

Infiltration trenches are suitable for relatively sediment-free sources of stormwater runoff, like that from rooftops. They are not suitable for commercial parking lots, because they soon clog up with fine sediment. The cost to construct infiltration basins is less than sand filters and varies depending on the size.

Rain Garden

Do you know where excess rain drains from your home? Part of the excess rain from the Freshwater Center entryway drains to a small depression with plants, called a rain garden. Our rain garden has been specially modified with the addition of a liner and is designed to act like a small wetland. Similar to the larger filtration structures on site, the rain garden absorbs and treats stormwater. When excess rain drains into the rain garden, sediments settle out, nutrients and some other pollutants will be taken up by the plants, and the volume of water is reduced through plant transpiration.

The rain garden was created by excavating a small depression, placing an impervious liner, and then partially filling the basin with organic or muck soils. Next, we planted wetland-

loving wildflowers like joe-pye weed, marsh marigold, and blue flag iris.

Rain gardens are a simple, cost-effective option that businesses and residents can use to treat stormwater and reduce pollutants to neighboring waters.

Rain Barrel

The age-old technique of collecting water for watering gardens and indoor house plants is regaining popularity. Collecting rain water with rain barrels not only saves money and energy, but also reduces the amount of stormwater. Rooftop stormwater is relatively free of dissolved chemicals such as chlorine and lime, which can be harmful to some plants.

Our rain barrels collect a portion of the rooftop stormwater from the Freshwater Center. We use what's collected to water the landscape plantings around both the entranceway and the infiltration basin during dry spells. Each of these barrels holds about 90 gallons. The water flows via gravity through the outlet hose. The barrels are "childproof" and contain screening to keep out debris and insects, particularly mosquitoes.

How does stormwater pollute our waters?



When stormwater flows over roads, sidewalks, lawns, and gardens, it picks up substances like dirt, fertilizers, oil, salt, and bacteria. Most stormwater runoff washes into nearby water bodies carrying these pollutants from the places where we live and work into lakes and streams. Large volumes of runoff can come from areas that have curbs and gutters or underground pipes (storm sewers).

Decreasing the volume of stormwater runoff is important for maintaining the health of our waters. Effective stormwater management entails looking at both quality and quantity. Improving the quality of stormwater can involve collection and treatment systems like the Freshwater Center's sand filter, or the simple act of a homeowner reducing fertilizer and pesticide use. Decreasing the volume of stormwater runoff is also important, particularly where roads and other hard surfaces have increased the volume significantly above what would have normally soaked into the ground.

Your actions can positively impact your waters. What can you do about stormwater?

- **Never dump fluids or yard waste into storm drains.**
- **Maintain your car (ensure there are no leaking fluids).**
- **Wash your car on the lawn or at car wash locations.**
- **Be careful when changing your car's motor oil and dispose of oil properly.**
- **Dispose of household hazardous materials carefully.**
- **Move pet waste to a location that won't wash into the water or storm drain.**
- **Reduce or eliminate the use of fertilizer on your lawn.**
- **Have your soil tested to determine the proper amount of fertilizer.**
- **Avoid or minimally use pesticides.**
- **Rake leaves and other organic materials away from storm drains.**
- **Cover areas of bare soil with vegetation and mulch.**
- **Sweep off the driveway rather than hosing it down.**
- **Plant a rain garden to absorb runoff that drains from your lawn.**
- **Mow your lawn at a higher length to absorb more runoff.**
- **Plant more shrubs, trees, and ground covers in your lawn.**
- **Collect and use rainwater on site.**

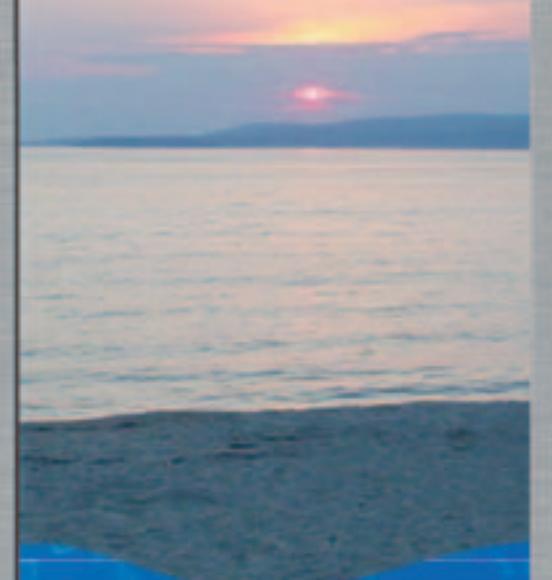
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For more information about stormwater, pollution, and how you can help, contact Tip of the Mitt Watershed Council:

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Clean water is everybody's business



Stormwater solutions for individuals and businesses



Clean water is everybody's business

Reducing stormwater pollution is one of the primary goals of Tip of the Mitt Watershed Council. Demonstrating how to collect and treat stormwater, the Watershed Council has installed systems that use simple techniques to reduce the impact to Little Traverse Bay from our office building in Petoskey, Michigan. We encourage you to employ these techniques at your place of business and/or residence.

The Freshwater Center's Stormwater System

When Tip of the Mitt Watershed Council moved its office into the urban environment of downtown Petoskey, we were determined to "walk our talk" and create a model stormwater management system at our new location. We have retrofitted the Freshwater Center with four different stormwater management systems to help reduce pollution to Little Traverse Bay. They are:

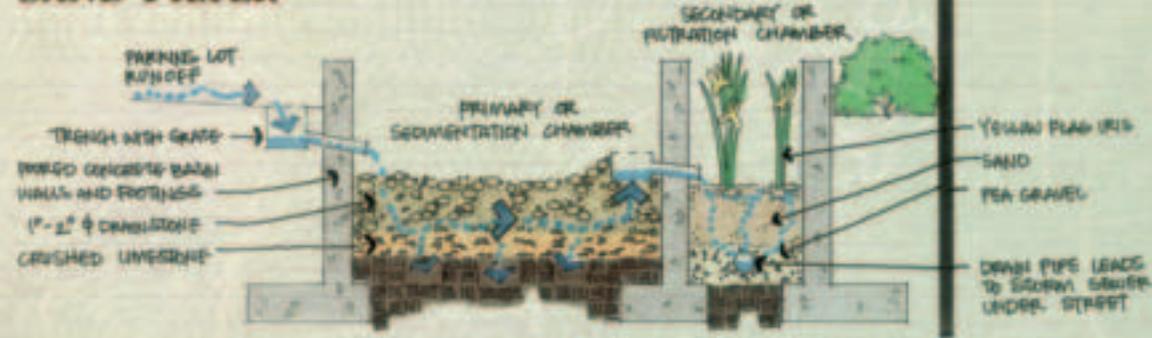
1. Sand filter for parking lot stormwater
2. Infiltration basin for rooftop stormwater
3. Rain garden for stormwater from the entrance area
4. Rain barrels to use stormwater for landscape watering

Each one of these techniques plays an important role in reducing the pollutants and volume of stormwater from our facility to help keep adjacent waters clean. The sand filter and infiltration basin are systems appropriate for businesses and public facilities, whereas the rain garden and rain barrels can be easily incorporated at business locations and individual residences as well.

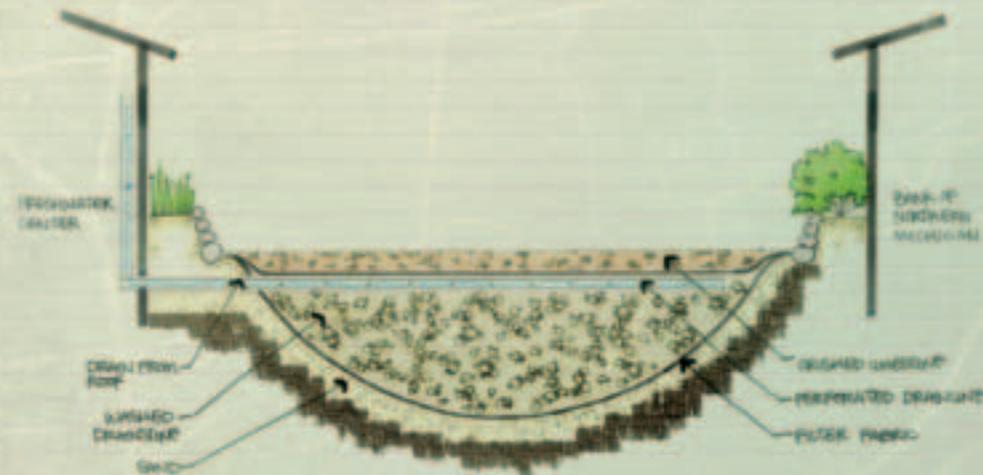
Sand Filter

The sand filter was installed to improve the quality of parking lot runoff from the Freshwater Center. Prior to its creation, roughly 64,000 gallons of untreated runoff from the parking lot flowed annually into Bay Street, down Petoskey's storm sewers, and eventually into Little Traverse Bay; carrying with it sediment, nutrients, heavy metals, petroleum products, toxins, bacteria, and other pollutants. Consisting of two basins or chambers, parking lot runoff first enters the larger chamber, where sand, silt, other

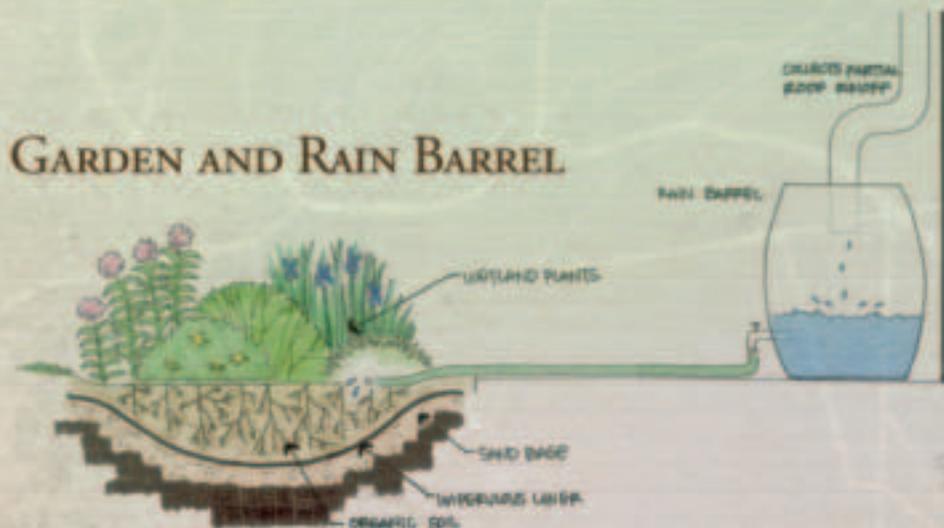
SAND FILTER



INFILTRATION BASIN



RAIN GARDEN AND RAIN BARREL



1



2



3



4

coarse particles, and the pollutants adhering to them are filtered out. It then enters the smaller chamber that is filled with sand over pea gravel, which filters out tiny particles. Yellow flag iris and micro-organisms in the sand provide some biological treatment by taking up nutrients and toxins. Most of the runoff entering the structure soaks into the sandy soils underlying both chambers, with the remaining runoff discharging to the storm sewer system.

Sand filters require engineered plans designed to handle runoff from large storms. Although considered to be a low-maintenance design, sand filters require a certain amount of space and regular maintenance. This structure is designed to be cleaned out periodically.

Infiltration Basin

Although it may look like an ordinary gravel parking lot, this area is a simple yet effective stormwater treatment structure called an infiltration basin that treats stormwater runoff from the Freshwater Center's roof. Part of the Watershed Council's roof formerly drained onto the parking lot, where it joined other runoff from nearby hardened surfaces, flowed through the storm sewer system, and emptied into Little Traverse Bay. Amazingly, we discovered that another part of the roof was illegally hooked up to Petoskey's sanitary sewer where it annually dumped approximately 28,000 gallons of water into the already overloaded wastewater treatment plant. Our infiltration basin has been successfully handling all the runoff from our roof (about 51,000 gallons per year) since the autumn of 2001.

The infiltration basin site was chosen because of its sandy underlying soils. Construction of the structure began by digging a basin-shaped trench about eight feet deep. The basin was then lined with sand and a felt-like synthetic geotextile and filled within a couple of feet of the surface with washed drainstone. Perforated drain pipes (similar to what is used in a septic system) were laid on top of the drainstone and hooked up to the roof drains. After the addition of another layer of filter fabric, the structure was covered with a layer of crushed limestone, forming a stable surface.