- Glover Dumm Equations

System Capacity and Drainage Coefficient

To protect plants, a subsurface drainage system must be able to remove excess water from the upper portion of the active root zone. System capacity shall provide the desired amount of water removal per day, commonly referred to as the "drainage coefficient."

Experience in drainage systems in Abu Dhabi has shown that this figure is often between 2 mm and 5 mm of water removal per day at steady-state operation of the drainage system. Initial drainage coefficient may reach up to 20 mm per day and must be adjusted during initial operation to prevent migration of fines and subsequent settlement.

Careful geotechnical and hydrogeological study shall be performed in order to clearly understand the water regime as well as the individual and the interface characteristics of the relevant site soil. Not only the soil hydraulic stability, solid mass transport, but also its physical and chemical stability shall be thoroughly studied.

Outflow from the drainage system is equal to the drainage coefficient multiplied by the area contributing to the drainage. Field drain pipe flow is equal to the drainage coefficient multiplied by the area served by the pipe. The length of this area is the length of the field drain whilst the width is the field drain spacing. Past experience has shown that maximum flow from a field drain ranged between 15 litres/hour/meter to 20 litres/hour/meter of field drain for spacing of 75 m – 80 m. These figures can be used to double-check the numbers calculated using the formulas presented in the previous paragraph.

Minimum size for perforated pipes is 110mm DN.

Pipe Materials

Approved pipe materials parameters are shown in Table 5-6.

Material	unplasticised polyvinyl chloride (uPVC) (plain or corrugated) – Class PN10 unless higher class is deemed necessary.
Rectangular perforations	0.6 to 2mm long 0.6 to 1mm wide
Circular perforations	The drain pipes shall be fully perforated in rectangular shapes around the pipes in an angle of 45 degrees measured from the vertical pipe axis. Perforation should be concentrated above the horizontal centre line of the pipe.

Table 5-6 - Approved Drainage Pipe parameters

Settlement Potential

Land drainage may result in changes in groundwater levels. The drawdown of groundwater below its normal seasonal variation may result in settlement of structures founded on or in the ground and/or collapse of voids that may be locally present within bedrock. The movement can result in damage to structures depending on the amount of settlement that is induced and how this changes beneath the structure, and the nature of the structure and its foundations.

Particular care shall also be taken with the design to ensure that ground material cannot wash into the sub-soil system and cause settlement of the surrounding ground.