforce
www.detroitgreentaskforce.org/
- Friends of the Rouge
www.therouge.org
- Land & Water Works Coalition of Detroit Future City
www.detroitfuturecity.com/our-programs/
- Sierra Club's Great Lakes Great Communities campaign
www.sierraclub.org/michigan/great-lakes-great-communities-campaign
- Southwest Detroit Environmental Vision
www.sdevweb.org/land-water-program

WHEN FLOODING HAPPENS...

Before flooding: If you live in an area that is more likely to experience flooding, you may have already attempted many of the flood prevention maintenance strategies described above. Some residents who have dealt with repeated flooding have also taken the following precautions:

- Being clear about what your home insurance covers— check your current policies and ask questions if the terms are unclear,
- Creating a flood clean up kit (e.g., www.redcross.org/store/flood-clean-up-kit/761300.html),
- Having a special set of rubber boots used only when headed downstairs,
- Placing all valuable and sentimental items up high or in a location other than your basement, and
- Unplugging all items that do not need to remain plugged in at all times.

After flooding:

- Document as much as you can:
 - Take pictures of any damage to property, appliances, or your belongings.
 - Save receipts and write down costs or spending for clean up in case insurance companies, the city, or the Federal Emergency Management Association (FEMA) can compensate you.
- Report flooding:
 - General emergency water & sewer issues in Detroit, including street flooding, gushing water and sewerage backups, can be reported by calling (313) 267-7401 or using the “Improve Detroit” SeeClickFix mobile app (<https://detroitmi.gov/ImproveDetroit>).
 - Sewage overflow or backups on your property can be reported by contacting the Detroit Water and Sewerage Department (DWSD) at 313-267-8000.
 - If you have an overflow or sewer backup into your home or business, complete a [DWSD claim form](#) and submit online or by mail. (State law requires you file a written claim with your local water utility, DWSD in this case, within **45 days** of when the overflow or backup was discovered.)
- Seek assistance from local organizations:
 - Neighborhood associations - Find those closest to you here on the Community Development Advocates of Detroit's [DCommunity website](#). Others in your neighborhood may be dealing with the same issues and know of additional resources or strategies to support you.
 - Red Cross - Contact your local chapter for support: www.redcross.org/local/michigan.html.

Protect your health!

Flood water may look relatively safe, but may actually contain **sewage** and **infectious contaminants**. Use masks, gloves, and boots when cleaning up.

You may do a thorough job of cleaning up, but **mold can easily grow unseen** in your walls or under floor tiles. Mold fungus, mycotoxins, and mycobacteria can trigger many health issues, such as *asthma, headaches, eye irritation, sneezing, skin rashes, and several other very serious conditions.*

Speak with a doctor if you think you have developed any health problems related to flooding or other environmental issues in your home.

For more tips:

CDC: www.cdc.gov/nceh/features/flood-safety/index.html

Ready.gov: www.ready.gov/floods

National Weather Service: www.weather.gov/safety/flood

FURTHER READING

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