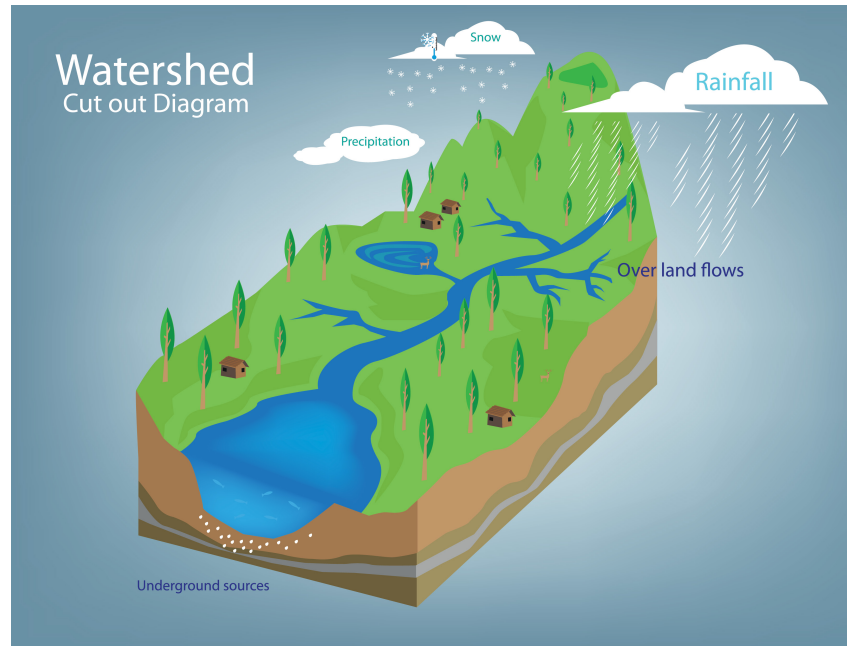


WHAT'S A WATERSHED?

Think of a watershed like a funnel. If you place a drop of water anywhere in the funnel, it will fall out through the spout. A watershed works much the same way, and it refers to any area of land that drains to a common point. Hills, mountains, and sloping topography separate watersheds and act like the walls of the funnel, while the rivers, streams, and stormwater drains act as the spout that concentrates the water flowing over the land, channeling it elsewhere.

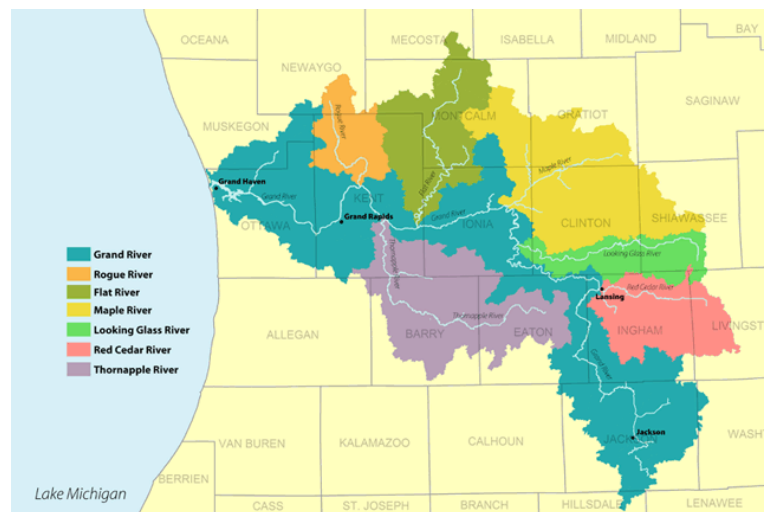
Picture a drop of water falling on a hill, miles from the nearest stream. When the rain falls, some of the water soaks into the soil and some evaporates into the air, while the rest runs off the land. That water joins small streams and wetlands that drain into lakes and rivers, and eventually flows to the ocean. This is how trash, chemicals, or bacteria miles from a body of water can still end up in our rivers and lakes, and it's why we all need to understand how our actions impact local waterways and those downstream!

The urbanized area around Lansing lies within a portion of the Upper Grand River Watershed which can be broken into three smaller watershed areas: the Grand River Watershed (direct drainage), the Looking Glass River Watershed, and the Red Cedar River Watershed. The runoff from this area eventually drains into Lake Michigan at the mouth of the Grand River in Grand Haven, MI. Because of this connection, our actions at home have a direct impact on the health of the Great Lakes!



Help Protect Our Water by Following These Tips!

1. Always conserve and reuse water wisely.
2. Soil test before you apply fertilizers. Use low or no-phosphorus fertilizers.
3. Use native vegetation and reduce turf grass by increasing native wildflowers and grasses.
4. Capture and reuse rainwater to control stormwater runoff.
5. Dispose of pet waste properly in the trash or toilet (not onsite septic systems).
6. Wash your car at a commercial facility or on the lawn instead of your driveway (if allowed by local ordinance).
7. Maintain all vehicles, eliminating leaks and spills.
8. Recycle and dispose of household chemicals properly (motor oil, household cleaners, paint, etc.).
9. Inspect and maintain onsite septic systems and sewers.
10. Join a local watershed organization!



SANITARY VS. STORM SEWER

Did you know that communities typically have two sewer systems? Most have both a storm sewer and a sanitary sewer.

Storm sewers redirect runoff from rain or snow events into a system of catch basins and pipes, while sanitary sewers collect wastewater from toilets and taps and send it to a treatment plant to be cleaned.

Though less common, some communities have combined systems. These Combined Sewer Overflows, or CSOs, are older systems but still remain in use in some areas. 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 backlogged the system. When this occurs, the mixture of stormwater and raw sewage flows directly into a river, stream or lake.

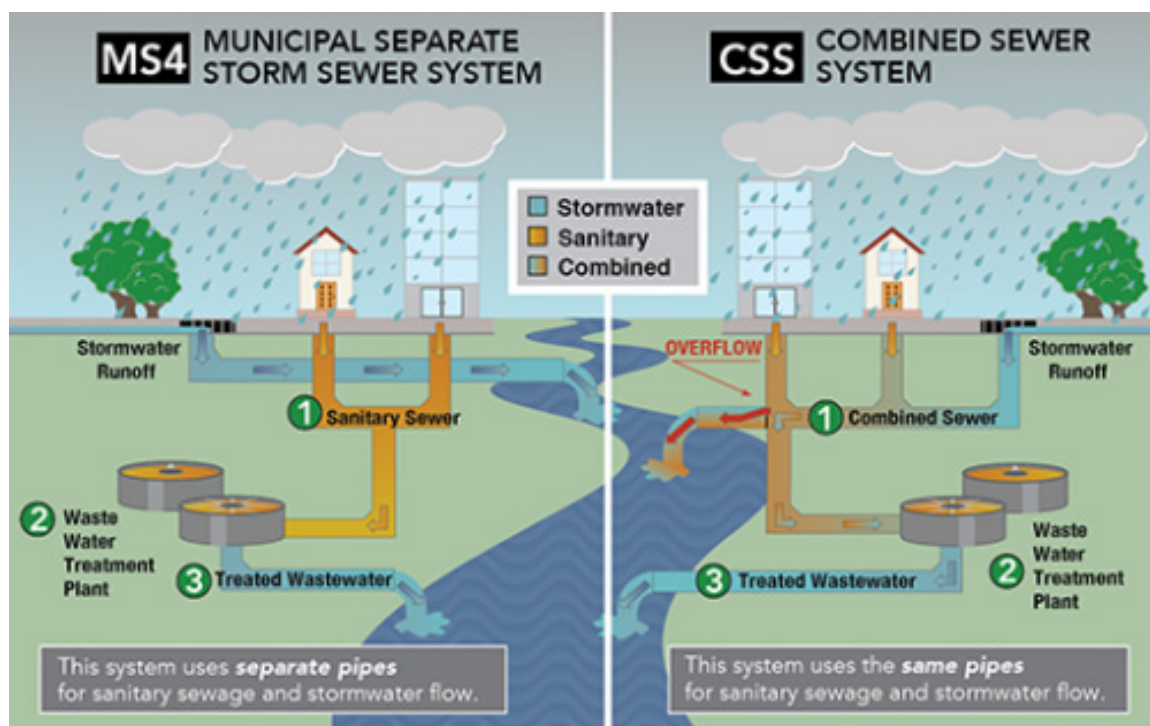
Untreated sewage entering our surface water had obvious impacts to the water quality and ecosystems that depend on these habitats.

To combat this, modern storm sewers have moved away from the “one pipe system” of the past and 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). Here, the sanitary sewer still directs sewage to the treatment facility, but stormwater is diverted directly to water bodies.

The MS4 system reduces the risk of large quantities of sewage entering the surface water, but since stormwater doesn't go to the treatment plant, it has it's 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, maintained, and understood by the public. If you see someone pouring anything down a storm drain, report it! Also report any clogged or dirty catch basins to your municipality.

Here are some things you can do to help maintain our sewer systems and keep our environment clean:

- Do not pour anything into storm sewer drains.
- Clean up spills and don't wash them into a drain.
- Keep storm sewer drains clear of leaves, grass clippings, sticks and litter.
- Don't pour paints, solvents, cleaners, etc. into any drain – take it to your local county household hazardous waste collection.
- Repair any leaks and drips from your vehicle.
- Minimize the use of herbicides and pesticides.
- Collect and recycle motor oil.



ILLICIT DISCHARGES

Did you know that most storm drains lead directly to our waterways without undergoing treatment at a wastewater treatment plant? This means even if you live miles from the nearest river or lake, your actions at home can still impact our shared water resources. Soaps and suds from washing our cars in the driveway, bacteria from pet waste, and excess lawn chemicals, can be swept up with runoff and pollute aquatic habitats. These examples - and anything else that drains to a storm drain or directly to a waterway that is NOT stormwater - is considered an illicit discharge.

Illicit discharges can also be the result of improper, or illicit, connections of sanitary sewers into the storm sewer system, sending domestic household waste, wash water, and other waste water directly into our waterways. Other illicit charges come from intentional dumping, be it pouring used motor oil into drains, or a restaurant dumping dirty mop water on the pavement outside the building, where it flows to a stormwater drain and sends detergents and other pollutants into waterways. Other discharges are from accidental sources, like leaking vehicles and fuel tanks. Whatever the source, illicit discharges are illegal and harmful, but preventable!

What Can You Do About Illicit Discharges?

You can help keep our lakes, rivers, streams, wetlands, and groundwater clean by applying the following tips:

Only rain in the drain: Never dump motor oil, chemicals, pet waste, dirty or soapy water, or anything else down the storm drain or in a drainage ditch. All of these materials pollute our lakes and rivers!

Sweep it: Do you have extra fertilizer, grass clippings, or dirt on your driveway or sidewalk? Sweep it back onto your lawn. Hosing your driveway sends these pollutants into storm drains that lead directly to our lakes and rivers.

Pick it up: If you see garbage near a storm drain, pick it up. Throw litter in its proper place.

Clean it: Clean up after your pet to reduce pet waste traveling to local waterways.

Dispose of it properly: Take household hazardous waste (paint, motor oil, etc.) to a local collection event.

Report it: If you see someone dumping something into a storm drain, or see a direct connection to the river that may be pollution you are encouraged to report it. You can do this by contacting your local public works department. In addition, you can contact the Michigan Pollution Emergency Alerting System (PEAS) at (800) 292-4706. PEAS is a 24 hour hotline managed by the Michigan Department of Environmental Quality and is used to report environmental



ADOPT A CATCH BASIN

Looking for an easy way to protect our water resources? Adopt a catch basin!

Catch basins are storm sewer inlets that drain excess rain and snow melt away from pavement and into a system of underground piping, culverts, and/or drainage ditches. Contrary to popular belief, pet wastes, oil and other materials dumped into storm sewer grates do not go to the wastewater treatment plant, but instead flow directly into streams and lakes. For example, dumping oil into a storm sewer grate has immense consequences; when it reaches the water, just one pint of oil can create a slick as large as a football field.

Luckily, catch basins serve as the first line of defense against stormwater pollution. Their grates are designed to prevent some debris from entering the system and clogging pipes or discharging into waterbodies. However, the grates only capture larger pieces of debris and can become clogged with yard waste and litter. That's why it's important to maintain catch basins to prevent localized flooding and minimize surface water pollution. While municipalities frequently street sweep and inspect catch basins, citizens can help!



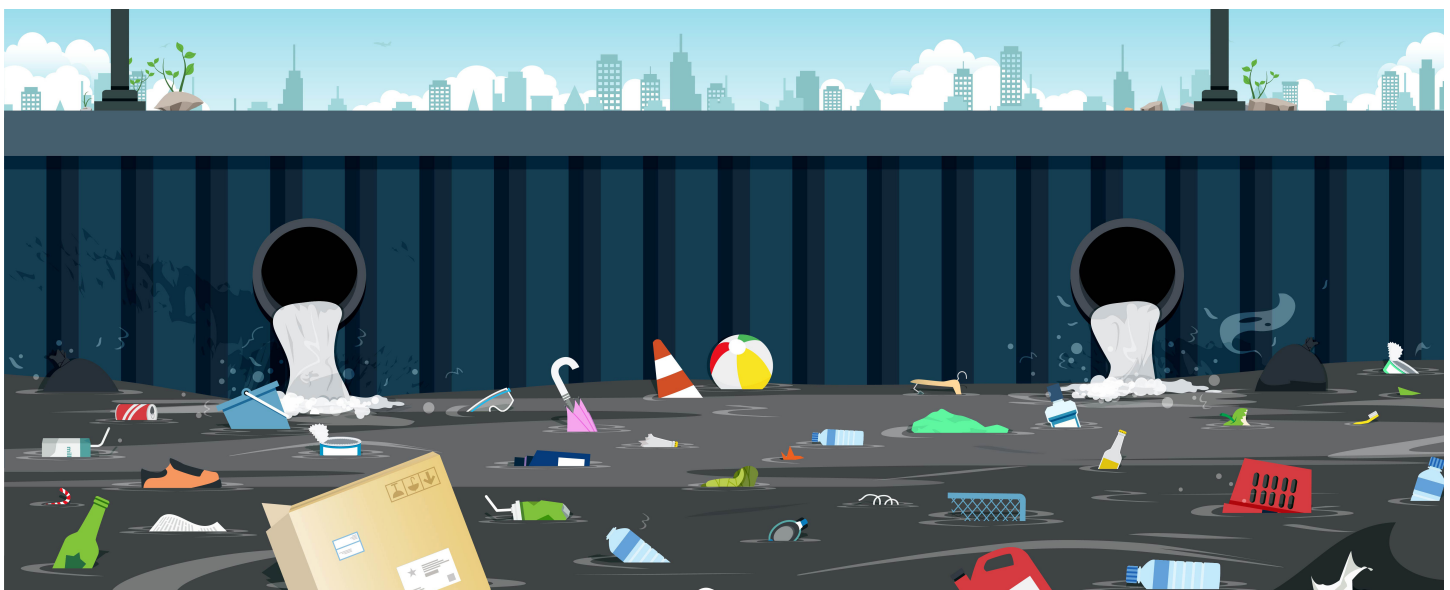
How Can I Adopt My Own Catch Basin?

Remove Debris From Grates: The grates of catch basins can become clogged with litter or leaves, especially in the spring and fall. Regularly inspect the grate and remove debris. Encourage neighbors to adopt the catch basins in front of their homes and keep them free of debris.

Ensure Regular Cleaning: Catch basins should be cleaned out before the storage area is half full. Once this level is reached, debris begins to wash into sewer pipes. Cleaning these storage areas should be performed by your local jurisdiction or a private contractor, but you can be your community's "eyes and ears" to alert them about problem areas. Contact your local public works department if you are concerned about the catch basins in your neighborhood.

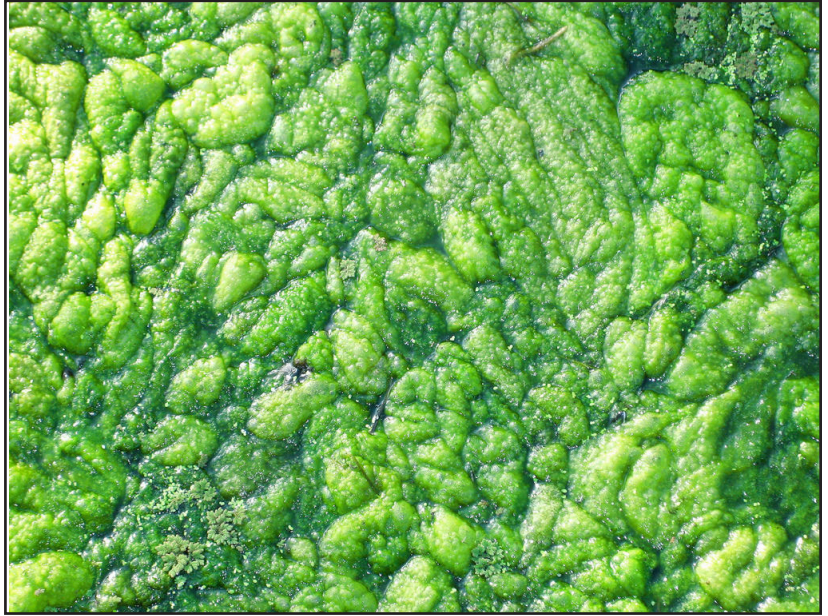
Label Your Storm Drains: Stenciled signs or applied decals that read "Dump No Waste - Drains to River" are a good reminder that nothing but water should enter a storm drain.

Teach Your Neighbors: When people realize storm drains discharge to waterways rather than a treatment plant, they are more likely to avoid polluting them. Make sure your neighbors understand how these systems work.



RESPONSIBLE CAR WASHING

There's no problem with washing your car, it just matters how and where you do it. Storm drains in our streets and roadside ditches lead directly to our lakes and streams, so when you wash your car in the driveway or on the road, the soap — together with dirt, wax, oil, grease, grime, and grit — runs from your car into nearby storm drains. From there, the mix of soap and dirty water flows through the storm sewer system and directly into our rivers, streams, wetlands, and lakes. This impacts water quality for both humans and aquatic life.



When water from car washing enters a waterway, it harms fish and impairs water quality. The phosphates from the soap cause excess algae to grow, which reduces oxygen levels as it decays. The soap's surfactants damage fish gills and kill their eggs. Even if soap isn't used, the oils, heavy metals, brake linings, and rust washed from vehicles enter storm drains and impact our shared surface water resources.

How Can You Wash Your Car and Help Keep Our Environment Clean?

The best way to minimize your environmental impact is to use a commercial car wash, especially if you plan to clean the engine or the bottom of your car. The average homeowner uses 116 gallons of water to wash a car, but commercial operations use 60 percent less water for the entire process than a homeowner uses just to rinse! Most car washes also reuse wash water several times before sending it to the sanitary sewer system for treatment, ensuring pollution stays out of our waterways.

Looking for other options? If allowed by your local community, wash your car on the lawn so the ground can filter the water naturally. The lawn will gladly soak up the water, preventing it from entering storm drains or roadside ditches. If you can't use the lawn, try to direct dirty water toward the lawn and away from nearby storm drains. Pour your bucket of soapy water down the sink when you're done, NOT into the street. Again, please be sure to check local ordinances before washing or parking your vehicle on the lawn!

You should also take care to minimize the amount of soap you use, or wash your car with plain water. Use a hose nozzle with a trigger to save water when you don't need it and avoid using engine cleaners or degreasers.

In recent years, sources of pollution like industrial wastes from factories have been greatly reduced. Now more than 60 percent of water pollution comes from smaller sources like residential car washing; cars leaking oil; fertilizers from farms, lawns, and gardens; pet waste; and failing septic tanks. Even these small-scale sources add up to a big pollution problem, but everyone can make minor changes to help clean up our water and be part of the pollution solution!



ON-SITE SEPTIC SYSTEMS

Also known as onsite/decentralized wastewater treatment systems, septic systems treat sewage from homes and businesses that are not connected to a municipal sewer and treatment plant. They work simply: sewage and grey water flow out of the building into a septic tank that holds and settles solids in the wastewater while liquids continue to flow into a drainage field where they soak into the ground.

However, having your own onsite sewage solution does come with some added responsibilities and risks for homeowners. If the tank is full or broken, if the drainfield has failed and saturated with water, or harmful chemicals, wipes, and greases are flushed down the drain, the septic system can stop working correctly. Failed systems pose a risk to human and environmental health, as untreated sewage can pool in yards and enter our waterways and groundwater sources. Repairs can also be costly.

Learn how to prevent and spot the signs of failure here.

Signs of Failure

- Pooling water or muddy soil around your septic system
- Water backing up into your basement
- Your toilet or sink backing up when you flush or do laundry
- Strips of bright green grass over the drain field

What Can You Do?

- Don't use excess water. Overloading the system is biggest reason for system malfunction. Space out large dishwashing and laundry loads.
- Don't add additives - they only harm your system.
- Don't damage it. The septic system is buried just beneath the ground surface and can be damaged if you pave over it, drive over it, or park on top of it.
- Don't direct excess rain water to the area where the septic system is buried. Water from the septic tank travels through the laterals to drain through the soil. If the soil is already wet, the water may back up in your system or pool on the ground. Make sure downspouts and yard drainage are directed to other areas of your yard.
- Do install risers and inspection ports. Because the system is buried, it is difficult to inspect to check for problems leading to a malfunction. Small inspection ports are easy to install and can allow inspectors to easily check your system.
- Do get a yearly inspection. An annual inspection of the lateral lines will reveal possible problems.
- Do check septic tanks for damage every three years and pump out solid material when needed.

Save Money

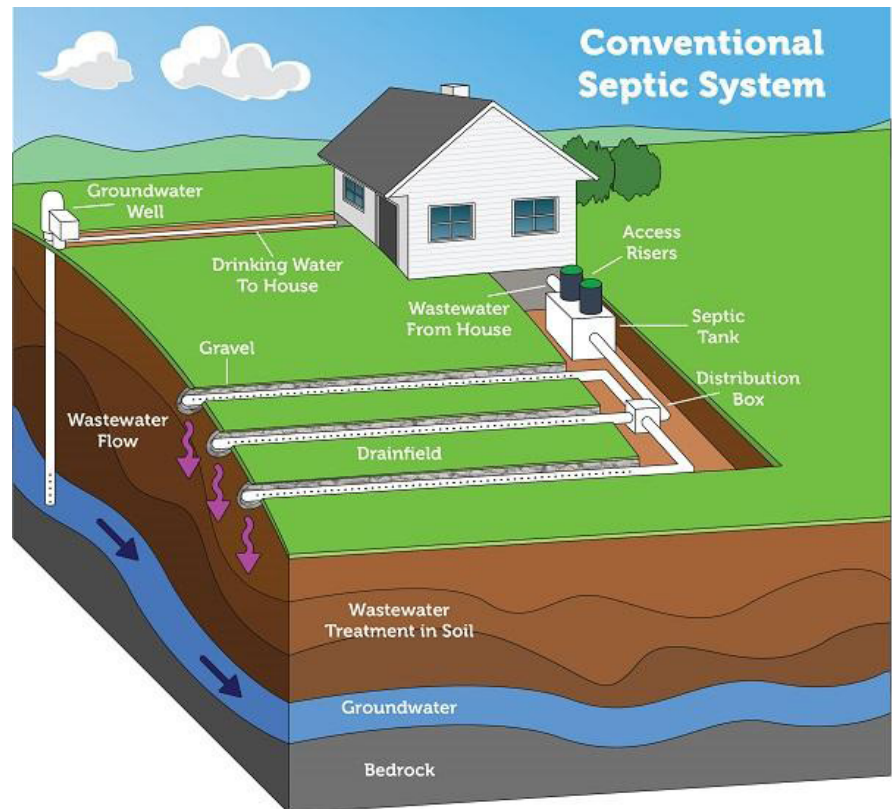
If your septic system isn't maintained, you will need to replace it, costing you thousands of dollars. If you sell your home, your septic system must be in good working order.

Protect the Environment

Proper maintenance of your septic system prevents the spread of infection and disease and protects water resources. Inadequately treated sewage from failed septic systems can cause groundwater contamination, posing a significant threat to drinking water. Improperly treated sewage that contaminates nearby surface waters also increases the chance of swimmers contracting a variety of infectious diseases.

Who Do You Call?

Check online for professional septic pumpers, installers, inspectors, and tank manufacturers. They will be able to answer simple questions about your septic system.



Please note: Septic systems vary. Diagram is not to scale.

YOU'RE NOT JUST FERTILIZING YOUR LAWN

Lawn fertilizer isn't a problem if it's used carefully, but over-fertilizing can contribute to stormwater pollution in the Grand River watershed. If you use too much fertilizer or apply it at the wrong time, it can wash off your lawn or garden, enter the storm sewer system, and flow untreated into our rivers, lakes, and streams.

Just like in your garden, fertilizers make aquatic plants grow. But while fertilizer may help our lawns, excess phosphorus and nitrogen in waterways causes algae to grow faster than aquatic ecosystems can handle. Large algal blooms reduce oxygen levels, increase toxicity, and spur bacterial growth, making the water unsafe for human recreation and aquatic life. By properly applying and limiting usage of lawn fertilizer, you can help protect our surface water resources from nutrient pollution.

- **Don't Guess...Test!** First, find out if you even need fertilizer! Contact your Michigan State University Extension office to get a soil test. You'll save money and reduce the chance of over-applying.
- **Sweep It:** Sweep excess fertilizer and grass clippings from pavement back onto your lawn so that they don't wash into storm drains.
- **Go Slow and No:** Use slow-release nitrogen, no-phosphorus fertilizers that provide a slow, steady source of nutrients.
- **Hire Smart:** Select a lawn care service that follows the practices noted above.
- **Mow High:** Keep your lawn at three inches in height. Taller grass strengthens roots and shades out weeds. Also, remember that the nutrients from grass clippings left on your lawn act as a great fertilizer.
- **Don't Over Water:** Consider using a drip system or soaker hose instead of a sprinkler.
- **Go Natural:** Use commercially available compost or make your own using garden waste. Mixing compost with your soil means your plants will need less chemical fertilizer and puts your waste to good use. Also consider using organic fertilizers and pest control methods whenever possible.
- **Make Fertilizer-Free Zones:** Keep fertilizer at least 20 feet away from the edge of any lakes, streams, or storm drains.



In recent years, sources of pollution like industrial wastes from factories have been greatly reduced. Now more than 60 percent of water pollution comes from things like excess fertilizer applications, cars leaking oil, pet waste and failing septic tanks. All these sources add up to a big pollution problem. But each of us can do small things to help clean up our water too, and that adds up to a pollution solution!

PET WASTE AND THE ENVIRONMENT



Pet waste isn't just a nuisance in yards and parks: it's full of bacteria that can make people and aquatic habitats sick. When left on the ground, precipitation and sprinkler runoff can wash pet waste (and the bacteria it carries) into storm drains. Since most storm sewers discharge into rivers, lakes, and streams without undergoing any treatment, runoff polluted with pet waste and other contaminants can impair our surface water resources.

With 80% of people (and therefore most of America's 90 million dogs) living in developed areas where stormwater isn't treated before discharging into our rivers, the impact of pet waste-contaminated runoff is amplified. It doesn't stay where it's left, as its bacteria can be swept up and concentrated downstream. Considering that dogs are relative newcomers to the ecosystem, the fact that they produce 10 million tons of waste each year in the U.S alone indicates a significant environmental impact.

When beaches are closed in the summer, it's often due to high levels of bacteria, especially *E. coli*. While failing septic tanks, wildlife, and poorly managed livestock can also introduce bacteria into the watershed, pet waste is a major contributor. In fact, due to the high protein, highly processed diets of modern dogs, their waste can contain more bacteria and pathogens by weight than that of cows. Just one gram of dog waste can contain as many as 23 million fecal coliform bacteria! It can also contain salmonella, giardia, and other bacteria and parasites that spread disease and impair water quality.



Help Keep Our Waterways Healthy

There are many threats to the health of our watershed, but picking up after our pets is a simple and easy way to limit one source of pollution.



Bring A Bag: Carry a bag (preferably biodegradable) when walking pets and be sure to pick up after them. Clean up pet waste in your yard frequently.

Clean It Up: Pick up pet waste from your yard or hire a pet waste removal company to clean it on a routine basis. Pick it up before rain, watering your yard, or cleaning patios and driveways. Never hose pet waste into the street or gutter.

Dispose of the Waste: Throw it away with the household trash, flush it, or bury small quantities in your yard where it can decompose slowly. For the latter, dig a hole one foot deep. Put three to four inches of waste at the bottom of the hole. Cover the waste with at least eight inches of soil. You can bury the waste in several different locations in your yard, but keep it away from vegetable gardens!

In recent years, sources of pollution like industrial wastes from factories have been greatly reduced. Now more than 60 percent of water pollution comes from things like residential car washing, cars leaking oil, fertilizers from farms, lawns and gardens, pet waste, and failing septic tanks. All these sources add up to a big pollution problem, but each of us can do small things to help clean up our water, and that adds up to a pollution solution!

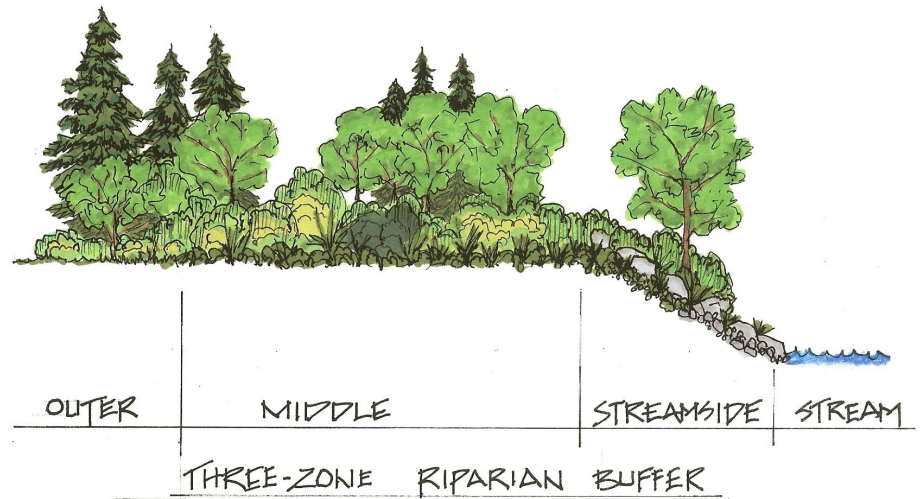
PROTECTING THE WATER'S EDGE

The health of our waterways is determined by how we treat the land that drains into them. All residents, especially those who own and manage lake- or river-front land, can take steps to impact the river in a way that is beneficial to it and the wildlife that depends on it.

A riparian zone is the water's edge, or where the land meets a waterway. Riparian zones act as a buffer for rivers and other waters by filtering out polluted runoff from agricultural, urban, residential or other land uses. Riparian buffers, whether they're planted with deep-rooted native plants or occur naturally with existing trees and woody plants, can absorb sediments, chemical nutrients, and other substances contained in polluted runoff before they enter our rivers and streams. They also slow down the velocity of runoff and infiltrate runoff to recharge groundwater. A healthy, functioning riparian area and associated uplands can dramatically increase the health of fish and wildlife habitat, aid in erosion and foliage control, late season stream flow, and water quality.

What Can YOU Do to Protect the Water Edge?

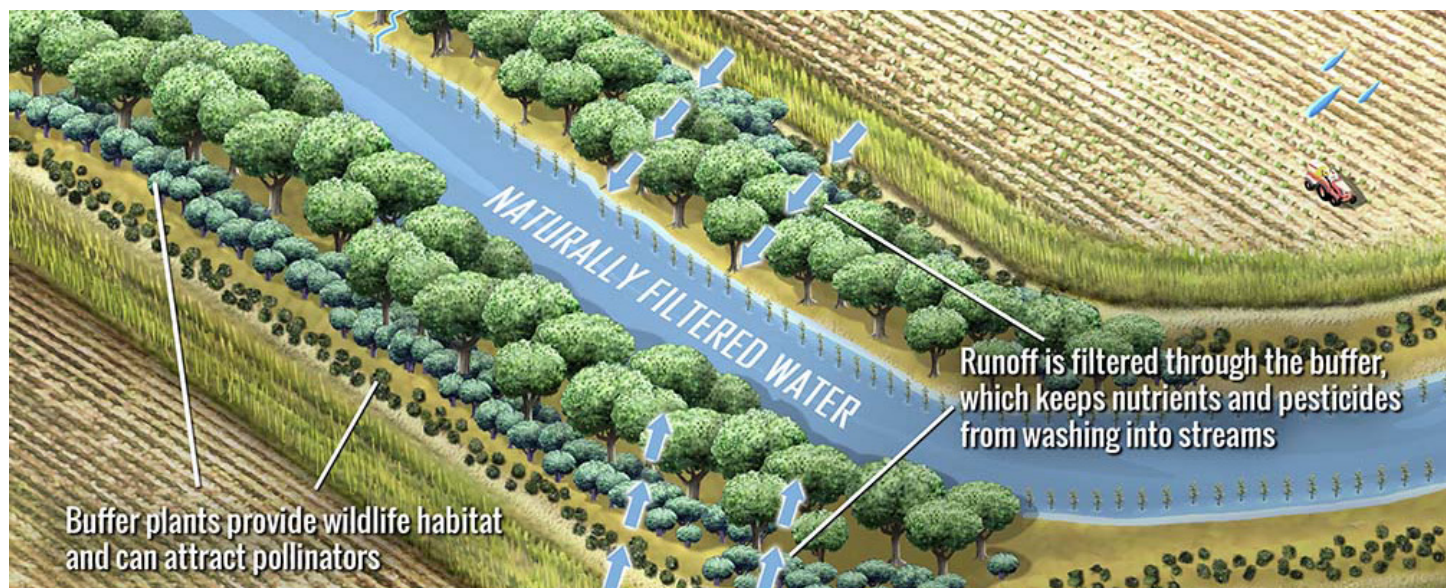
By creating a healthy riparian zone on your property, you can help improve water quality.



Reduce Turf Grass: Shoreline and stream bank property planted with turf grass is really an unnatural landscape. While turf grasses slow runoff, their root systems are too shallow to stabilize stream banks or shorelines.

Don't Mow to the Water's Edge: Lawns mowed to the water's edge will do little to control shoreline erosion. In fact, removing native vegetation and replacing it with turf grass usually results in accelerated stream bank and shoreline erosion that degrades water quality. A buffer between 15-25 feet is usually suitable, but the more the better.

Plant Native Michigan Plants: Native plants actually help improve water quality and they're an attractive alternative to turf grass. Native plants generally have deeper roots that absorb runoff and break down pollutants that would otherwise go straight to the river. You can usually find native plants at your local nursery.



OIL AND WATER DON'T MIX

Most oil pollution looks different than the pictures you see of oil covered beaches after a major spill or accident. In fact, poorly maintained vehicles are one of the largest causes of oil pollution in our waterways. Leaking automotive fluid goes from your car to the street, from street to storm drain, and from the drain directly into our rivers, lakes, and streams. This impacts aquatic habitats and makes waters unsafe for human recreation. With over 250 million cars on the road, these small spills add up to big problems. It's estimated that Americans spill 180 million gallons of used oil each year. That's 16 times the amount spilled during the Exxon Valdez disaster! By quickly fixing leaks, you can help protect both your vehicle and our water resources.

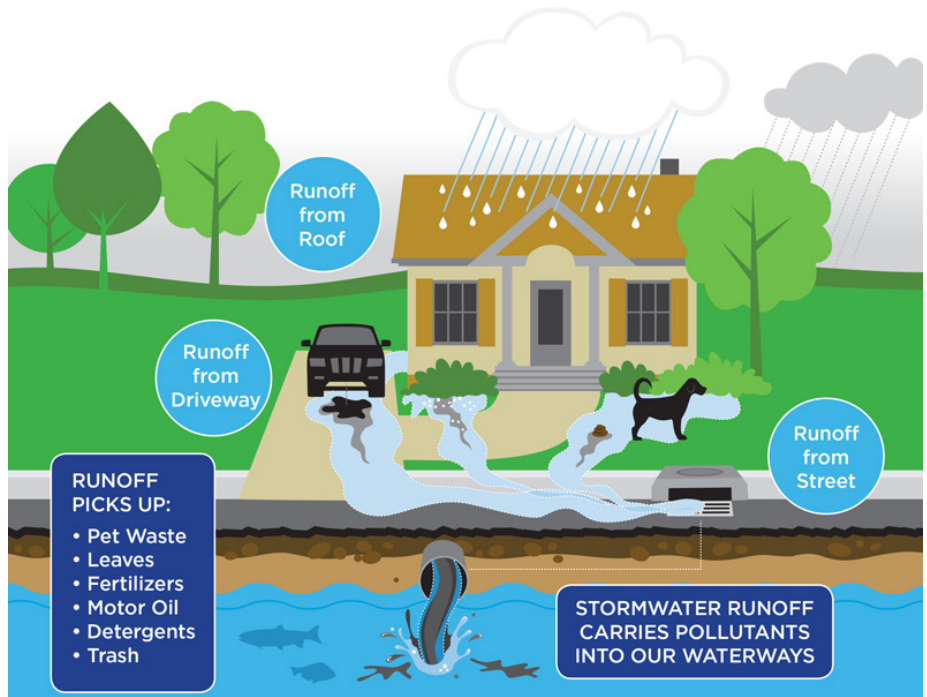
While checking for leaks and resolving them helps, it's not just leaking fluids that cause issues. When washing a vehicle on pavement, the soap suds, grease, oil, and sediment that rinse off your car or lawn equipment also become stormwater pollutants.

Worse yet, this pollution is not an isolated problem that only impacts the neighborhood or local waterway where the leaks or spill occur. As part of the Grand River watershed, runoff in the Lansing area eventually enters the Grand River. From there, water flows from the mouth of the river in Grand Haven and into Lake Michigan. This means that hazardous chemicals on the ground at home impacts our local waterways, the Great Lakes, and beyond!



Help Keep Our Waterways Clean

- Repair any leaks and drips from your automobile. This includes: motor oil, transmission fluid, anti-freeze/coolant, power steering fluid, brake fluid, gasoline and other lubricants. Remember, these chemicals are also dangerous to your pets.
- If you choose to change your own oil, do not dump the used oil in the yard, on your driveway, or in a storm drain. Find a local firm that will recycle the used oil.
- Do not use used motor oil to control dust on gravel driveways.
- Wash your car on the grass to filter out impurities or take it to a commercial car wash where the water is reclaimed (check local ordinances first).
- Basic automobile maintenance such as tune-ups, proper tire inflation, and efficient driving practices save on fuel, as well as water and air pollution.
- Abandoned automobiles should be taken to a scrap yard or donated to a local charity. Old cars sitting out in a field will leak oil and fuel.



WETLANDS

What is a wetland? Having often been referred to as “too wet to plow and too dry to swim,” wetlands are transitional lands that lie between the water and dry ground. Most people think of wetlands as marsh-like areas filled with cattails. However, there are many types of wetlands such as swamps, marshes, bogs and fens, and seasonal wetlands such as wet meadows, sedge meadows and wet prairies.

Wetlands are areas where water either covers the soil or is at or near its surface at least part of the year. This saturation alters the development of the soil, resulting in an organically rich, special class of soils known as hydric soil. Wetland’s importance to the protection of our lakes and streams cannot be overstated, as these unique environments act as natural filters, settling sediments and absorbing nutrients and other pollutants from runoff before they reach open water. They are also home to a diverse range of aquatic and terrestrial species. For this reason, many wetlands, particularly larger ones and those bordering the Great Lakes, are protected by state and federal laws. Several communities also regulate smaller wetlands. Some of the many benefits we derive from wetlands include:

- Flooding and storm water control. Wetlands help to stabilize soil and reduce erosion by soaking up excessive surface water runoff. They can then slowly release this excess water either into groundwater or into the lake or stream.
- Protecting water quality by filtering and breaking down sediments, nutrients, and toxins and then slowly releasing the water to recharge the groundwater.
- Providing habitat for many different species of wildlife including fish, insects, amphibians, reptiles, birds and mammals. This habitat is used for breeding, nesting, feeding and cover. Many threatened or endangered species depend on wetlands.
- Providing numerous recreational opportunities for fishing, bird watching, canoeing, hiking and hunting. In addition, there are other economic benefits such as farming for blueberries, cranberries, wild rice, and timber.
- Treating pollution by serving as a biological and chemical oxidation basin.
- Controlling erosion by serving as a sedimentation area and filtering basin for silt and organic matter.

You can play a role in protecting our vital wetland resources by helping to restore wetlands, promoting wetland stewardship and permanent protection through conservation easements, and educating yourself and others about the importance of wetlands and how to protect them.

