



## I. Designing of a PPBPS Fill System

PPBPS fill systems can help to provide a 50% reduction in nitrification line lengths over what would be required in conventional fill systems.

PPBPS fill systems are installed using horizontal panels. There are several reasons we use horizontal rather than vertical panels in fill. Horizontal panels have a lower profile than vertical panels. Horizontal panels also have an advantage in that both chambers are dosed, meaning more area for biomat growth and aerobic treatment.

The total linear footage of nitrification line needed for a PPBPS System is calculated as follows:

1. Design Daily Flow / LTAR = Required Area of Conventional Trench Bottom
2. Required Area of Conventional Trench Bottom / 3 feet = Required Conventional Linear Footage
3. Required Conventional Linear Footage x 0.5 = **Required PPBPS Linear Footage**

Key elements to consider in the design and installation of PPBPS Fill Systems:

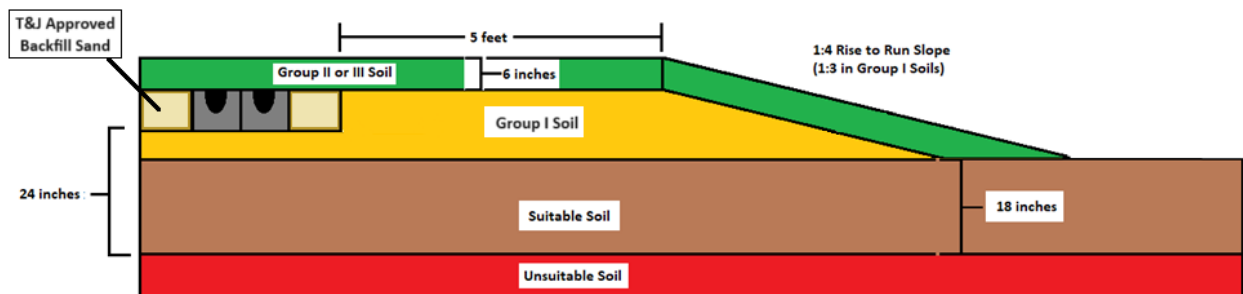
Fill systems may be installed on sites where at least the first 18 inches below the naturally occurring soil surface consists of soil that is **SUITABLE** or **PROVISIONALLY SUITABLE** with respect to soil structure and clay mineralogy, and where organic soils, restrictive horizons, saprolite or rock are not encountered. Further, no soil wetness condition shall exist within the first 12 inches below the naturally occurring soil surface and a groundwater lowering system shall not be used to meet this requirement. Fill systems shall not be utilized on designated wetlands unless the proposed use is specifically approved in writing by the designating agency. The following requirements shall also be met:

1. Trench bottom must have at least 24 inches of separation to any soil horizon **UNSUITABLE** as to soil structure, clay mineralogy, organic soil, rock or saprolite. However, if a low pressure pipe system is used, the minimum separation distance shall be 18 inches. *Note: Trench Bottom refers to the bottom of the excavated trench*
2. Nitrification trenches shall be installed with at least 18 inches separating the trench bottom and any soil wetness condition. This separation requirement for soil wetness conditions may be met with the use of a groundwater lowering system only in Soil Groups I and II, with **SUITABLE** structure and clay mineralogy. However, if a low pressure pipe system is used, the minimum separation distance shall be 12 inches.
3. Systems shall be installed only on sites with uniform slopes less than 15 percent. Storm water diversions and subsurface interceptor drains or swales may be required upslope of the system to divert surface runoff or lateral flow from passing over or into the system.
4. The long-term acceptance rate shall be based on the most hydraulically limiting soil horizon within 18 inches of the naturally occurring soil surface or to a depth one foot

below the trench bottom, whichever is deeper. The lowest long-term acceptance rate for the applicable soil group shall be used for systems installed pursuant to this Rule. However, the long-term acceptance rate shall not exceed 1.0 gallons per day per square foot for gravity distribution or 0.5 gallons per day per square foot for low-pressure pipe systems installed on sites with at least 18 inches of Group I soils below the naturally occurring soil surface or to a depth of one foot below the trench bottom, whichever is deeper.

5. Systems with a design daily flow greater than 480 gallons per day shall use low-pressure pipe distribution.
6. Fill material shall have such soil texture to be classified as sand or loamy sand (Soil Group I) up to the top of the nitrification trenches. The final six inches of fill used to cover the system shall have a finer texture (such as Group II, III) for the establishment of a vegetative cover. Existing fill material shall have no more than ten percent by volume of fibrous organics, building rubble, or other debris and shall not have discreet layers containing greater than 35 percent of shell fragments.

**The figure below is a visual representation of a PPBPS Fill System**



## II. Installation of a Fill System

1. Where fill material is added, the fill material and the existing soil shall be mixed to a depth of six inches below the interface. Heavy vegetative cover or organic litter shall be removed before the additional fill material is incorporated.
2. The fill system shall be constructed as an elongated berm with the long axis parallel to the ground elevation contours of the slope.
3. The side slope of the fill shall not exceed a rise to run ratio of 1:4. However, if the first 18 inches below the naturally occurring soil surface is Group I soil, the side slope of the fill shall not exceed a rise to run ratio of 1:3.
4. The outside edge of the nitrification trench shall be located at least five feet horizontally from the top of the side slope.

5. The fill system shall be shaped to shed surface water and shall be stabilized with a vegetative cover against erosion.
6. The setback requirements shall be measured from the projected toe of the slope.
7. Add the appropriate amount of fill material to achieve elevation of the top of the nitrification trench (must meet afore mentioned separation requirements).
8. Excavate 36-inch wide trenches to an appropriate depth (must meet separation requirements).
9. Follow Trench Installation Methods for Horizontal Panels
  - a. Place 1x6 boards in the middle of trench.
  - b. Place the appropriate number of panels in the trench (Linear feet x 12 / 52; if 0.5 or higher round up; if 0.4 or lower round down). Panels should be centered on the boards in the trench and space about six inches apart (spacing can be adjusted to allow the proper number of panels to fit within the designed line length).
  - c. Utilize 1.5-inch PVC (smaller diameter pipe may be used for LPP systems) to span from panel to panel, making sure that the pipe ends in the inner chambers of each panel.
  - d. Utilize Approved Foam Sealer to construct partial seals in the inner cutouts and full seals on the outer cutouts of each panel.
  - e. Place cap blocks on each end of the panel.
  - f. Backfill trenches with appropriate back fill sand up to the top of the panel blocks.
10. After inspection of the PPBPS installation, the final six inches of fill used to cover the system shall have a finer texture (such as Group II, III) for the establishment of a vegetative cover.

### **III. Inspection of a PPBPS Fill System**

1. Ensure that the fill system was constructed in accordance with the previous sections of this manual.
2. Determine that the proper number of panels were installed in each nitrification line (Linear feet x 12 / 52; if 0.5 or higher round up; if 0.4 or lower round down)
3. Shoot grade off the cap blocks to see if lines are level or less than 0.25-inch of fall per ten feet
4. Lift several cap blocks to ensure the PVC pipe extends from inner chamber of one panel to the inner chamber of the following panel and inspect inner and outer seals
5. Ensure that the proper backfill sand was used (either a clean, screened river sand or a concrete sand; naturally occurring sands, no man-made sands)