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Water Distribution in Mawadi Pimpri

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Abstract – The distribution system is to deliver water to consumer with appropriate quality and quantity. Pressure distribution system is used to collectively describe the facilities used to supply water from its source to the point of use. This paper refers to rural water supply and the distribution of the Mawade-Pimpri village from the Nazare dam, located in the village of Nazaré, Purandar, Pune.Our research will minimize the cost of the water and water distribution system; In addition to this project we provide water purification system in the distribution network, while the most economical water distribution system has been developed.

Keywords: Water Supply System, Water Treatment, Water Distribution System.

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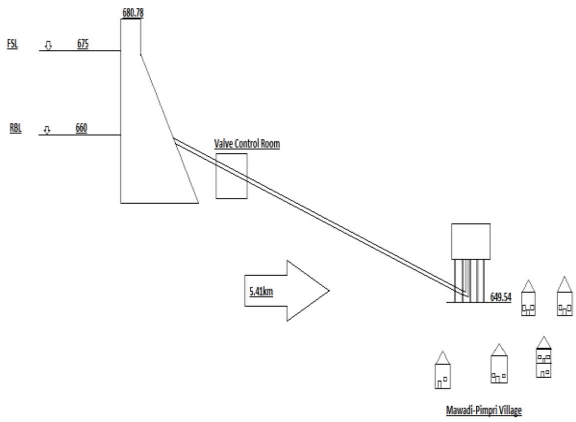
1. INTRODUCTION

Water is essential for man, animals and plants. Without water, life on earth will not be possible. Since beginning of human civilization, families have settled near water sources, along rivers, along lakes or near natural springs. In fact, people lived; some waters are normally available for drinking, for domestic use and possibly for watering animals. These does'nt imply that source is convenient and of sufficient capacity or that the water is safe and healthy. On obverse, in many countries people live in areas where water is limited. Often, women and children carry it long distances, especially during dry periods. Water scarcity can also force people to use sources that are contaminated by human or animal weast which is dangerous to human health.

Historically, supply of drinking water in parts of rural areas in India has been outside the sphere of influence of the government. Open wells managed by the community, private wells, ponds and small-scale irrigation reservoirs have often been the main traditional sources of rural drinking water. The effective role of the Government of India in the rural drinking water supply sector began in 1972-73 with the launch of the Accelerated Rural Water Supply Program (ARWSP).



During the 1972-1986 period, the main thrust of the ARWSP was an authority created to check adequate supply of potable water to rural community through Public Health Engineering System. The second-generation program began with the launch of Technology Mission in 1986-87, renamed in 1991-92 as Rajiv Gandhi's National Drinking Water Mission. In the rural water supply sector, issues related to water quality, appropriate technology interference, support for human resources development and other similar activities were introduced. The third generation program began in 1999-2000 when the Sector Reform Projects evolved to involve the community in the planning, implementation and administration of schemes related to drinking water, later expanded as Swajaldhara in 2002.

2. REVIEW OF LITERATURE

AMIT KAUSHIK (2007) :

AmitKaushik studied water is basic needs, mainly drinking water, bathing and maintaining hygiene and domestic uses, such as cooking. As this is the main understanding of water for basic needs, this literature review is structured according to several topics, namely, the dimensions of water, Quantity, Quality, Affordability, Access, Pricing and the Mechanism for the water delivery.

The amount of water required by households is an important aspect of water for basic needs. The water required for basic needs varies according to climate, lifestyle, cultural tradition, diet, technology and wealth. Different development agencies recommend different amounts of water requirements to meet basic needs. Peter Gleick, president of the Pacific Institute for Studies in Development, Environment and Security (1996) presents the concept of basic water requirements where he analyzes the quantities of water required for different basic needs. It concludes that a range of 20 to 40 liters per day of freshwater per capita is generally considered as a minimum necessary to satisfy the needs of drinking water and sanitation only.

The quality of water used by households is an important aspect of the debate on water needs for basic needs, as it influences hygiene and public health. The health implications of poor water quality are enormous. It is estimated that around 37.7 million Indians are affected by waterborne diseases annually, it is estimated that 1.5 million children die of diarrhea alone and 73 million workdays are lost due to waterborne diseases. every year. The resulting economic burden is estimated at $ 600 million per year. (Khurana and Sen, WaterAid, 2007).

ASHIM DAS GUPTA (2016) :

Ashim das Gupta studied that the integral management of water resources [IWRM] is a process that promotes the coordinated development and management of water, land and related resources. IWRM involves the collection and management of information about natural resources, the understanding of the interaction that occurs in the use of this resource, along with the implementation of policies, practices and management structure, which allow the resource to be used to achieve The implementation of IWRM by the International Union for the Conservation of Nature and Natural Resources, said that IWRM is practical and feasible. The key is the two-way strategy in which IWRM planning is complemented by pilot action that demonstrates results that address local and national priorities.

3. MATERIAL &METHODOLOGY

3.1 Material:

Collecting Information regarding project.

Population of last 3 decades

- Population of Mawade-Pimpri village in 1991=1378
- Population of Mawade-Pimpri village in 2001=1550
- Population of Mawade-Pimpri village in 2011=1709

Forecasting future 30 year population :

3.2 Methodology:

Methods for forecasting

1. Arithmetical Increase Method
2. Geometrical Increase Method
3. Incremental Increase Method
4. Line-fit Graphical Method
5. Decadal Growth Method
6. Contour map of Nazare Dam.
7. Information of Nazare dam.

Reduce Level taking from Google earth. Study of alternative path for fixing alignment & select one path which is economical according to cross section given from Google earth. Total station survey: After finalizing the path from Google earth we use total station for taking actual elevation. Take output file of total station in terms of excel sheet and cross section which can give us information regarding elevation select path. Drawing cross section of actual path to fixing the alignment

Design

1. Pumping station
2. Design of jack well
3. Calculate Capacity of pump
4. Design of pipeline
5. Design surge tank

6. Design of pressure release valve

7. Design of well

8. Design of pump

9. Design of overhead water tank

We are choosing arithematic increase method for proposed project work for designing water distribution system.

They are as follows:

Project-Nazare Dam, Constructed on river karha, near village Nazre

- Taluka-Purandar,River-Karha river
- Catchment area-397.82 square Km
- Yearly use of water-634 $\times 10^7$ cubic ft.
- Total storage-371 $\times 10^7$ cubic ft.
- Dead storage-200 $\times 10^7$ cubic ft.
- Height of Dam-22.545m.
- Length of Dam-2020.82m.
- River Bed level-658.12m.
- Full supply level-675.28m.
- Height flood level-678.88m.
- Dam top level-680.77m.
- Spillway type-Ogee type ungated
- Spillway length-158m.

Proposed Scheme :

A) Details of scheme components

- Intake well cum pump house
- Raw and clear water pumping main
- Water treatment plant
- Distribution system including overhead water tank
- Pumps & motors to fill overhead tanks.

B) Source: Nazare dam is capable of meeting water requirement of the system for the design period, as such dependability is 100% can be ensured.

C) Intake system: A penstock will carry water directly from dam and a small pump house room like structure is to be constructed by the side of dam from where the flow through the penstock flow control valve.

D) Water treatment plant: Based on the raw quality requirement necessary unit for the water treatment shall be decided as per the prevailing engineering practices so that it will deliver designed quality of water. It is to be ensured that WTP components shall be so designed to permit a 20% overload considering the system sustainability O%M preferably for the rural water supply smaller system slow sand filter (SSF) technology shall be adopted in conjunction with horizontal roughening filter (HRF) and or plain sedimentation (PS) as well as aeration unit if required rate of filtration for SSF should be 0.1&0.2 m/hr. For HRF rate of filtration will be 0.8 to 1.2m/hr including gravity feed disinfection system all filter components shall be designed in accordance with the laid down norms.

Overhead reservoir (OHR):-The capacity of service reservoir is ½ of total designed demand based on 20 yrs of design period. The design is made with due care of safe bearing capacity of soil, uneven settlement is avoided by distributing equal pressure on footing, and as such raft foundation is used.

Water distribution network:- The distribution system is designed as gravity distribution system and no special pumps are required for the same.

Type of pipe:-PVC pipes are to be used for distribution and GI pipe to be used as rising main.

Important points:-

1. Shortest, straight possible route is chosen for the pipeline and trees, building, etc. are avoided.

2. If any change in direction happens it should be made by gradual deflection in the pipe joints.

3. Sharp bends are absent.

4. Strainer is to be fitted at the pipe against injury from traffic and from weather condition

it is to be buried in the ground at suitable depth (30cm).

5. The width of excavation trench for pipeline should be 30-45cm.

6. The pipes should be laid on firm ground to prevent unequal settlement which may injure pipe joints.

7. Newly laid pipeline should undergo hydrostatic tests for 24hrs to determine both the location and amount of leakage while performing these tests the sections of pipes between joints be covered but the joints themselves should be exposed for inspection.

Design of pipe Diameter:-

Designed village population after 25 years:-2500

Assumed per capita demand as recommended by ministry of drinking water supply and sanitation for small villages: 40 liters.

Hence total daily supply =2500 $\times$ 400

=1,00,000 liters/day

=100 m^3 /day

Let thus supply is to be delivered in 8 hours.

$$\therefore \text{Discharge} = \frac{100}{8\times60\times60} = 3.472\times10^{-3} m^3/sec$$

Consider following two extreme cases

1) When the dam is full the water head available is

=675.28-649.54-3

=22.74m.

Where full supply level=675.28m

R.L.of delivery end main=649.54m

Head kept available at delivery end=3m

Using Darcy weisbach equation for head lost due to friction

$$hf = \frac{flv^2}{2gD} = \frac{flQ^2}{2g(\frac{\pi}{4})^2 D^5}$$

$$D^5 = \frac{0.02\times5400\times(3.472\times10^{-3})^2}{2\times9.81\times(\frac{\pi}{4})^2\times22.74}$$

$$D^5 = 4.729\times10^{-6}$$

$$D = 0.086m = 86mm$$

2) For lowest water level in reservoir

The head available = 660.61 – 649.54 – 3

= 8.13m

$$hf = \frac{flQ^2}{2g(\frac{\pi}{4})^2 D^5}$$

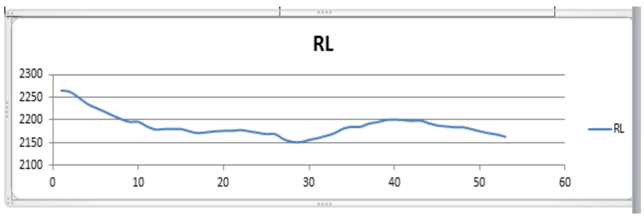
$$D^5 = \frac{0.02\times5400\times(3.472\times10^{-3})^2}{2\times9.81\times(\frac{\pi}{4})^2\times8.13}$$

$$D^5 = 1.3228\times10^{-5}$$

$$D = 0.105m$$

$$D = 105mm$$

Hence adopt D=105mm, i.e.provide a pipe of diameter 105mm. This is so because a pipe of larger diameter than required when the dam has water level at full supply level will result in less loss of head. Hence the required quantity of water at required head may be made available by regulating the flow by means of a valve. In the contrary if a pipe of smaller diameter than required when reservoir has the lowest water level is provided then it would result in a considerable loss of head and the required discharge at the required residual head will not be obtained



3. CONCLUSION

Therefore, we conclude that we were able to provide the population with pure and safe water for its use and that it can be used for drinking. We have designed a new plan for the water distribution system of the village of mawadipimpri this will help the population of the water shortage in the village.

4. REFERENCE

Amita Kaushik (2007). "*Right to Water for Basic Needs"* ISJR

Andrew Keller, R.Sakthivadivel and David Seckler (2010). "*Water Scarcity and the Role of Storage in Development".IOSR*

Ashim Das Gupta (2016). "*Integral management of water resources [IWRM]"*

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