

## 4.8 Evapotranspiration and Evapotranspiration/Infiltrative Systems

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### 4.8.1 Description

An evapotranspiration (ET) system is composed of a sand and gravel bed contained within an impervious lining, which receives septic tank effluent and in which evaporation through the system's surface and plant transpiration are the sole means of effluent removal. All forms of ET systems function best where the climate is dry and hot. Preferably, the difference between the site precipitation and evapotranspiration provides water loss of 2 inches per month on average.

An ET system that allows some wastewater to infiltrate the subsurface can be allowed under the proper site conditions and source attributes. This is an evapotranspiration infiltrative (ETI) system. An ETI system has more restrictive site and design constraints because of the additional wastewater discharge path into the surrounding soils.

Due to the complex water balance calculations for system sizing, coupled with liner design and construction details, these systems must be designed by a PE licensed in Idaho, or professional geologist (PG). Construction requires the services of a licensed Complex Alternative System Installer as specified in IDAPA 58.01.03.006.01.b.

Because of the impermeable liners, ET systems are classified among the non-discharging wastewater systems. This is different from ETI systems, which discharge a small amount of wastewater to the soil. Sites with soils that have percolation rates greater than 120 minutes/inch ( $3.5 \times 10^{-4}$  centimeters per second [cm/s]) and have site attributes that meet both the minimum vertical and minimum horizontal setback distances for design group C soils, may be suitable for installation of a properly designed and constructed ETI system.

### 4.8.2 Approval Conditions

1. The site must not be subject to flooding.
2. Ground water
  - a. For ET systems, high ground water, seasonal or normal, must not come within 6 inches of the bottom of the impervious liner.
  - b. For ETI systems, vertical separation distances must meet the minimum distance requirement for design group C soils (section 2.2.1, Table 2-6).
3. Soil
  - a. ET systems may be approved where soils:
    - 1) Are very thin
    - 2) Are classified unsuitable as defined in IDAPA 58.01.03.008.02.b.
  - b. ETI systems are restricted to sites with soils that are classified as *Unsuitable* through use of the soil texture determination flowchart (section 2.1.1, Figure 2-3), exhibit unacceptably low infiltration (section 2.3, Table 2-10), and the site attributes meet design subgroup C-2 soil depth requirements (section 2.2.1, Table

- 2-6). Unacceptably low infiltration rate soils have percolation rates greater than 120 minutes/inch ( $3.5 \times 10^{-4}$  cm/s) (section 2.3, Table 2-10).
4. The adjusted growing season (March–October) site evapotranspiration must exceed the 10-year return frequency annual precipitation. Some sites may have attributes that provide evapotranspiration losses year-round. These beneficial site attributes may allow an ET or ETI system to be sized based on annual evapotranspiration rates (January–December). Permit applications proposing use of annual evapotranspiration must document the site attributes that justify this alteration. Attributes that may qualify a site for annual evapotranspiration losses include but are not necessarily limited to:
    - a. Site receives full sun exposure year-round.
    - b. Site has a growing season exceeding 210 days.
    - c. Site lacks features causing snow drifts to settle over the system.
    - d. System uses cool season growing grasses and other plants  
<http://www.hort.purdue.edu/newcrop/afcm/grasseed.html>.
  5. The slope must not exceed 12%.
  6. The setback distance from surface water for ET systems may be reduced to 100 feet if the system is constructed with a minimum of a 30-mil (0.030-inch) PVC or 60-mil (0.060-inch) high-density polyethylene (HDPE) liner. Horizontal setback distances to surface water for an ETI system must adhere to those for design group C soils (100 feet per IDAPA 58.01.03.008.02.d).
  7. Both ET and ETI systems must have a minimum 100 feet of separation to any domestic or public well.
  8. ETI systems may require an augmented soil liner to limit infiltration and ensure proper system function when the soils exhibit moderate-to-strong vertical soil structure or are very gravelly or very stony. Infiltration should be limited to no more than 10% of the home's wastewater flow. Infiltration rates of 85,000 minutes/inch ( $5 \times 10^{-7}$  cm/s) or more will typically be needed to inhibit wastewater infiltration sufficiently for proper system operation. This restriction is required to balance water losses before system maturation. At system maturation, a fully developed biomat will further inhibit wastewater infiltration into the soil and allow the ETI system to operate using evaporation and plant transpiration.
  9. The soil's infiltration rate will need to be determined. Table 4-1 identifies acceptable soil infiltration specifications depending on soil type and configuration. Soils with infiltration rates greater than  $5 \times 10^{-7}$  cm/s (85,000 minutes/inch) will need to have an augmented soil liner.