HEAVY RAINS AND BACKED-UP DRAINS

GREATER LANSING REGIONAL COMMITTEE FOR STORMWATER MANAGEMENT

Areas of Greater Lansing experienced waves of localized flooding throughout summer 2021, leaving many looking to their neighbors and leaders for answers. Long-term residents who have typically avoided flood damage at their property are asking what's changed? Why is this flooding happening now? In short, these were no typical rain events.

On August 11-12, areas of Ingham County saw over 8 inches of rainfall and in late June, 3.76 inches fell in East Lansing. Both rain events met or exceeded the 30-day total precipitation that is normal for their respective months and the single August 11-12 event brought more than twice the rain that is typical for all of August! The speed and intensity of these storms played a critical role in the flooding impact, as they produced stormwater-runoff faster than our storm sewer systems were designed to handle.

The 8-inch event in August fell over a 7-8 hour period, and a smaller, yet more intense event in mid-September saw 2 inches of rain within 15 minutes! Per the National Oceanic and Atmospheric Administration's (NOAA) Atlas-14 Precipitation Frequency Estimates, rain events like these have a .1% likelihood of occurring in any given year. Simply put, they are expected once every 1,000 years.

ALTERED LANDSCAPES, CHANGING CLIMATE

The increased volume, intensity, and frequency of these events is due at least in part to our warming climate. As air warms, it allows the atmosphere to hold more moisture resulting in more precipitation, and climate models project that the Great Lakes region will become wetter and warmer with more intense storms in the future. Under these conditions, what was once a 100- or 500-year rain event may be experienced much more frequently.

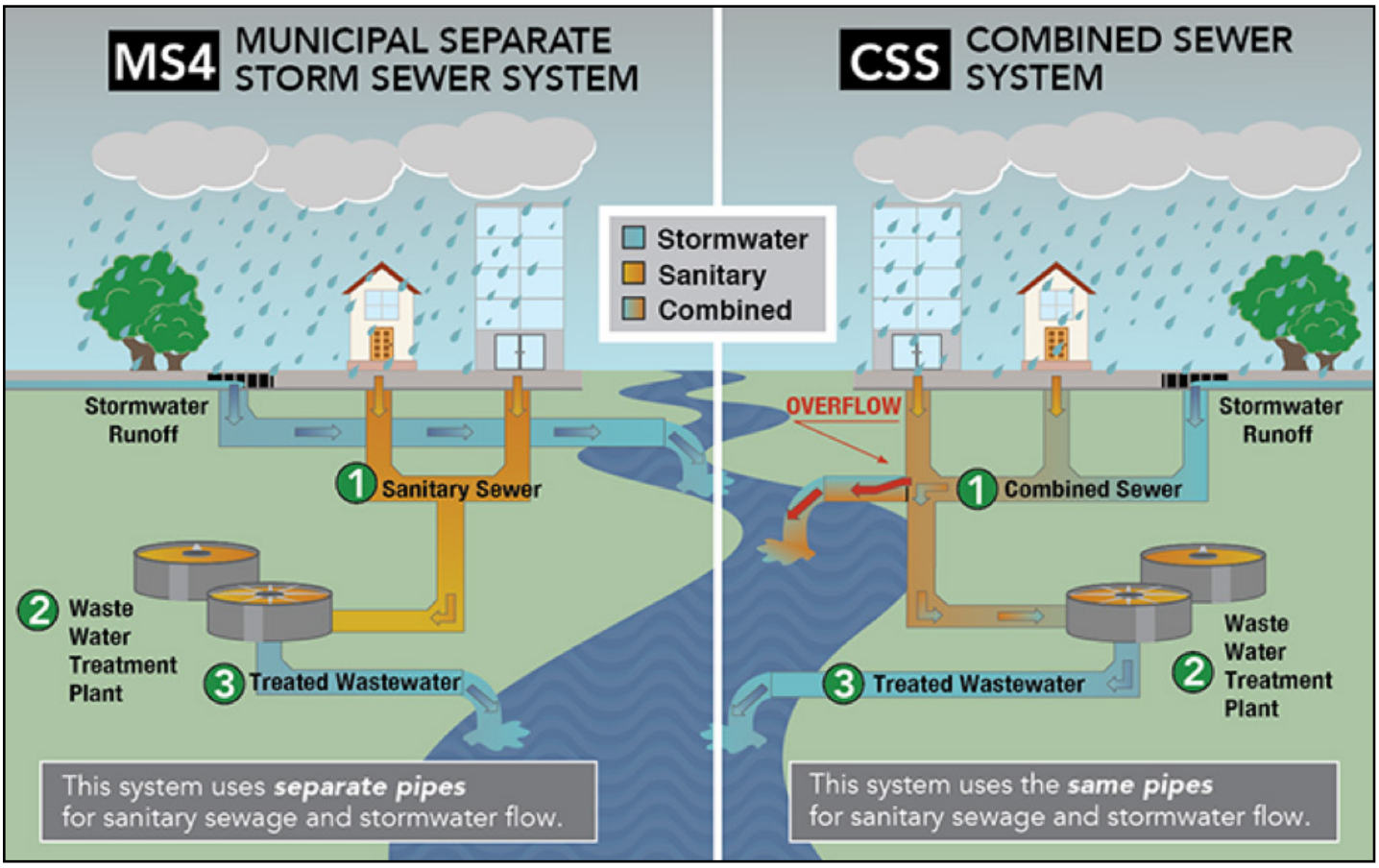
Intense storms can have a greater impact on developed areas like Greater Lansing. In urban and suburban communities, rain runoff has fewer places to go as impervious surfaces like homes, roads, and parking lots cover the landscape and prevent stormwater from infiltrating into the ground.

Normally, a two-inch rainfall event during a 24-hour period occurs once or twice a year. In an undeveloped, forested area with sandy soil, little to no run-off is generated by this type of rain event. However, on a highly developed parcel like a shopping center, the same storm would create over an inch of run-off! For that much run-off to be generated in a natural, undeveloped area, 5.5 inches of rain would have to fall within 24 hours - something that would be considered a 100-year event. This means that once land is developed, storms that happen one or two times a year generate as much run-off as what a natural, undeveloped area would historically see every 100 years.

Communities work to prevent this excess run-off from becoming flooding through networks of storm sewers that carry would-be floodwaters away from developed areas and discharge them into water bodies (and in some cases, a treatment plant). Detention and retention ponds, rain gardens, and other structural practices are also used to capture, infiltrate, or slow the water on site. However, these systems were not designed to handle the volume or intensity of rain that is becoming more common.

SEWERS, EXPLAINED

Many residents use the term "sewer" interchangeably when referencing the different types of waste and storm sewer systems, though there are important distinctions. Some older communities may have combined sewers known as **Combined Sewer Overflows**, or CSOs. They are outdated systems that are still in place in some older communities. This "one pipe system" combines both surface runoff (stormwater) with wastewater (sewage) and leads to a treatment plant for processing. However, these systems were designed to overflow when a heavy rain or snow melt event backlogs the system and exceeds its storage and treatment capacity. When this occurs, the mixture of stormwater and raw sewage overflows directly into a river, stream or lake. In rare cases, extreme rain events and/or blockages can cause combined sewers to back up through a home basement drain.



Credit: DC Dept. of Energy & The Environment

Untreated sewage entering our surface water or property has obvious impacts to the water quality, ecosystems, and human health. To combat this, modern storm sewers have moved away from the "one pipe system" of the past (though some remain) and now separate wastewater from storm runoff. Most of the storm sewers in the Greater Lansing area are what we call **Municipal Separate Storm Sewer Systems (MS4s)**. In these systems, the sanitary sewer still directs sewage to the treatment facility, but stormwater is diverted directly to water bodies.

The MS4 reduces the risk of large quantities of sewage entering surface waters or backing up into homes, but since the stormwater doesn't go to the treatment plant, it has its own risks and must be "treated" in other ways. MS4s rely on catch basins and built infrastructure to filter out large pieces of litter, sediment, and oils, but these systems only work if they

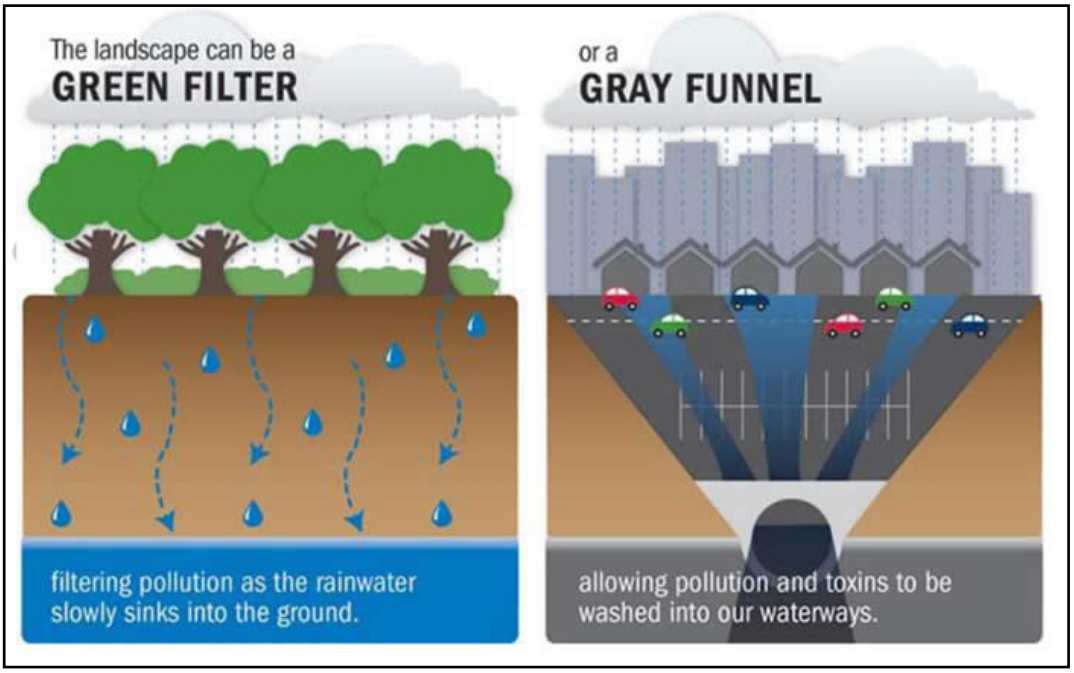
are cleaned and maintained, and understood by the public. If they are clogged with debris, grass clippings, or leaves, or if intense rains fall faster than the system can carry it away, the MS4 can back up and cause localized flooding in roads, neighborhoods, and business districts.

To put it in perspective, consider Cook County, Illinois, the home of Chicago. One inch of rain across this heavily developed county yields ***16 billion*** gallons of water, so every drop kept out of the storm sewer system helps, and every clogged drain can cause problems. You can take steps to reduce the risk of flooding on or near your property by capturing or infiltrating precipitation, which can limit the likelihood of backed-up drains and catch basins and lower the burden on the storm sewer system.

YOU CAN HELP

What can you do to reduce your contribution to the storm sewer system?

- Install a rain garden that features deep-rooted, native plants and a depression in the landscape to capture and infiltrate runoff.
- Install a rain barrel and connect it to a downspout to save water and use it later.
- Consider the impact of impervious surfaces when redoing driveways or adding outbuildings. Use bioretention, porous pavers, or other green techniques to negate increases in runoff.



All of these stormwater tips can help protect your home from flooding, either directly by preventing the pooling of runoff in your yard, or indirectly by reducing your contribution to the storm sewer and therefore lessening the burden on the system. But there are other ways to protect your home against water damage from heavy rain.

- Adopt a drain! Keep debris clear of the storm drain catch basins to allow for proper drainage, and/or alert your local municipality of issues with drainage.
- Ensure your gutters are clear to avoid water overflowing before reaching the downspout.
- Place your downspout discharge at least four to six feet away from the home, which reduces the amount of water near your foundation and basement.
- Grade the landscape around your home to move water away, not towards, your foundation. A good rule of thumb is that the ground should drop one inch for every one foot you move away from the house. Build up soil and landscaping to create this downslope.
- Use a sump pump and hook it up to a battery backup in case of a power outage.
- Consult with a plumber about flood prevention tools like backflow preventors, sewer traps, check valves, and more.
- Plan your landscaping to avoid root intrusion into sewer pipes. Roots can damage sewer lines and cause blockages.

It's also important to share these ideas with your neighbors and support investment in our local infrastructure. If residents, businesses, and municipalities work together to reduce stormwater runoff and improve both our public and private wet-weather infrastructure, we can be better prepared for intense rain events in the future. Visit MyWatersheds.org to learn about how communities in Greater Lansing and throughout the country are managing their stormwater challenges and how you can help at home.