

**MARYLAND DEPARTMENT OF THE ENVIRONMENT
ENGINEERING AND CAPITAL PROJECTS PROGRAM**

Supplemental Design Guidelines for Drip Dispersal of Treated Wastewater

**To Be Used in Concert with the Department's Design Guidelines for Sewerage Facilities and the
Recommended 10-State Standards**

Scope:

Drip dispersal is a method used to distribute treated wastewater over an area of land at root zone depth for final polishing, reuse, and/or recharge of groundwater. The proposed dispersal system shall be capable of uniformly distributing the wastewater effluent over the required area of application.

Applicability:

These guidelines are applicable to the design of large on-site dispersal systems, land application systems or any other treatment systems receiving discharge and construction permits from the Maryland Department of the Environment (Department).

The Department's discharge permit must be issued and its limitations set before a construction permit can be reviewed and issued.

As for any construction permitted facility, the drip system design plans submitted to the Department for construction permit shall be signed and sealed by a Professional Engineer licensed in the State of Maryland. The system design engineer shall follow these guidelines and incorporate necessary manufacturing product specifications into the design document to ensure satisfactory performance of the drip dispersal system.

Pre-Treatment:

Wastewater effluent dispersed through this method must be treated to meet the water quality standards within the issued discharge permit limitations. The treatment process will be reviewed and approved for construction in accordance with the Department's Design Guidelines and the Recommended 10-State Standards.

Nitrogen removal capability by the vegetation planted at a drip irrigation field or other means is determined by the discharge permitting process and is accounted for in the set discharge permit limitations. The vegetation planted on the drip dispersal field shall provide a comparable nitrogen uptake rate as used in the Nitrogen Balance Calculation for achieving a zero nitrogen percolate concentration during the growing season.

Wastewater Effluent Dosing and Equalization Tank:

The treated wastewater effluent shall be discharged to the drip disposal system through a dosing tank that has sufficient volume to provide flow equalization. Storage requirements within the treatment and dispersal system shall be at least one full day-storage located between the treatment and dispersal systems.

The Wastewater Effluent Dosing and Equalization Tank will be reviewed and approved for construction in accordance with the Department's Design Guidelines and the Recommended 10-State Standards.

Drip System Dosing Pump and Filter:

The system is to be designed with the pumps, filters, and dispersal area to accommodate the following conditions:

1. Filter flushing
2. Zone dosing
3. Tubing network flushing

Dosing pump selected for the dispersal system shall be capable of delivering the design hydraulic flow. At least one standby pump must be provided and available for service at all times.

The filters shall be included as part of the drip dispersal system and meet the manufacturer's specifications as approved by the design engineer.

Wastewater Effluent Loading Rate:

The wastewater effluent loading rate will be determined and provided by the issued discharge permit and shall not exceed an annual average loading rate of two inches per week.

$$2 \text{ inch per week} = 0.18 \text{ gal/ft}^2/\text{day}$$

Dispersal Area Sizing:

The size of the required dispersal area is determined by the daily design flow (gpd) and the loading rate stipulated in the issued discharge permit.

Zone Layout:

Dispersal Zone, as defined by NOWRA, is the smallest unit of a drip dispersal system, consisting of a supply manifold, return manifold, drip laterals, and associated appurtenances, which can be loaded independently of all other parts of the dispersal system.

Zone width across contour is typically from 50 to 300 feet. Zone width is delineated by the following factors:

1. Site and soil evaluation.
2. Available distance down slope
3. Maximum linear feet of drip tubing as provided by the manufacturer

Drip Tubing (Dripper line) Runs and Laterals:

A length of dripper line across the contour is defined as a “run.” The tubing is to be installed on contour.

Typical Run Length = 50’ to 300’

Lateral is a dripper line consisting of a run or series of runs extending from the supply manifold to the return manifold of a single dispersal zone. Lateral length is dependent on head loss, and the drip system design (i.e. dosing pump and filter).

Typical Dripper line Depth = 6 to 12 inches

Percent Run Time:

Each manufacturer offers different models with various dispersal dosing capacities. The selected model must be capable to accommodate the peak day flow within the desired Percent Run Time of less than 50%.

$$\text{Percent Run Time} = \frac{\text{Peak Day Flow (gpd)}}{\text{Dispersal Dosing Capacity (gpm) X 1440}} \text{ X 100\%}$$

Dripper line Spacing:

Typical manufacturer recommendations call for drip tubing to be spaced 1 foot to 3 feet on center (2’ o.c. is the most common).

Zone Dosing:

- A pressure regulator is required to maintain adequate residual pressure during dosing.
- The control system must allow for variable loading rate and/or dosing time at the individual zones.
- Individual zones shall be designed to be easily taken in and out of service for maintenance or repair.

Zone Forward Field Flushing:

Each drip zone must automatically undergo a periodic forward field flushing usually every 25 cycles or 15 days, whichever occurs first. Other flushing frequencies can be considered if recommended by the manufacturer. Control system must allow for adjustable flushing frequency.

A minimum velocity of 2 ft/sec should be used in the zone flushing.

A minimum velocity of 1 ft/sec is acceptable if the drip tubing is manufactured with antimicrobial inner lining to inhibit adhesion of biological growth on the inside walls of the tube and emitters.

Flush Residuals Required Treatment:

All filter flush and tubing network forward flush residuals are to return to the head of the pre-treatment system, or be treated by an acceptable side-treatment system before returning to the dosing station.

Air Release Valve:

An air release valve shall be provided for each zone at the highest elevation of the zone.

Minimum Required Horizontal Separation:

The following are the minimum horizontal separation distances required between the Drip Dispersal Area and other land features or components. Any exception may be considered by the Department using the Department's Design Guidelines and the Recommended 10-State Standards.

Land Feature or Component	Minimum Required Horizontal Separation Distances (in feet)
A flowing body of water	50
Well or suction line	100
Water service line	50
Occupied building	50
Property line	50
In-ground Swimming Pool	50