

# Infiltration Basins



**Description:** Infiltration basins are stormwater runoff impoundments that are constructed over permeable soils. Pretreatment is critical for effective performance of infiltration basins. Runoff from the design storm is stored until it exfiltrates through the soil of the basin floor.

## Ability to meet specific standards

Standard	Description
<b>2 - Peak Flow</b>	Can be designed to provide peak flow attenuation.
<b>3 - Recharge</b>	Provides groundwater recharge.
<b>4 - TSS Removal</b>	80% TSS removal, with adequate pretreatment
<b>5 - Higher Pollutant Loading</b>	May be used if 44% of TSS is removed with a pretreatment BMP prior to infiltration. For some land uses with higher potential pollutant loads, use an oil grit separator, sand filter or equivalent for pretreatment prior to discharge to the infiltration basin. Infiltration must be done in compliance with 314 CMR 5.00
<b>6 - Discharges near or to Critical Areas</b>	Highly recommended, especially for discharges near cold-water fisheries. Requires 44% removal of TSS prior to discharge to infiltration basin
<b>7 - Redevelopment</b>	Typically not an option due to land area constraints

## Advantages/Benefits:

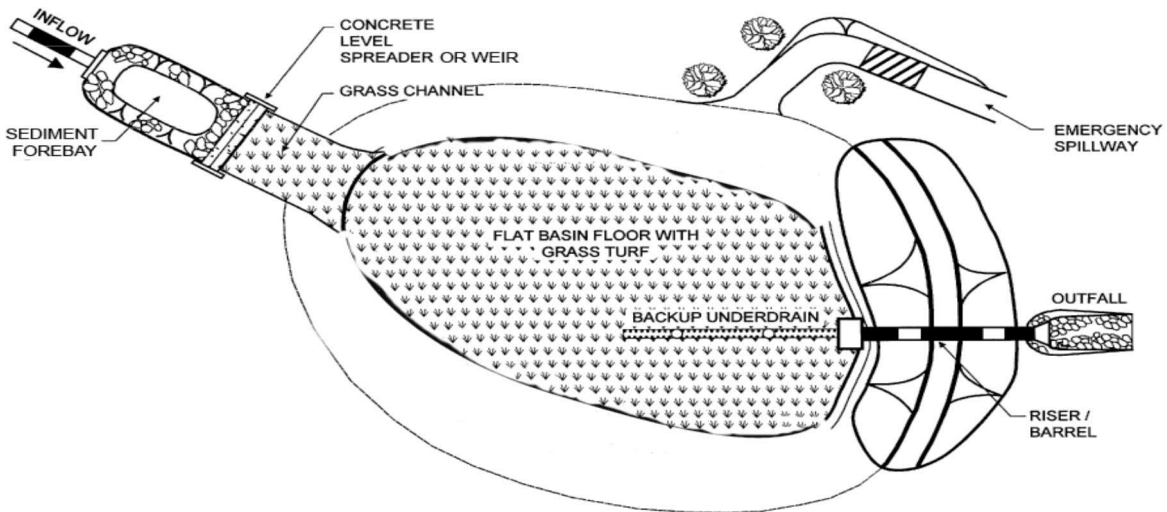
- Provides groundwater recharge.
- Reduces local flooding.
- Preserves the natural water balance of the site.
- Can be used for larger sites than infiltration trenches or structures.

## Disadvantages/Limitations:

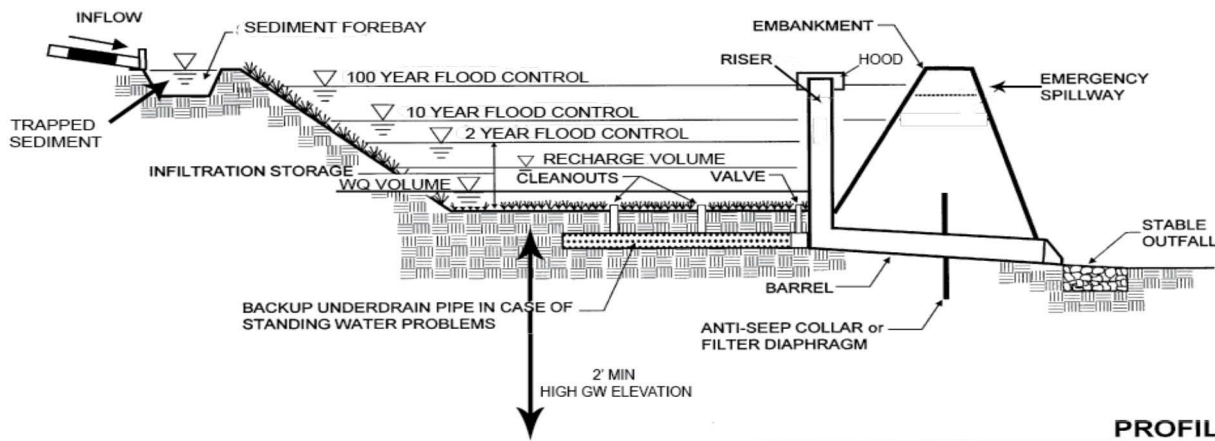
- High failure rates due to improper siting, inadequate pretreatment, poor design and lack of maintenance.
- Restricted to fairly small drainage areas.
- Not appropriate for treating significant loads of sediment and other pollutants.
- Requires frequent maintenance.
- Can serve as a “regional” stormwater treatment facility

## Pollutant Removal Efficiencies

- Total Suspended Solids (TSS) 80% with pretreatment
- Total Nitrogen 50% to 60%
- Total Phosphorus 60% to 70%
- Metals (copper, lead, zinc, cadmium) 85% to 90%
- Pathogens (coliform, e coli) 90%



**PLAN VIEW**



**PROFILE**

*adapted from the Vermont Stormwater Manual*

## Maintenance

Activity	Frequency
Preventative maintenance	Twice a year
Inspect to ensure proper functioning	After every major storm during first 3 months of operation and twice a year thereafter and when there are discharges through the high outlet orifice.
Mow the buffer area, side slopes, and basin bottom if grassed floor; rake if stone bottom; remove trash and debris; remove grass clippings and accumulated organic matter	Twice a year
Inspect and clean pretreatment devices	Every other month recommended and at least twice a year and after every major storm event.

**Special Features:** High failure rate without adequate pretreatment and regular maintenance.

**LID Alternative:** Reduce impervious surfaces. Bioretention areas

# Infiltration Basins

The following are variations of the infiltration basin design.

## Full Exfiltration Basin Systems

These basin systems are sized to provide storage and exfiltration of the required recharge volume and treatment of the required water quality volume. They also attenuate peak discharges. Designs typically include an emergency overflow channel to discharge runoff volumes in excess of the design storm.

## Partial or Off-line Exfiltration Basin Systems

Partial basin systems exfiltrate a portion of the runoff (usually the first flush or the first half inch), with the remaining runoff being directed to other BMPs. Flow splitters or weirs divert flows containing the first flush into the infiltration basin. This design is useful at sites where exfiltration cannot be achieved by downstream detention BMPs because of site condition limitations.

## Applicability

The suitability of infiltration basins at a given site is restricted by several factors, including soils, slope, depth to water table, depth to bedrock, the presence of an impermeable layer, contributing

watershed area, proximity to wells, surface waters, and foundations. Generally, infiltration basins are suitable at sites with gentle slopes, permeable soils, relatively deep bedrock and groundwater levels, and a contributing watershed area of approximately 2 to 15 acres. Table IB.1 presents the recommended site criteria for infiltration basins.

Pollution prevention and pretreatment are particularly important at sites where infiltration basins are located. A pollution prevention program that separates contaminated and uncontaminated runoff is essential. Uncontaminated runoff can be infiltrated directly, while contaminated runoff must be collected and pretreated using an appropriate combination of BMPs and then rerouted to the infiltration basin. This approach allows uncontaminated stormwater to be infiltrated during and immediately after the storm and permits the infiltration of contaminated stormwater after an appropriate detention time. The Pollution Prevention and Source Control Plan required by Stormwater Standard 4 must take these factors into account. For land uses with higher potential pollutant loads, provide a bypass to divert contaminated stormwater from the infiltration basin in storms larger than the design storm.

**Table IB.1 - Site Criteria for Infiltration Basins**

1. The contributing drainage area to any individual infiltration basin should be restricted to 15 acres or less.
2. The minimum depth to the seasonal high water table, bedrock, and/or impermeable layer should be 2 ft. from the bottom of the basin.
3. The minimum infiltration rate is 0.17 inches per hour. Infiltration basins must be sized in accordance with the procedures set forth in Volume 3.
4. One soil sample for every 5000 ft. of basin area is recommended, with a minimum of three samples for each infiltration basin. Samples should be taken at the actual location of the proposed infiltration basin so that any localized soil conditions are detected.
5. Infiltration basins should not be used at sites where soil have 30% or greater clay content, or 40% or greater silt clay content.
6. Infiltration basins should not be placed over fill materials.
7. The following setback requirements should apply to infiltration basin installations: <ul style="list-style-type: none"><li>• Distance from any slope greater than 15% - Minimum of 50 ft.</li><li>• Distance from any soil absorption system- Minimum of 50 ft.</li><li>• Distance from any private well - Minimum of 100 ft., additional setback distance may be required depending on hydrogeological conditions.</li><li>• Distance from any public groundwater drinking supply wells - Zone I radius, additional setback distance may be required depending on hydrogeological conditions.</li><li>• Distance from any surface drinking water supply - Zone A</li><li>• Distance from any surface water of the commonwealth (other than surface water supplies and their tributaries) - Minimum of 50 ft.</li><li>• Distance from any building foundations including slab foundations without basements - Minimum of 10 ft. downslope and 100 ft. upslope.</li></ul>