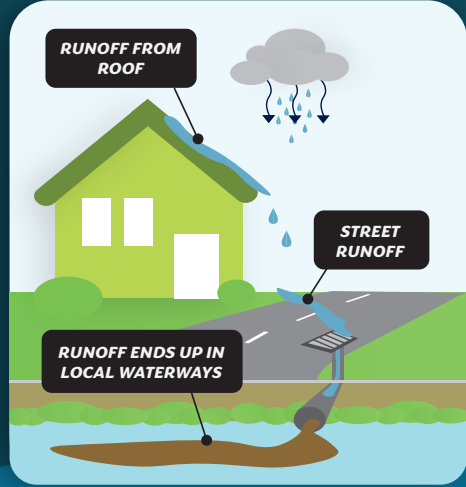


# GREEN STORMWATER INFRASTRUCTURE FOR COMMUNITIES

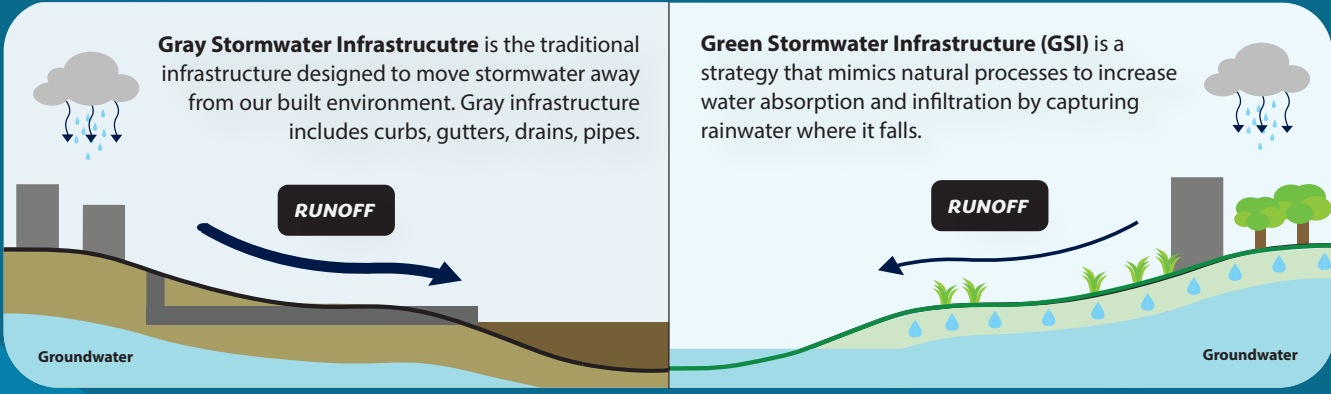
## WHAT IS STORMWATER AND STORMWATER RUNOFF?

**Stormwater** is water generated from precipitation like rainfall and snowmelt. When stormwater is not absorbed into the ground, this is called stormwater runoff. When stormwater runoff flows over impervious surfaces, like concrete or asphalt, it can pick up pollutants such as oil, trash, bacteria, and chemicals which end up in rivers, lakes and streams and threatens clean water (refer to the image on the right).



## WHY DO WE MANAGE STORMWATER?

**Stormwater management** is the effort to capture and slow stormwater runoff while improving water quality. Changes in population growth, urban development, and climate, including increased frequency and intensity of rainfall, have increased the magnitude of stormwater-related problems. Effective management of stormwater can reduce the severity of flooding from stormwater runoff and help create cleaner waterways. **Stormwater infrastructure** (both gray and green as shown below) are the engineered systems that handle and manage stormwater.



## THE MANY BENEFITS OF GREEN STORMWATER INFRASTRUCTURE

Green stormwater infrastructure is designed to capture and filter stormwater before it enters the gray stormwater infrastructure system and/or a river, lake, or stream. This in turn eases pressure on existing gray infrastructure. Green infrastructure also provides a number of environmental, social, and economic benefits including:



**FLOOD MANAGEMENT**  
Reduces the water going into storm drains and pooling on impervious surfaces can reduce the risk of flooding.



**CLIMATE CHANGE RESILIENCY**  
Improves air quality, dissipates ambient heat, and stores more carbon in the ground.



**WATER QUALITY AND QUANTITY**  
Reduces stormwater runoff and pollutant loading.



**WILDLIFE HABITAT**  
Native plants used in green stormwater infrastructure provides food and shelter for wildlife, such as pollinators.

## THE HYBRID APPROACH: GREEN AND GRAY TOGETHER

While gray infrastructure systems are the traditional method for managing stormwater runoff, it has been found that **green and gray stormwater infrastructure are more effective when used together**. Adding elements of green stormwater infrastructure to existing systems ensures that the existing system can operate at better capacity.



Continue to the back for examples of green stormwater infrastructure applications that can easily be woven into any community.

# APPLICATIONS OF GREEN STORMWATER INFRASTRUCTURE

## IMPLEMENTING GREEN STORMWATER INFRASTRUCTURE INTO YOUR COMMUNITY

Green stormwater infrastructure can be integrated into existing streets, parking lots, buildings, and parks. It's beneficial to consider green infrastructure when:

1. Repairing, resurfacing, or replacing roadways and parking lots
2. Repairing or replacing damaged sidewalks and curbs
3. Upgrading or replacing utilities in the public right-of-way (e.g., sanitary sewer systems, storm sewer systems, drinking water supply lines)
4. Redeveloping vacant or abandoned properties
5. Repairing or renovating buildings
6. Improving existing space

Listed below are examples of green infrastructure applications that have the flexibility to be scaled up or down based on the changing needs of a community.

## LANDSCAPE APPLICATIONS



### NO-MOW ZONES



A designated area where grass and plants are allowed to grow freely without cutting. These zones reduce stormwater runoff and carbon output. It is best to locate them in areas with wet soils and near open water to act as a buffer.



### URBAN GREEN SPACES



Open-space areas that can be reserved for parks and include plant life and other ponds, streams, and natural features. These areas reduce the amount of impervious surface in a community.



### RAIN GARDENS



A garden located in a depressed landscape that is used to collect and infiltrate stormwater runoff from impervious surfaces into the ground.



### URBAN TREES



Trees capture and store rainfall in their canopy and release the water into the atmosphere.



### BIOSWALES



Long, depressed channels of native plants, grasses, flowers, and customized soils that run parallel to parking lots or roads. These catch runoff and allow it to infiltrate into the ground.



### DETENTION BASINS



Man-made pond that collects stormwater runoff from surrounding landscapes, roads, and rooftops. These store excess stormwater temporarily until channels can safely carry it away.

## STRUCTURAL APPLICATIONS



### DOWNSPOUT DISCONNECTION



Redirect rooftop runoff away from storm drains to a permeable surface, such as a lawn, or direct into rain barrels. This can significantly reduce the amount of stormwater municipalities must manage.



### RAINWATER HARVESTING



Capture, store, and use rainfall collected from impervious surfaces (such as rooftops) using cisterns or rain barrels. These provide a practical way to meet municipal non-potable water needs.



### GREEN ROOFS



Green roofs partially or completely cover buildings with vegetation planted over a waterproofing membrane. They are also known as living roofs, eco-roofs, or grass roofs.



### PERMEABLE PAVEMENTS



Porous pavement that allows rainfall to seep through layers of pollutant-filtering soil before going into groundwater aquifers.

**KEY** Estimated cost level Amount of stormwater managed

For access more information and contact us on the above listed green stormwater infrastructure applications, as well as guidance on construction, maintenance, and funding, scan the QR code:





Figure 1: Factors Influencing GSI Selection

Site Name:

Site Location:

Assessor Name:

## Runoff Quantity and Quality Needs

What is the source of the stormwater runoff (i.e., parking lot, roof, grass, etc.)?

How much stormwater runoff is being generated from adjacent land (i.e., volume)?

What pollutants are likely to be present on site and are you concerned about water quality?

What is the current outlet/receiving water?

How “clean” is the receiving water (high quality stream, combined sewer, etc.)?

What stormwater runoff permit requirements need to be met?

### Site Factors

What type of native soils are located on the site?

Does the site have a high groundwater table?

Are there groundwater contaminants or “hot spots” that need to be considered?

Do local regulations promote the use of GSI practices?

Are there known utility or other infrastructure conflicts?

Is there room to locate the GSI practices close to the source of the stormwater?

### Aesthetic/Habitat Related Issues

Is there a desire to incorporate habitat features into the GSI? If yes, what type of habitat?

Will the GSI practices be in a highly visible location? How important is appearance?

Are invasive species nearby or of future concern?

### Maintenance Issues

What types of maintenance are required? Is any special equipment needed?

Who will conduct the maintenance and how often (i.e., what is the maintenance plan)?

### Construction Considerations

What type of equipment is needed to construct the GSI practices?

Does the site allow access for that type of equipment?

Can the GSI practices be constructed with Parks staff or are external contractors required?

### Costs

What is the cost of the GSI practices being proposed?

Are there alternatives to the proposed GSI practices and what would that cost?

Is there grant funding available for the practices?

What are the long-term maintenance costs?

### Applicability by Land Use

Do the GSI practices under consideration match the surrounding land uses?

Are there future plans for this site that would impact the GSI practices?

How often will people access or interact with the GSI practices?

Is there an opportunity for dual purpose? For example; porous pavement can capture stormwater and allow for parking; or a native garden could capture stormwater and also have an educational component.

GSI Practices Under Consideration

- Bioretention Cells (Rain Gardens)
- Vegetated Swales and Bioswales
- Infiltration Galleries or Swales
- Permeable Pavement
- Cisterns, Water Harvesting, and Reuse
- Native Landscaping

Additional Notes