

Section 8

Plant Selection Considerations

Plant Selection Considerations



SOUTH BURLINGTON, VERMONT: Plants within a vegetated swale system.

In a Green Street, plant selection depends upon the type of system, the purpose and function of the planting, site conditions above and below ground, and the maintenance that will be required. Prioritizing objectives at the inception of designing a Green Street will help direct end results in terms of what type of plants should be used, the media (soil) requirements, and a maintenance schedule. When identifying a design consultant, be sure to prioritize experience with these factors of green design.

8.1 KEY PLANT SELECTION FACTORS

Factors to be kept in mind when selecting plants.

- **Function:** In addition to the water quality benefits, what other functions do you want the vegetation to provide, i.e. shading, color and/or visual barrier? Plants vary in the services and benefits they contribute to the landscape. To achieve desired results, choose plants based on function.
- **Site Conditions:** Understanding the site's limitations and potential is necessary for successful plantings and involves analyzing above and below ground conditions. Below ground considerations include understanding the soil texture, structure, drainage, and chemical properties. Inadequate soil volume or soil compaction will limit plant growth. Trees and other vegetation benefit from being planted in a continuous soil system; connecting systems underground benefits health and growth. Medium to large trees require 500 – 1000 cubic feet of soil to grow to maturity. Above ground considerations include exposure, as plants differ in their adaptations to temperature and ability to withstand cold, and available overhead space to accommodate crown development. Planting plans should consider mature size, height and spread in relationship to potential conflicts such as sidewalks, parking, utilities, lights, viewsheds, and line of sight.
- **Maintenance:** Understanding long-term maintenance needs is critical to facilitate the to select of the right plants. Regardless of plant selection, all plantings will require maintenance, especially in the early years of establishment. Deciduous leaf drop and other vegetative changes that create litter, such as fruit and seeds, can become a safety hazard or a clogging risk for drainage systems. Care should be taken near permeable pavements

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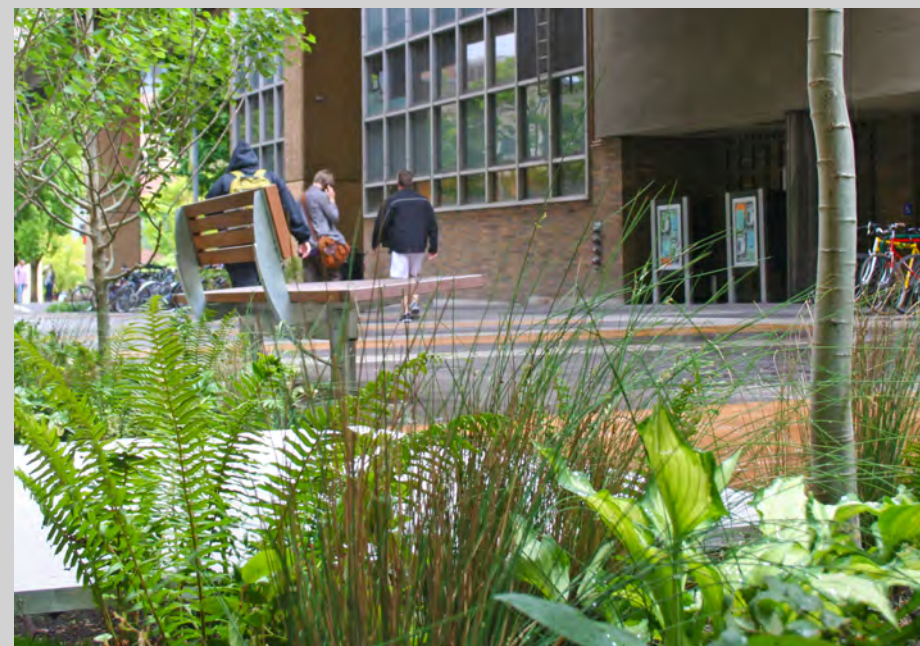
to avoid obstruction of the surface from leaf litter. If not already in effect, municipalities should consider adoption of regular street sweeping to collect leaf litter along roads before it enters conventional storm drainage systems.

- **Tolerances:** Placement of vegetation along roads where salt or other de-icing compounds are used throughout the winter months is a concern. It is highly advisable that any vegetation located adjacent to roads be tolerant of both salt applications and air pollution emitted from vehicular traffic. Where road salt application is excessively high, to support any native species consider changes to the de-icing policy in order to balance public safety and environmental and community benefits.
- **Characteristics:** Plants characteristics may be desirable only in certain situations. For example, plants that attract pollinators are ecologically beneficial and add colorful insect life to vegetation. But bees may not be ideal guests at a public park or school. Similar considerations should be given to plants that are known to be poisonous or have thorns.
- **Native:** It is preferable to use native when possible, however, options may be limited to meet desired function(s), conditions, and aesthetics. At all times, invasive plants should be avoided.
- **Diversity:** Diversity of plant species is encouraged, as it contributes habitat for more species and increases resistance to future pests and diseases. When considering diversity, look beyond the project and consider the broader landscape context. To create healthy and resilient landscapes, species, spatial, and age diversity needs to be considered.
- **Quantity:** To improve the success of vegetation in stormwater installations, specifying a higher density of plants is recommended. This provides an immediate 'look' of a system and reduces the potential for weeds to grow among the plants. However, this does not go for woody plants, particularly trees. The quantity selected and density of planting should be based on the desired outcome at mature size.

Several Guides for selecting plants are available in Vermont, including:

- Vermont Tree Selection Guide, Vermont Urban & Community Forestry Program
- Vermont's Landscape Plants for Vermont, University of Vermont Extension
- The Vermont Rain Garden Manual, Winooski Conservation District, UVM Extension, and Lake Champlain Sea Grant.

Cross referencing these resources, as well as observing successful applications of difference species from existing projects throughout Vermont or nearby States is recommended. These resources are available at the Vermont Urban & Community Forestry's website: [VTcommunityforestry.org/greenstreets](https://vtcommunityforestry.org/greenstreets)



▲ High-density planting installed within green street projects provides maximum pollutant treatment, suppresses weed growth, and looks great.

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INDIANAPOLIS, INDIANA: The Indianapolis Cultural Trail green street plantings.

8.2 AESTHETICS

Green Street projects should all be designed as community amenities. Hence, the decision on what plant material should be installed within a Green Street or parking lot project is an important one. One primary consideration in choosing plants for a particular stormwater project is how the project will ultimately look.

The overall look of a Green Street project can vary considerably. Plantings can have a relatively formal and manicured appearance, or they can have a more “natural” look. Regardless, the choice of plant material should fit with the surrounding landscape context i.e. residential, urban.

The overall diversity of plant material within a Green Street project can also affect aesthetics. A highly diverse planting palette with differing textures, colors, and growing heights can be very desirable. This is especially true for larger stormwater facilities and those that incorporate side slopes in the design. For those stormwater facilities that are smaller and more linear, such as stormwater planters, a single-species planting may be more appropriate. Regardless of the chosen palette, it is important to design and install the plant material at an appropriate density. Too often, stormwater facilities are installed with too few plants, so few, in fact, that one can’t really call the project a “Green Street.” A well-designed stormwater facility should have no bare ground showing after a two-year plant establishment period.

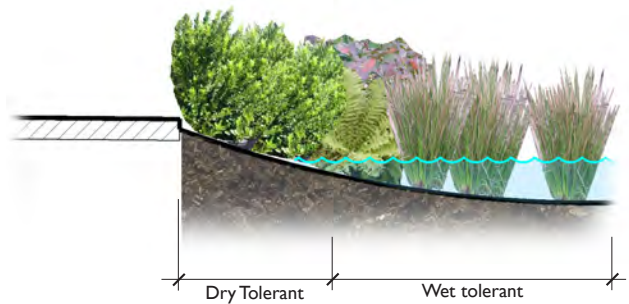
Except for trees, choose lower-growing plant material that do not exceed three feet in height. Low-growing plants tend to be more aesthetically and functionally preferable for Green Street applications. In addition, low-growing plant varieties help to reduce ongoing maintenance by eliminating the need for plant trimming.

The last aesthetic consideration is how much of the plant material should be designed as evergreen versus deciduous. It is recommended that at least 70% of the plant palette, excluding trees, be evergreen. This helps to ensure that Green Street projects have year-round plant structure. Having a predominantly evergreen green street also helps slow water runoff due to the persistence of leaves.

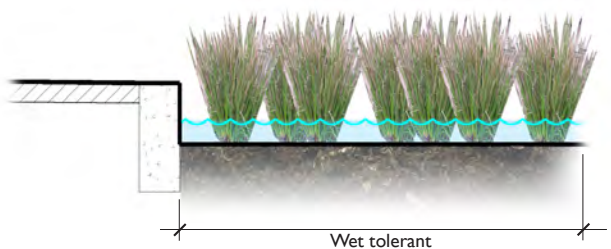
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8.3 PLANTING ZONES FOR STORMWATER

Green Street projects may have different planting zones based on the type of stormwater facility used. Stormwater facilities that are designed with a side slope condition (e.g., vegetated swales) have two planting zones: dry and wet. Shrubs, groundcovers, and perennials that thrive in drier conditions should be placed on the upper portions of the side slopes while wet tolerant plants, such as sedges and rushes, are best suited for the low, flat bottom zone of the stormwater facility. Stormwater facilities that have only a flat-bottom condition with no side slope (e.g., stormwater planters) have only one planting zone that should only be planted with wet-tolerant plant material. The illustrations below show the typical planting conditions based on stormwater facility type. It should be noted plants chosen for wet zone conditions should also have some level of drought tolerance in order to minimize, or potentially eliminate, the need for supplemental irrigation during dry periods.



Typical Side Slope and Flat-Bottom Planting Condition



Typical Flat-Bottom Planting Condition



▲ This street rain garden has two planting zones with dry-tolerant plants placed on the side slopes and wet-tolerant plants placed at the lowest elevations..



▲ These street stormwater planters have no side slope condition and have only one planting zone featuring wet-tolerant plant material.

Green Capitals: Managing Wet Weather with Green Infrastructure



Stormwater Pollution

Stormwater is a large amount that runs off impervious surfaces such as parking lots, streets, roofs, and driveways. During rain events, stormwater is contaminated and carries pollutants including oil, road salts and sand, feces, and excess nutrients such as phosphorus and nitrogen down storm-drains into water bodies, and eventually into nearby waterways. As impervious surfaces increase due to development, urbanization, less rain water is absorbed by the soil and filtered through the natural processes of plants and microbes. Instead, this water flows directly to local waterways as storm drains and surface runoff. Excess stormwater runoff can contribute to our drinking water.

By using permeable and filtering surfaces, flooding and erosion are reduced, which can clean up water, habitat for fish and invertebrates. Rain that falls on the Capitol grounds in Montpelier drains into the Winooski River and eventually to Lake Champlain.



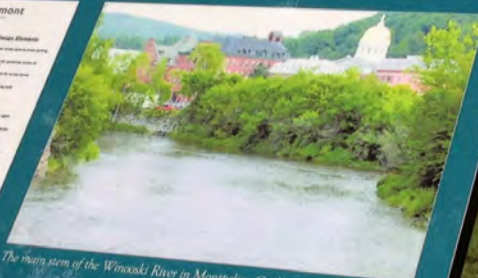
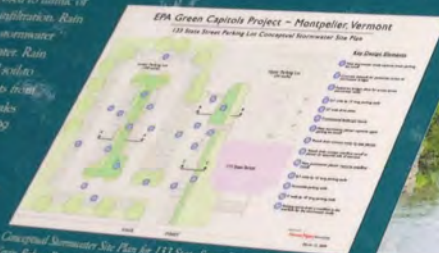
Stormwater runoff in a parking lot at 133 State Street captures and treats stormwater runoff. Credit: Vermont Department of Buildings & General Services.

Green Infrastructure: A Natural Solution

Green infrastructure practices, such as rain gardens, permeable pavement, and infiltration basins, use a natural solution to stormwater runoff. These practices can be used to mimic or restore natural watershed functions such as infiltration. Rain gardens are designed to capture and infiltrate stormwater runoff, remove pollutants, and recharge groundwater. Rain gardens use the biological activity in plants and soils to remove rain from stormwater preventing pollutants from entering streams. The rain gardens and stormwater swales at this site were installed by the State of Vermont in 2009 and 2010 as part of the US Environmental Protection Agency's Green Capitals Project. The green infrastructure demonstrates that these practices are highly effective at managing stormwater runoff and improving water quality under a variety of conditions.

EPA Green Capitals Project - Montpelier, Vermont

133 State Street Parking Lot Conceptual Stormwater Site Plan



The main stem of the Winooski River in Montpelier. Credit: Intervale Foundation.

MONTPELIER, VERMONT: An educational sign for a parking lot swale.

KEVIN ROBERT PERRY