Introduction

Why Sustainable Stormwater Management Matters

B efore Portland was developed, forests and open spaces absorbed rainwater. Today, rain falls on buildings, streets, sidewalks, and other hard surfaces and runs off into rivers and streams. Stormwater runoff causes erosion, carries pollution and sediment to the river, decreases groundwater recharge, and increases river temperatures. Sustainable stormwater management is a strategy that helps the City of Portland comply with pollution prevention and resource protection regulations by managing water at its source.

Sustainable stormwater management is rapidly gaining acceptance in the United States, particularly here in Portland. The increased interest is a response to mounting infrastructure costs of new development and redevelopment projects, more rigorous environmental regulations, and concerns about the impact of growth on natural resources.

The strategy recognizes the relationship between the natural environment and the built environment, and manages them as integrated components of a watershed. Sustainable stormwater management is an alternative to the traditional piped approach. It promotes onsite collection and conveyance of stormwater from roofs, parking lots, streets, and other surfaces to infiltrate into the ground or collect for reuse, often reducing the need for costly underground structures.

The approach relies on vegetated natural systems to slow and filter the water. Vegetation enhances both interception and evaporation of rainfall through its leaves. Vegetation reduces stormwater runoff volume as well as pollutants in urban runoff.

Studies show that natural landscaping at a residential development can reduce annual stormwater runoff volume by as much as 65%. Natural drainage and native landscaping areas

in residential developments can remove up to 80% of the suspended solids and heavy metals, and up to 70% of nutrients like phosphorous and nitrogen from stormwater runoff.

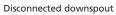
Sustainable stormwater management uses both structural devices such as rain barrels, cisterns, and planters, and non-structural devices like landscaped swales and infiltration basins. The sustainable approach is cost effective and attractive. It also addresses erosion, water pollution, combined sewer overflows and other stormwater runoff problems all at once.

The information presented shows how to use one or a combination of technologies to effectively manage stormwater onsite and reduce the impacts of development on water quality.

This information is not intended as a substitute for professional advice applicable to specific project circumstances. Design approaches are offered to facilitate understanding of the concepts and must be considered in terms of the project, site conditions, local building codes, water availability, and regional climate. Readers are urged to seek professional assistance before applying any of these techniques. The techniques and other information presented may not represent the latest, approved approaches of the City of Portland.

residential and neighborhood facilities







rain barrels



ecoroof on garage



garden swale





driveway of pervious pavers



flagstone driveway



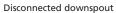
large trees



naturescaping

Commercial and industrial facilities







Disconnected downspout



roof garden



ecoroof





pervious paver parking lot



parking lot swales



sidewalk planter with trees



naturescaping

General factors that influence the selection of stormwater management facilities

This chart is a guide to typical site conditions, the benefits of specific approaches and how they may influence your selection of stormwater management facilities. It is a general guide, not a definitive analysis.

| Site conditions will vary, and exceptions may apply. See individual facility descriptions for specific details such as siting, permitting, and design standards. | spout Disconnection to Landscape | arrels | SI | ıfs | Gardens | | ated Swales | ated Infiltration Basin | ned Planters | hrough Planter | ition Planter | us Pavers | us Pavement | ock | ge Trenches | sll: | |
|--|----------------------------------|--------------|----------|----------|-------------|-------|--------------|-------------------------|--------------|----------------|----------------|--------------|--------------|------------|-------------|----------|--|
| design standards. | Downspout | Rain Barrels | Cisterns | Ecoroofs | Roof Garden | Trees | Vegetated Sv | Vegetated In | Contained Pl | Flow-through | Infiltration P | Pervious Pav | Pervious Pav | Turf Block | Soakage Tre | Drywells | |

Constraints When selecting an appropriate facility, it is important to assess your site for soil type, slope, amount of space, and proximity to your foundation and your neighbor's property. For example, infiltration facilities do not perform well in soils that do not drain well (such as clay) or on sites that have steep slopes due to erosion concerns.

| Space limitations | • | • | | • | • | • | • | 0 | • | • | _ | • | • | • | • | • |
|-----------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Poorly-draining soils | 0 | • | • | • | • | • | | 0 | • | • | 0 | 0 | 0 | 0 | 0 | 0 |
| Steep slopes | 0 | • | 0 | • | • | • | 0 | 0 | 0 | • | 0 | 0 | 0 | 0 | 0 | 0 |

Benefits Some facilities are best for flow control (reducing total volume and/or velocity), other facilities are better for cleansing and filtering pollutants, some facilities do both, and some facilities achieve cooler air and water temperatures.

| Air and water temperature reduction | • | 0 | 0 | • | • | • | • | • | • | • | • | 0 | 0 | 0 | • | • | |
|-------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|
| Water quality | _ | 0 | 0 | • | • | 0 | • | • | 0 | • | • | • | _ | _ | 0 | 0 | |
| Flow control | • | • | • | • | • | 0 | • | • | 0 | • | • | 0 | _ | _ | • | • | |
| | | | | | | | | | | | | | | | | | |

Most appropriate

Moderately appropriate

O Least appropriate