Rural (undeveloped) catchments

The following formula for t_c is based on kinematic flow assumptions and should be used for rural catchments:

$$t_c = \frac{0.12 n^{0.6} L^{0.6}}{S^{0.3} i^{0.4}}$$

Where:

t_c = time of concentration (hours)

n = Manning's roughness coefficient

L = length of flow from furthest point (meters)

S = average slope (meters/meters)

i = average rainfall intensity (mm/hr)

The rainfall intensity i is related to the storm duration by a relationship of the form:

$$i = \frac{\alpha}{t^{\beta}}$$

The values of α and β for this equation for each return period are given in Table 3-5.

Because the required storm duration is equal to the time of concentration, combining these equations gives:

$$t_c = \left(\frac{0.12 n^{0.6} L^{0.6}}{S^{0.3} \alpha^{0.4}} \right)^{\frac{1}{1-0.4\beta}}$$

This equation should be used to calculate time of concentration. The appropriate multiplier given in Table 3-3 is then applied to give the design storm duration for the storm water network.

It is recommended that an appropriate 'n' value to use for undeveloped areas of Abu Dhabi lies between 0.020 and 0.035. This range has been established using a method for developing Manning's 'n' values for floodplains. Where catchment response is expected to be dominated by channel flow, then an appropriate value of Manning's n based on the channel type should be used.

Urban (developed) catchments

Time of concentration for urban catchments is made up of two chief components:

- Time taken for water to enter the storm water drainage network (entry time)
- Time taken for water to pass through the storm water drainage network (travel time)

The total time of concentration is the sum of these.

For calculation of entry time, use

Figure 3-1 and an average value for catchments slope to calculate the flow velocity, then use this with the average distance water must travel to reach the storm water network to calculate the entry time. A minimum value of 10 minutes should be used for impervious catchments.