Green infrastructure and Stormwater Management

MICHIGAN ECONOMIC DEVELOPMENT CORPORATION

What you will learn:

How stormwater infrastructure works

The difference between traditional infrastructure and green infrastructure

The benefits to green infrastructure

How to incorporate more green infrastructure into your community

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Stormwater management are the processes which control the amount, quality and timing of runoff in a watershed system.

When rain falls in undeveloped areas, soil and plants absorb and filter the water. When rain falls on impervious surfaces like roofs, streets, and parking lots, the water doesn't soak into the ground, but flows off the surface. Stormwater that lands on impervious surfaces is traditionally collected into pipes (gray infrastructure) and eventually discharged into nearby water bodies or a water treatment plant.

TERMS:

Gray infrastructure refers to constructed structures such as treatment facilities, sewer systems, stormwater systems, or storage basins. The term "gray" refers to the fact that such structures are often made of concrete.

Green Infrastructure refers to ecological systems, both natural and engineered, that act as living infrastructure. Elements include bioswales, rain gardens, and constructed wetlands to manage wet weather impacts.

Impervious surfaces refers to those areas which prevent or impede the infiltration of stormwater into the soil as it enters in natural conditions prior to development. Common impervious areas include rooftops, sidewalks, walkways, patios, driveways, parking lots, storage areas, compacted gravel and soil surfaces, awnings and other fabric or plastic coverings.

State laws that may also apply:

Michigan Natural Resources and Environmental Protection Act, 1994

Michigan Zoning Enabling Act, 2006

Michigan Drain Code Act, 1956

The collected stormwater carries trash, bacteria, heavy metals, and other pollutants from the streets, parking lots and roofs that end up polluting the receiving waters or further tax the water treatment plan.

By contrast, green infrastructure is a stormwater management system that mimics nature, using vegetation, soils, and natural processes to manage (soak up and store) water to create healthier urban environments. On a large scale, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water.

Green infrastructure uses natural and engineered systems such as bioswales, rain gardens, and constructed wetlands to manage wet weather impacts. Gray infrastructure uses drains and pipes to do the same thing. Either type of infrastructure is designed to move urban stormwater away from the built environment, preventing flooding and damage to buildings.

Green infrastructure has many advantages over gray infrastructure. Green infrastructure allows stormwater to infiltrate natural systems gradually after storm events, lessening flooding, erosion, and pollution. The vegetation within green infrastructure absorbs and purifies excess water through a natural filtration process – lessening pollution loads from farms, city streets, vehicles, and lawns in the stormwater. More vegetation in a community also mitigates heat and improves air quality. It also can increase biodiversity, habitat space, and ecosystem integrity.

WHAT COMMUNITIES ARE DOING THIS?

Clinton Township – Installed green infrastructure in their civic center.

Charter Township of West Bloomfield – Encourages/requires green infrastructure through local ordinances.

City of Ann Arbor – Encourages rain gardens on private property and in the street right of way.

City of Dearborn – Provides grants to residents who install rain gardens.

City of Grand Rapids – Provides informational tools and guidance to residents, green infrastructure installation in public spaces.

City of Novi – Recent parking ordinance changes reduced the number of spaces required for certain uses, but required the space "savings" be used as open space (rather than a larger building).

City of Petoskey – Installed demonstration rain gardens in public spaces.

Resources:

Environmental Protection Agency's What is Green Infrastructure webpage

Green Infrastructure Targeting in Southeast Michigan, SEMCOG and EPA, 2016

Michigan Association of Planning's Environmental Planning Workshop

While the lifetime cost of green infrastructure is less than traditional, gray infrastructure, the upfront cost is greater. It can be challenging, in these cash strapped times, to justify the higher cost now, even while knowing there will be cost savings in the future. Asset management is a method of looking at the up front (installment/construction) costs as well as the long term operational costs to determine what is the least expensive option over an asset's lifetime.

How to Incorporate More Green Infrastructure

As a community moves through its capital improvement process, there may be ways to incorporate green infrastructure into development and redevelopment. A community's parks department can include green infrastructure facilities, which not only enhance natural systems, but also add beauty.

When streets or public parking lots are slated to be rebuilt, green infrastructure tools such as planter boxes, bioswales, and raingardens can be incorporated into those designs.

Likewise, infrastructure in private developments can be required or encouraged to be more green and less gray.

Local ordinances can:

- Limit the amount of impervious surface on a property similar to lot coverage totals for buildings and structures.
- Stipulate landscaping requirements for new developments.
- Define overlay zones near lakes or flood prone areas to lessen the impact of flooding to structures.
- Provide for cluster developments to preserve natural features on the parcel while allowing denser development elsewhere on the property.

Adopting stormwater fees based upon the amount of impervious surface on a property is another way to incentivize more green infrastructure. Properties with less impervious surface would be required to pay a smaller fee.

Providing grants to residents who install/create rain gardens on their property is another way to incentivize green infrastructure.

Since stormwater issues do not hew to corporate boundaries (city, township, village or county), intergovernmental efforts will yield more significant impacts. Reach out to your neighbors to coordinate efforts.

This tear sheet was developed by the Michigan Association of Planning (MAP) for the Michigan Economic Development Corporation (MEDC). The Michigan Association of Planning is a 501 c 3 organization, dedicated to promoting sound community planning that benefits the residents of Michigan. MAP was established in 1945 to achieve a desired quality of life through comprehensive community planning that includes opportunities for a variety of lifestyles and housing, employment, commercial activities, and cultural and recreational amenities.