| Facility | Depth of Formation Level (m bGL) | Minimum Depth to Groundwater (m) |
|---|---|---|
| | | |
| Septic Tanks | 3.0 - 4.0 | 0.5 m below formation level |
| Telephone Cables and Chambers | 0.4 - 1.5 | 2.0 below Ground Level |
| Power Cables and Chambers | 0.4 - 1.5 | 2.0 below Ground Level |
| Potable Water System; Pipes and Chambers | 0.9 | 1.4 below Ground Level |
| TSE System; Pipes and Chambers | 1.0 | 1.5 below Ground Level |
| Roads; Formation Level of Base Course | 0.3 - 1.0 | 0.5 m below formation level |
| Buildings Foundation Level | 1.0 - 1.5 | 0.5 m below formation level |
| Buildings Basement | 4.0 - 4.5 | 0.5 m below formation level |
| Sewers | 1.2 cover min (highways)<br>0.9 cover min (private) | 1.2 m below Ground Level |

Table extracted from the Qatar Drainage Design Manual

**Table 5-2 - Guideline Depths of Infrastructure and Minimum Groundwater Levels**



In urban landscaping requirements, experience in Abu Dhabi has shown that water table at the midway point must also be at least 15 cm below the plantation root zone. For streetscape landscaping this is approximately 40 cm to 50 cm below soil surface, and for date palms in the street medians the water table must be at least 1 m below the surface.

Another parameter related to drainage design is the initial time required for the water table to drop from one level to another. Systems shall be sized based on the steady state outflow of drainage water not initial high discharge levels occurring immediately following installation. Designs causing very rapid water table drop will result in closely spaced drains with higher cost and present settlement risks.

## 5.4. Subsurface Drainage Planning

The main phases of planning a subsurface drainage project are shown in Table 5-3.

| | |
|---|---|
| **Reconnaissance study** | Comprises of a desk and field research. Objective is to make an inventory of the problems (potential or actual), to determine whether a groundwater control system is needed and formulate possible solutions |
| **Concept design** | Involves setting out various alternatives and then subjecting them to an economic and technical feasibility analysis. |
| **Detailed Design** | The selected solutions are progressed to detailed design whereby final drawings / specifications are produced before implementation. |

**Table 5-3 – Phases of Subsurface Drainage Project Design**

### 5.4.1. Reconnaissance Study

The Consultant shall collect relevant data as shown in Table 5-4.

| Item | Description |
|---|---|