1.2 DESIGN PERIOD

The future period for which a provision is made in the water supply scheme is known as design period.

It is expressed in years.

- During design period, the structures, equipment and components should be adequate to serve the requirements.
- As per normal procedure water works is designed for a period of 30 years.

Influencing factors:

- Useful life of pipes, equipment and structures.
- The anticipated rate of growth. If rate is more, design period will be less.
- The rate of inflation during the period of repayment of loans when inflation rate is high, a longer design period is adopted.
- Efficiency of the component units. The more the efficiency, the longer will be design period.

IMPOUNDING RESERVOIRS:

It is a basin constructed in the valley of a stream or river for the purpose of holding stream flow so that the stored water may be used when supply is insufficient.

They have the following two functions:

(i) To impound water for beneficial use.

(ii) To retard flood.

Two functions may be combined to some extent by careful operations.

An impounding reservoir presents a water surface for evaporation. This loss must be considered. Possibility of large seepage loss must also be considered. If it is economically impossible to prevent them, the project may have to be abandoned or move it to a more favorable site. There will be some loss by seepage through and under the dam itself.

1.2.1 POPULATION FORECASTING METHODS

When the design period is fixed the next step is to determine the population of a town or city population of a town depends upon the factors like births, deaths, migration and annexation. The future development of the town mostly depends upon trade expansion, development industries, and surrounding country, discoveries of mines, construction of railway stations etc may produce sharp rises, slow growth, and stationary conditions or even decrease the population. For the prediction of population, it is better to study the development of other similar towns, which have developed under the same circumstances, because the development of the predicted town will be more or less on the same lines.

Following are the population forecasting methods

i. Arithmetical increase method
ii. Geometrical increase method
iii. Incremental increase method
iv. Simple graph method
v. Decrease rate of growth method
vi. Comparative graph method
vii. The master plan method

ARITHEMATICAL INCREASE METHOD

This method is based on the assumption that the population is increasing at a constant rate. The rate of change of population with time is constant. The population after 'n' decades can be determined by the formula.

$$\mathbf{Pn = P_0 + n\bar{x}.}$$

where

P_0 → population at present

n → No. of decades

$\bar{x}$ → Constant determined by the average of increase of 'n' decadesGEOMETRICAL

INCREASE METHOD

This method is based on the assumption that the percentage increase in population from decade to decade remains constant. In this method the average percentage of growth of last few decades is determined; the population forecasting is done on the basis that percentage increase per decade will be the same.

INCREMENTAL INCREASE METHOD

This method is improvement over the above two methods. The average increase in the population is determined by the arithmetical method and to this is added the average of the net incremental increase once for each future decade.

DECREASING RATE OF GROWTH METHOD

The method is applied to a city that owns a limiting saturation population. In this type, the rate of growth is a function of its population deficit.

COMPARATIVE GRAPH METHOD

In this method, population curve of different cities with similar population growth is studied. The different factors that are taken into consideration are:

The likeness of Economic Base

Proximity of geography

Access to similar transportation systems

MASTER PLAN METHOD

The master plan is prepared for next 25 to 30 years for the city. Master plan the city is divided into various zones such as residence, commerce and industry.

FACTORS INFLUENCING POPULATION GROWTH:

ECONOMIC DEVELOPMENT

Countries that are in the early stages of economic development tend to have higher rates of population growth. In agriculturally based societies, children are seen as potential income earners. From an early age, they can help with household tasks and collecting the harvest. Also, in societies without state pensions, parents often want more children to act as insurance for their old age. It is expected children will look after parents in old age. Because child mortality rates are often higher, therefore there is a need to have more children to ensure the parents have sufficient children to look after them in old age.

SOCIAL AND CULTURAL FACTORS

India and China (before one family policy) had strong social attachments to having large families. In the developed world, smaller families are the norm.

AVAILABILITY OF FAMILY PLANNING

Increased availability of contraception can enable women to limit family size closer to the desired level. In the developing world, the availability of contraception is more limited, and this can lead to unplanned pregnancies and more rapid population growth.

DEATH RATES

Level of medical provision. Often death rates are reduced before a slowdown in birth rates, causing a boom in the population size at a certain point in a country's economic

development. In the nineteenth and early twentieth century, there was a rapid improvement in medical treatments which helped to deal with many fatal diseases. Death rates fell and life expectancy increased.

URBANISATION

Rural to urban migration happened in the past centuries in richer nations and is happening today in poorer nations. It has a significant impact upon population growth because it can impact upon the birth and death rates of a country. As a country becomes increasingly urbanized the birth rate tends to rise and death rates tend to fall. The birth rates rise because people have more access to medical care in cities than in rural areas thus infant mortality falls and birth rate rises. This is a short term change, as development occurs over longer periods of time in the urban area birth rates can fall as it is then easier to deliver family planning.

Death rates fall in urban areas because it is cheaper and more economic to provide medical and education services, and to ensure more reliable food supplies. This means that people get more educated, better fed and can be treated when sick. This is often not the case in more remote rural areas so death rates fall in urban areas. The net effect of this is population growth.