

Guide to Green Infrastructure

and

What is Green Infrastructure

How Do We Maintain It?



Developed in partnership by:







Green infrastructure is a term used to describe an array of practices that use or mimic natural systems to manage stormwater runoff, which is the biggest source of pollution for waterbodies and waterways in Massachusetts.

Examples of green infrastructure includes large efforts like restoring wetlands, floodplains, and utilizing infiltration basins. Smaller, more localized efforts include rain gardens, planting native vegetation and trees, installing permeable pavers, and allowing more drainage through bioswales. Green infrastructure is effective, economical, and enhances community safety and quality of life by mitigating flood and water degradation threats associated with stormwater runoff.

Like all stormwater infrastructure, these green infrastructure systems require varying levels of inspection and maintenance to retain functionality and best serve your community. Depending on ownership, this maintenance may be the responsibility of the municipality, homeowner's association, property management company, or business/property owner. The responsible party should have an Operations & Maintenance (O&M) manual on file which describes a property's infrastructure and lays out proper maintenance procedures and scheduling.

You may have implemented or come across green infrastructure without even knowing it! This guide is intended to aid in the identification and subsequent maintenance of smallscale green infrastructure in your own neighborhoods and properties, so we can all work to maintain their essential functions and ensure our community is resilient against storms, flooding, and other natural hazards.



Greenscapes North Shore Coalition is a collaborative of municipalities and partner organizations focused on stormwater and watershed related issues. Greenscapes provides outreach and education to support municipal compliance with water-related regulatory requirements. Find out more at Greenscapes.org

Rain Gardens and Bioretention

Rain gardens, also known as bioretention facilities, are depressed areas in the landscape that collect rainwater from a roof, driveway, or street allowing it to soak into the ground. Native grasses, shrubs, and flowers are used, which aid in the infiltration of rainwater and provide an aesthetic appearance to the structure. Not only do rain gardens help filter and retain rainwater, but the native plants provide food and shelter for native birds, insects, and other wildlife.

Maintenance

Rain gardens, like any garden, require maintenance to retain functionality and beauty. Since rain gardens contain native plants, they do not require the use of pesticides, fertilizer, and require less water. General maintenance includes removing weeds from the garden, replacing dead plants, and adding mulch as needed. Finally, you should inspect your garden for damage after large storm events.



Fun Fact: Compared to a conventional lawn, rain gardens soak up 30% more water, filter up to 90% of nutrients, and 80% of sediment from stormwater!

Click the link below the images to play the video!

Rain Garden Inspection/Maintenance



https://vimeo.com/572216434

Bioretention Inspection/Maintenance



https://vimeo.com/571766624

Bioswales

Bioswales, or filter strips, are linear, vegetated ditches that allow for the collection, conveyance, filtration, and infiltration of stormwater. They are typically sized to treat the "first flush", which is often the most polluted volume of water from a storm event. Bioswales can vary in size and fit well in parking lots, cul-de-sacs, and road medians.



Maintenance

To ensure the functionality of a bioswale, it is recommended to semi-annually inspect the structure along with routine inspections after large storm events. Additional maintenance includes removing trash and debris, stabilizing eroded areas with biodegradable rolled erosion control products or turf reinforcement mats. If the bioswale is covered in grass, the area should be mowed as needed. Additionally, check for sediment accumulations and clogging in surface and subsurface drains on a monthly basis. Bioswale protection is crucial in maintaining its functionality. Driving, parking, or anything that may erode its sides must be avoided. Bioswales do not need to be watered, but if they are, avoid over irrigation to prevent erosion.

Detention/Retention Ponds

A detention pond is a large, constructed depression that receives and stores stormwater runoff from large drainage areas. It is designed to be a temporary stormwater storage facility and promotes the gradual release of water. Therefore, it is normal for the detention pond to run dry. These facilities may have an outlet structure to promote the gradual release of water.



Maintenance

Both detention and retention ponds require minimum maintenance, including occasional mowing between the months of April and November, removal of trash and debris, simple landscaping to reduce erosion, slope stabilization, and sediment removal. Removal of trash, debris, and sediment is especially important, as it can potentially clog the outlet and flood the surrounding area.

Inspections are an essential part of maintaining detention and retention ponds. These structures should be inspected annually and within 24 hours of a storm event that generates more than 1 inch of rain. Inspections should be done by a trained professional who will look for obstructions, trash accumulation, erosion, and sedimentation.

Permeable Paving

Permeable pavements are porous alternatives to traditional concrete/asphalt pavement that allows rainwater to pass through and infiltrate into the ground below. Permeable paving can include nonporous blocks that are spaced out to allow water to flow through the gaps and into the ground below. These unique pavers can be used in many ways to reduce stormwater runoff, including driveways, parking lots, and sidewalks. Examples of permeable pavers include porous asphalt, paving stones, and interlocking pavers.



Maintenance

Permeable pavements may require additional upkeep, depending on the frequency and intensity of its use. Check for any water that is remaining on the surface of the pavement more than 30 minutes after a rain event. This is a good indication that the pavement is clogged and not draining as intended. To clear clogged permeable pavement, clean with a power washer or compressed air blower. To prevent clogs, sweep the area at least twice a year to remove any sediment and debris and be sure to remove snow and leaves as needed. The use of a vacuum sweeper may be useful for larger areas of permeable surfaces, such as a parking lot.

Green Roofs

A green roof is a living roof that contains 6" or less of soil and vegetation that filters rainwater and allow it to drain off the roof. In addition to increasing water quality, they are great for reducing energy costs in the home.



Fun Fact: Green roofs lower heating and cooling costs of a building. During the winter, a green roof can reduce heat loss by 25% or more.

Maintenance

Green roofs need regular maintenance, similar to other landscaped areas of a property. Seasonally, weeds and invasive plants must regularly be removed within the first 18 months of installing a green roof and then twice a year after all plants are established. Routinely inspect the drain inlets and outlets, removing any blockages that may occur. Check the system once a year to ensure that the roof is functioning properly and is not pooling with water in any spots. If irrigation systems are installed, inspect them annually.

Constructed Wetlands

Wetlands serve an important function, slowing and cleaning stormwater runoff before it makes its way into streams and rivers. Constructed wetlands are man-made ecosystems that perform these same functions.



Maintenance

Maintenance of constructed wetlands is especially important in the first few years as they are getting established. Emergent areas, that is areas that are seasonally dry, should be mowed. Constructed wetlands are planted with native wetland species; weeds and woody growth should be removed regularly. Trash and debris should be removed as needed to prevent areas of pooled water.

Tree Pits

Tree pits or trenches are constructed to allow stormwater to infiltrate into the soil around street trees and use tree plantings to help mitigate and reduce stormwater runoff into surrounding areas. The system includes a tree with porous soil and an underlying layer of crushed stone with a perforated pipe, with either surface grates or curb drains to help water flow into the pit.



Maintenance

Remove any trash or debris to prevent obstruction, especially after large storms. The area made need supplemental watering during particularly dry periods. Tree health should be inspected biannually and weeding conducted as needed.

Additional Information

Additional information on green infrastructure, maintenance and other low-impact development techniques are available online at **Greenscapes.org**.

Questions? Please contact the Greenscapes North Shore Coordinator, Anna Sheridan: anna.sheridan@salemsound.org.