APPENDIX 8

Mounding Analysis Procedures

Ground Water Mounding Analysis: Narrative How-To

Pertinent Variables	
Variable	*Unit*
m: aquifer thickness	Feet
w: width of flow path	Feet
L: length of the side of the drain field that is **perpendicular** to the flow	Feet
ΔH: change in height of groundwater	Feet
Q: design flow rate per unit time	Gallons/day (design storm event)
A: area of flow path (cross-sectional) (m*w)	Square feet
K: hydraulic conductivity (average)	Feet/day

1. Calculate K, the hydraulic conductivity
2. Calculate Q based drainage area and design storm event
3. Set Q/A as less than K (determined in step #2).

4a. Determine the A range that keeps (Q/A) < K. A **must** be large enough that (Q/A) < K. A is a cross-sectional area, found by multiplying the thickness of the aquifer (m) and the width of the window of flow (w).

4b. If (Q/A) > K and A cannot be increased or if the soil is determined to be silt or clay, groundwater mounding— in which the hydraulic head immediately below the drainage field rises to within 5 feet of the bottom of the drain field then infiltration trenches cannot be used.

5a. Use the equation ΔH= ([Q x L] / [A x K]) to determine by how much the groundwater will mound. ()

5b. Ensure that ΔH does not put the groundwater mounding level within 5 feet or less of the bottom of the drain field.

Helpful note	
Aquifer thickness: (Distance to impermeable boundary below aquifer) - (distance to groundwater when groundwater is at its highest level)	Example: Distance to impermeable boundary below aquifer is found to be 29 feet. When groundwater is at its highest, it is found 4 feet below ground. Therefore, 29-4=25, so the aquifer is 25 feet thick.

Example (from "Model Decentralized Wastewater Practitioner Curriculum", Aziz Amoozegar, PhD, North Carolina State University)

Ground Water Mounding: The lateral movement of water in the saturated zone must be determined to assess the level of rise of water table (i.e., ground water mounding) under the drain field of the system. Based on the depth to water table (3 ft) and the impermeable boundary below the aquifer (25 ft), the thickness of aquifer is assumed to be 22 ft. Using an average saturated hydraulic conductivity of 18 ft/d and a drainage ditch located at 300 ft from the edge of drain field, the groundwater mound under the drain field (approximately 60 ft by 105 ft) was calculated by the Hantush model presented by Molden et al. (1984). The model predicted a maximum ground water mounding of approximately 0.47 ft, which puts the top of the water table at 2.53 ft below the land surface.

Another way to determine ground water mounding is to assume that all the applied wastewater must move toward the drainage ditch located at approximately 300 ft from the drain field edge. Similar to the above analysis, we assume the length of the drain field (105 ft) is parallel to the drainage ditch, the thickness of aquifer at the edge of the field is 22 ft , and the average K_{sat} for the saturated zone is 18 ft/d. The length of flow (i.e., the width of the drain field) for calculating hydraulic gradient is 60 ft, and the cross sectional of the flow is 2,310 ft^2 Using Eq. [2], the rise in water table for a total flow volume of 425 ft^3/day is then:

ΔH = ([425 × 60]/(2,310 × 18) = **0.61 ft**