

## 5.2 VEGETATED SWALES

### 5.2.1. INTRODUCTION

Grassy swales are vegetated channels that convey stormwater and remove pollutants by sedimentation and infiltration through soil. They require well-draining shallow slopes and soils. Pollutant removal capability is related to channel dimensions, longitudinal slope, and amount of vegetation. Optimum design of these components will increase contact time of runoff through the swale and improve pollutant removal rates.

A credit is given when impervious cover in a drainage area less than 2 acres is directed to a vegetated swale where it can either infiltrate into the soil or filter over it. The credit is obtained per the criteria in this section where 20% of the impervious area in that 2-acre contributing drainage area can be deducted from the total impervious cover (therefore, potentially gaining compliance with the Low Impact Development impervious cover levels or reducing BMP volume).

Grassy swales are primarily stormwater conveyance systems. They can provide sufficient control under light to moderate runoff conditions, but their ability to control large stormwater flows is limited. Therefore, they are most applicable in low to moderate sloped areas or along highway medians as an alternative to curb and gutter drainage. Grassy swales can be used as a pretreatment measure for other downstream facilities such as bioretention areas. Enhanced grassy swales utilize engineered soils and an underdrain to provide filtration of pollutants. A photograph of a grassy swale is presented in Figure 5-1. They can also be included in the design of commercial parking areas as shown in Figure 5-2.

Grassy swales can be more aesthetically pleasing than concrete or rock-lined drainage systems and are generally less expensive to construct and maintain. Swales can slightly reduce impervious area and reduce the pollutant accumulation and delivery associated with curbs and gutters. Disadvantages of this technique include the possibility of erosion and channelization over time and the need for more right-of-way as compared to a storm drain system.

The suitability of a swale at a site will depend on existing land use, size of the area serviced, soil type, slope, as well as dimensions and slope of the swale system. Irrigation is not required to maintain growth during dry periods but may be necessary for vegetation establishment.

### SELECTION CRITERIA

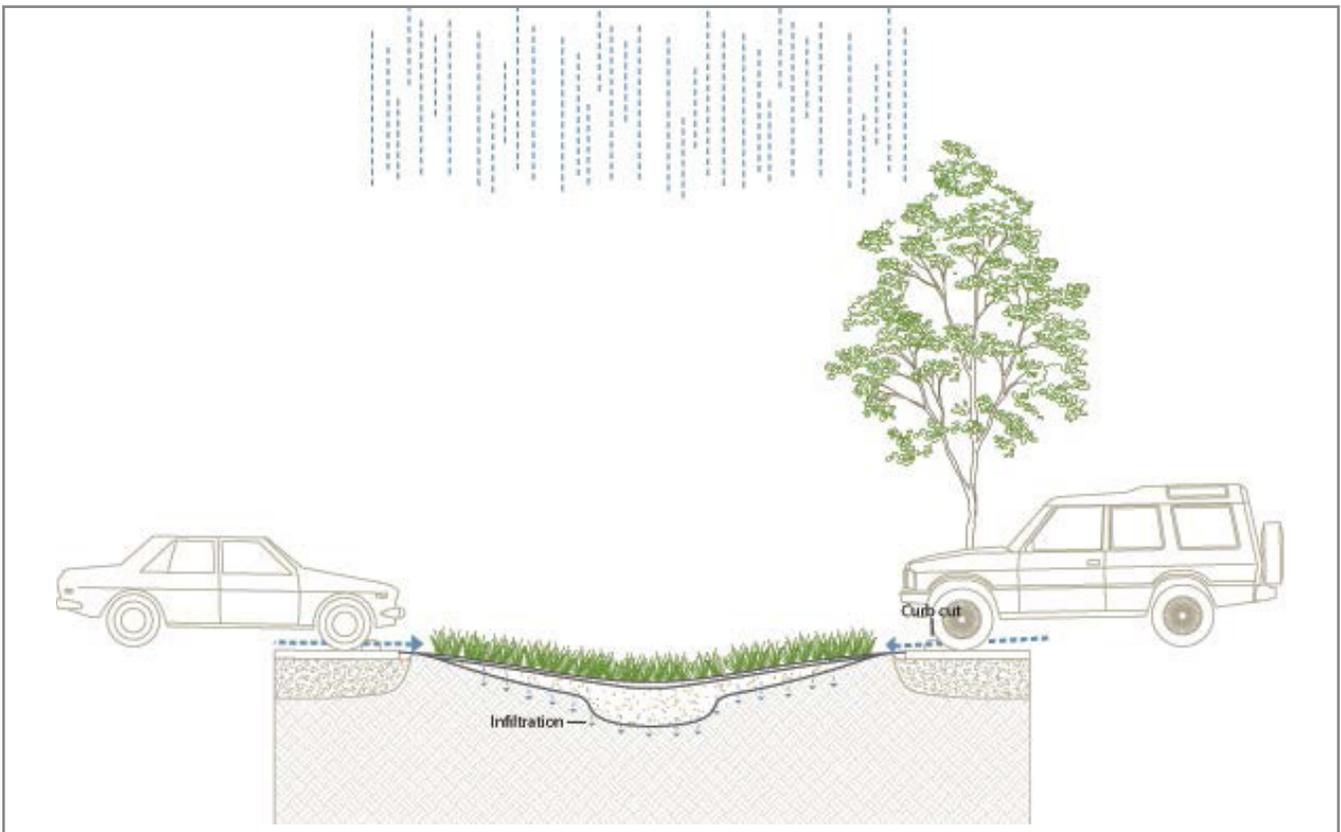
- Preferred method of conveyance in residential developments and islands in commercial parking lots.
- Pretreatment for other sustainable development practices.
- Limited to treating less than 2 acres.
- Sufficient available land area.

### LIMITATIONS

- Can be difficult to avoid channelization.
- Number of culverts required may make infeasible in higher density developments.



**Figure 5-1:** Typical swale in a residential neighborhood in Chambers County, Texas. (Photo courtesy of Google Earth)



**Figure 5-2:** Swale in parking lot area. (Showing the use of short grasses, low slopes, curb cuts from parking area and some infiltration.)

### 5.2.2. SWALE DESIGN GUIDELINES

1. The swale should be sized per local requirements for stormwater conveyance and be at least 50 feet long.
2. The geometry of the channel is not critical as long as a broad, relatively flat bottom is provided with a longitudinal slope equal to or less than 0.5%. The side slopes should be no steeper than 6:1 (H:V).
3. Roadside ditches should be regarded as significant potential swale sites and should be utilized for this purpose whenever possible.
4. If flow is to be introduced through curb cuts, place pavement slightly above the elevation of the vegetated areas. Curb cuts should be at least 12 inches wide to prevent clogging. An apron of riprap should be installed at the curb cut to slow the flow of the runoff and induce settling of sediment.
5. Swales must have at least 80% grass cover in order to provide adequate stabilization. For general purposes, select fine, close-growing, water-resistant grasses. Climate-adapted plant species help reduce irrigation needs, vulnerability to pests, and the need for quick release fertilizers.
6. Swales should be evaluated for the need to remove sediment and restore vegetation following construction.
7. During the period of vegetation establishment, cover the graded and seeded areas with suitable erosion control materials.

### 5.2.3. MAINTENANCE REQUIREMENTS

Maintenance for grassy swales is minimal and is largely aimed at keeping the grass cover dense and vigorous. Maintenance practices and schedules should be developed and included as part of the original plans to alleviate maintenance problems in the future. Recommended practices include:

- **Seasonal Mowing and Lawn Care.** Lawn mowing should be performed routinely, as needed, throughout the growing season. Regular mowing should also include weed control practices; however, as noted previously, herbicide use should be kept to a minimum. An Integrated Pest Management approach can help reduce chemical use. Healthy grass can be maintained without using fertilizers and is typically assisted by nutrient inflow from runoff.
- **Sediment Removal.** Sediment accumulating near culverts and in channels needs to be removed when it results in a significant amount of standing water.
- **Grass Reseeding.** A healthy dense grass should be maintained in the channel and side slopes. Grass damaged during the sediment removal process should be promptly replaced using the same seed mix used during swale establishment.
- **Public Education.** Private homeowners are often responsible for roadside swale maintenance. Unfortunately, overzealous lawn care by homeowners can present numerous problems. For example, excessive application of fertilizer and pesticides is detrimental to water quality. Pet waste can also be a problem in swales and should be removed to avoid contamination. The delegation of maintenance responsibilities to individual landowners is a cost benefit to the locality. However, localities should provide an active educational program to encourage these recommended practices.