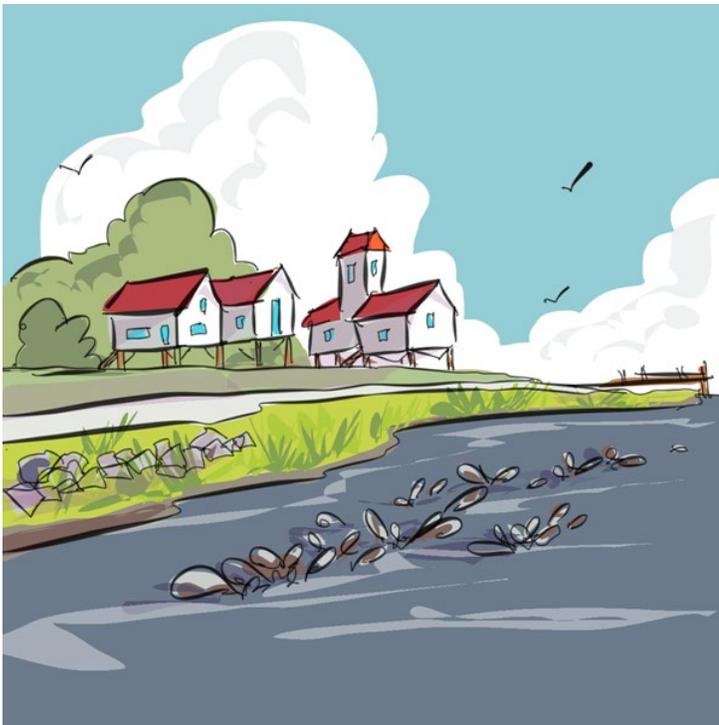


# What is Green Infrastructure

Green infrastructure is an approach to managing stormwater through a variety of landscaping practices that can be applied to neighborhoods and buildings to reduce stormwater flowing into sewer systems, streams, rivers, and the Bay. Green infrastructure provides a cost-effective approach to managing stormwater that simultaneously improves quality of life and provides many community benefits. While traditional gray stormwater infrastructure – conventional piped drainage and water treatment systems – are designed to transport stormwater to be treated and stored at another location, green infrastructure is designed to retain and treat stormwater where it falls.

At the watershed scale, green infrastructure is a network of natural areas and techniques that enhances flood protection and provides habitat, and cleaner air and water. At the neighborhood scale, stormwater management systems that mimic nature soak up and store water within a small-scale environment, filtering out contaminants as the water is absorbed by the ground.

Examples of green infrastructure that could be installed at the neighborhood level or on a homeowner's property are detailed in this document followed with an incentive program survey.



## Cleaner, Greener Talbot: A Plan for Future Livability



## Benefits of Green Infrastructure

### Environmental Benefits

- Recharges and improves quality of ground and surface waters
- Provides natural stormwater management
- Improves energy efficiency
- Reduces urban heat island effect
- Improves aquatic and wildlife habitat

### Social Benefits

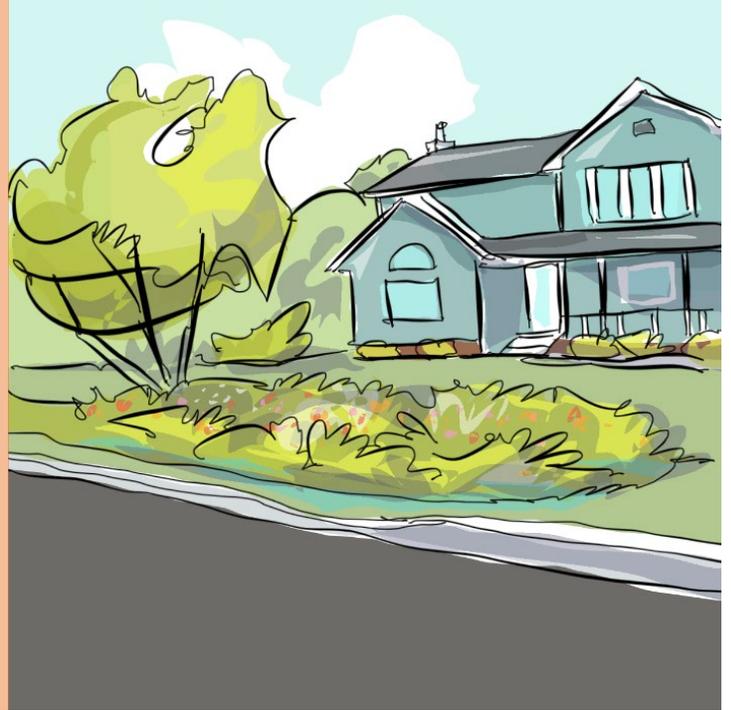
- Improves aesthetics and livability of urban communities
- Increases recreational opportunities
- Improves water and air quality
- Fosters environmental education opportunities

### Economic Benefits

- Reduces existing and potential future costs of gray infrastructure
- Increases property values
- Reduces energy consumption costs

# Rain Gardens (Bioretention)

Rain gardens (also known as bioretention) are vegetated basins that collect and absorb stormwater runoff from rooftops, sidewalks, and other paved surfaces. They are designed to be shallow basins - as opposed to typical mounded landscapes – to allow for infiltration to occur.



## Opportunities and Challenges

- Fits into most open spaces and right of ways
- Provides stormwater quantity and quality control (reduces stormwater that goes in sewer system and filters the water that infiltrates the ground)
- Are aesthetically pleasing and beautify neighborhoods
- Requires little regular maintenance to retain their appearance and remove trash and sediments that can reduce the infiltration capacity
- Underdrains may be needed in urban areas, which can make rain gardens infeasible if the storm sewer for the underdrain pipe is too shallow

## Typical Maintenance

- Periodic removal of sediment build-up
- Replenishing mulch as needed
- Weeding and replacement of dead vegetation
- Trash removal
- Flushing and monitoring of underdrain (if underdrain is needed)

# Bioswales

Bioswales are vegetated channels that serve as retention areas and move stormwater from one place to another. They are well suited for linear spaces such as the space between the sidewalk and the curb to allow stormwater to slow and infiltrate into the soil.



## Opportunities and Challenges

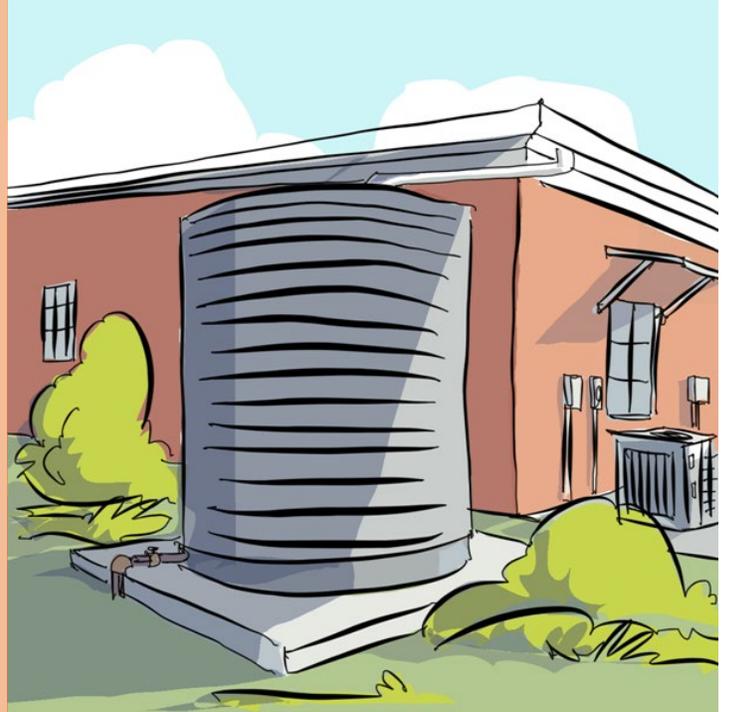
- Can replace curb and gutter while providing site drainage
- Provides stormwater quality and quantity control (reduces stormwater that goes in sewer system and filters the water that infiltrates the ground)
- Are aesthetically pleasing and beautify neighborhoods
- Limited application in areas where space is a concern

## Typical Maintenance

- Similar to what is needed to maintain rain gardens
- Periodic removal of sediment build-up
- Replenishing mulch as needed
- Weeding and replacement of dead vegetation
- Trash removal
- Flushing and monitoring of underdrain (if underdrain is needed)

# Rain Barrels

This practice reroutes rooftop downspouts from draining directly into the storm sewer system. Rain barrels collect and store rainwater to be used later for lawn irrigation and to water planters and gardens. The barrels are typically connected to downspouts to capture and store water runoff from roofs.



## Opportunities and Challenges

- Rain barrels can fit into many areas including above ground, below ground, inside buildings, on roofs, and beside buildings
- Reduce the need for water to be used for irrigation of plants and landscaping
- Water within an above ground system can freeze in colder seasons
- Water reuse may not remove enough water from the rain barrel, leaving inadequate storage capacity to capture runoff from the next precipitation event
- Provides reserve water supply when used in conjunction with capture system (e.g. rain barrel)
- Reduces stormwater runoff quantity

## Typical Maintenance

- Periodic inspection and replacement of worn parts
- Periodic removal of sediment build-up
- Regular use of harvested water is required to create enough volume in the barrel to capture additional water

## Planter Boxes

Planter boxes collect stormwater runoff from sidewalks and parking lots and serve as rain gardens in areas where space may be limited. They are an attractive tool that can be used simultaneously as a streetscaping element.



### Opportunities and Challenges

- Enhances site aesthetics
- Provides habitat
- Wide applicability, particularly in urban areas
- Provides limited stormwater runoff reduction
- Can be costly due to structural components

### Typical Maintenance

- Bypass valve may be required during winter to prevent damage to box when temperatures drop below freezing.
- Similar to what is needed to maintain rain gardens
- Periodic removal of sediment build-up
- Replenishing mulch as needed
- Weeding and replacement of dead vegetation
- Trash removal
- Flushing and monitoring of underdrain (if underdrain is needed)

# Tree Planting

Trees act as a sponge for rainwater, soaking up precipitation on their leaves and branches and absorbing water through their roots. Planting additional trees reduces the amount of water draining into a sewer system during a storm event. By providing shade, the presence of trees cools the air temperature. Through the absorption of carbon, trees can reduce the effect of greenhouse gases and improve air quality. Trees are an aesthetically pleasing element to streetscaping projects.



## Opportunities and Challenges

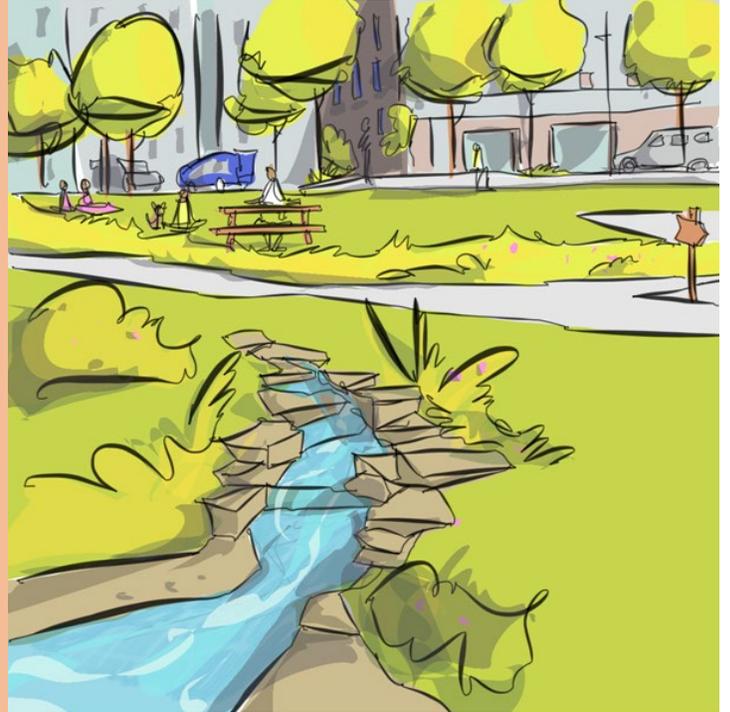
- Provides first interception of precipitation to help reduce stormwater quantity
- Provides additional shade canopy in urban areas, reducing heat island effect and reducing the amount of energy needed for cooling buildings
- Improves air quality by removing air pollution
- Generally low maintenance

## Typical Maintenance

- May require fertilizing and pruning
- May require watering during drought conditions until well established

## Native Landscaping

Plants that are native to an area typically have deeper and more extensive root systems which prevent erosion and absorb more water. Utilizing native plants also minimizes maintenance by reducing costs related to mowing, fertilizing, and watering.



### Opportunities and Challenges

- Deeper and more extensive root systems increase stormwater quantity and quality by absorbing and filtering rainwater
- Prevents erosion by retaining soil with its deep and extensive root system
- Once established, native plants are generally low-maintenance because they are adapted to the environment
- Improves wildlife ecosystem
- Requires less watering than exotic plants

### Typical Maintenance

- Periodic watering during drought conditions
- Trash removal
- Weeding

## Pervious Pavement

Removing pavement and other impervious surfaces and replacing them with permeable pavements or landscaping allows more water to be absorbed and infiltrated. Permeable pavement is porous and captures rainwater where it falls. It can be particularly useful in places where land values are high, and flooding is a common issue.



### Opportunities and Challenges

- Can be used on roads, parking lots, sidewalks and provides infiltration while maintaining a flat surface
- Works best in low or slow traffic areas where vehicles will not make sharp turns or sudden stops
- Dual use for pavement structure and stormwater management
- Higher maintenance needs than standard pavement

### Typical Maintenance

- Clean inlets
- Vacuum annually to remove accumulated dirt and grit
- Maintain adjacent landscaping
- Periodic replacement

## Green Roofs

Green roofs are vegetated roofs that enable rainfall to infiltrate into planted vegetation. Green roofs also provide insulation and can reduce costs for heating and cooling the building beneath them. These roofs also provide some carbon sequestration as the plants absorb carbon dioxide, thereby improving air quality. Replacing a black or dark roof with a green roof can also reduce the heat island effect, by cooling the ambient air temperature.



### Opportunities and Challenges

- Reduces stormwater quantity
- High aesthetic value
- Energy benefits for heating and cooling the building beneath
- Urban heat island reduction
- Improvement in air quality through carbon sequestration
- Higher maintenance needs until vegetation is established
- Need adequate roof structure to support weight of green roof

### Typical Maintenance

- Once vegetation is established, little maintenance is needed
- Periodic watering
- Weeding and replacement of dead vegetation