recharge / infiltration

SUMMARY SHEET

category: WATER QUANTITY

sub-category: RECHARGE/ INFILTRATION

BMP: RECHARGE BASINS

OBJECTIVE

To offset the effects of pumpage by providing water available for recharge. This will help decrease the extent of the cone of influence. Higher yields are possible.

WHERE APPLICABLE

The recharge basin must be hydraulically connected to the aquifer from which water is being pumped, and the infiltration rate of the basin must be adequate to allow for recharge.

PROS

1. Decreases the extent of the cone of depression caused by pumping.
2. Some filtering of the recharging water through soil may occur, increasing water quality.
3. The amount of runoff may be reduced as the water is retained and absorbed in the basin.

CONS

1. Water quality tests are necessary as the recharge water is so close to the pumping site.
2. The creation of an artificial basin implies an alteration of the natural drainage pathways which may or may not have an affect on the biota of the site.

IMPLEMENTATION CONSIDERATIONS

Recharge basins can be placed in a well field area to allow water to infiltrate into the ground or to be drawn into the ground as a result of pumpage. Basins can be existing lakes, artificial lakes, or constructed basins.

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EXAMPLES:

- Melvina Detention Reservoir, Metropolitan Sanitary District Of Greater Chicago, Illinois 60690.

- Loretto Rest Geriatrics Center, Syracuse, N.Y. 13211.

- Runyon Well Field, Sayreville, N.J. 08872.

Two recharge basins have been in operation in the Runyon area for six years. According to the Sayreville Water Department, the basins are operating better than had been anticipated. The only major problem cited was bank stabilization.

In the case of the Runyon Well Field, the basins were a source of profit as the dirt and peat moss removed for basin construction were sold to the contractors. Cost per cu. yd. may range from $1.75 to $2.25 (1979 Source: Jack Lakatosh, New Castle County District Conservationist, SCS, Newark, DE 19702).

Recharge basin water quality must be maintained at an adequate level, requiring frequent testing. Quality maintenance may include chemical precipitation of iron, sedimentation of iron, zinc, lead and heavy metals, chlorination, and general site maintenance (landscaping, trash removal, mowing, etc.)

This management practice would have to be evaluated for its consistency with recommendations of the State Water Supply Master Plan and the Areawide Water Quality Management Plan (Sussex County 208 Water Quality Management Plan).

For Additional Information

1. Poertner, H.G. Practices in Detention of Urban Stormwater Runoff. Washington: American Public Works Assoc., 1974.

2. Whipple, W., Jr. Dual Purpose Retention Basins. New Brunswick, N.J.: Water Resources Institute, Rutgers University, 1978.

b

SUMMARY SHEET

category: WATER QUANTITY

sub-category: RECHARGE/ INFILTRATION

BMP: RECHARGE TRENCH

OBJECTIVE

To recharge groundwater while providing some filtering by soil. Flood peaks are reduced and the concentration time increases.

WHERE APPLICABLE

Requires sufficient storage volume between trench and water table, so water table must not be seasonally high. Soil must have good drainage.

PROS

1. Since trench is filled with gravel, there is no danger of drownings. There is less chance of clogging than there is for wells. Trenches are cheaper than wells and detention basins. Can reach deeper, more permeable beds. Gravel-filled pits and trenches provide more storage space and time for water to infiltrate less permeable beds.

CONS

1. Clogging may be a problem. Sediment traps may be necessary, with increased maintenance cost.

IMPLEMENTATION CONSIDERATIONS

May be lined with porous fiber blankets to prevent clogging and maintain infiltration rates.

Can be covered by grating, porous asphalt, and soil.

Can be placed below roads, lots and sidewalks, using a porous cover if surface can support expected traffic.

Can also be used to help channel runoff from endangered area.

French drain or gravel set into trench provides more drainage capacity.

A system of infiltration ditches was used to dispose of stormwater generated on a lot developed by a restaurant complex in Gaithersburg, Maryland. Contact: Montgomery Co. Soil Conservation District, 600 S. Frederick Avenue, Gaithersburg, Maryland 20760.

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Cost requirements similar to that for dry wells. Trenches reduce costs by decreasing the need for sewers or pipe systems. Relatively cheap to dig. Costs vary with depth, and use of sediment traps, or porous blankets. Source: DVRPC.

Percolation tests are required. If the trench can be dug down to an adequately permeable strata, the trench is dug, lined with filter blankets, filled with gravel, covered by the filter blanket, stone or topsoil and topped by some permeable material such as porous asphalt, grating or soil. Degree of pollutant removal will depent on soil type.

Easements for required maintenance would need to be worked out. Relationship of this management practice to land development review process needs to be worked out as well.

For Additional Information

1. Dvoracek, M.J. and Peterson, S.J. Development of Systems for Groundwater Recharge. Lubbock, Tx.: Texas Tech University, June 1971.

2. Chow, Van Te. Handbook of Applied Hydrology. New York: McGraw Hill, 1964.

b

SUMMARY SHEET

category: WATER QUANTITY

sub-category: RECHARGE/ INFILTRATION

BMP: TILE FIELDS

OBJECTIVE

To maintain the pre-development groundwater budget by enhancing infiltration of stormwater.

WHERE APPLICABLE

Pipe systems are utilized to distribute water either directly into well-drained soils or into gravel-filled beds or trenches where soils are only moderately well drained. Both the water table (all seasons) and bedrock must be a minimum of 5 feet below ground level. (1)

PROS

1. The area of a tile field is larger than a pit or basin and therefore distributes recharge over a larger areas and displays less risk at clogging.
2. Minimal labor required.

CONS

1. Additional maintenance required such as removal of sediment prior to recharge through fields.
2. Filtering effect of topsoil may be lost.

IMPLEMENTATION CONSIDERATIONS

The permeability of both the soil and subsoil, and the spacing and depth of drains will dictate water movement. Generally the percolation rate of soils should be greater than 0.075 feet per day, and drains should be 10 ft. or more apart (1). Excavated trenches should be at least 48 inches according to ref. 1 below. These trenches are backfilled with 18 or more inches of washed gravel (or other approved granular material). The distribution line is laid on top of the filled trenches. (Examples of these are agricultural tile drain, perforated bituminized fibre or polyvinyl chloride pipe. Then granular material (12 inches or more) is laid over the distribution line. A filter blanket or a hay layer (2 inches) and then topsoil (12 inches) is laid. It is recommended by Tourbier that the trench width be at least 18 inches. Removal of sediment prior to incorporation into the drain system can be performed by sediment ponds or other methods. Design capacity should be calculated and compared to actual flow prior to field construction.

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For Additional Information

1. Urban Land Institute, Water Resources Protection Technology, Tourbier, 1981.

b