# Artificial Recharge of Ground Water using Filter Bed System

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***Abstract*- Recharge of floor water thru filtration mattress device, infront and at the back of of Lokikere primary street close to yavanagathilli village Davangere district. In order to enhance the release of borewells clear out out mattress device is adopted. The information of annual rainfall of the observe location for thirteen years are accumulated and common annual rainfall is taken as 680mm. By the usage of rational technique system i.e Q = CiA, the full runoff quantity withinside the observe location is anticipated as 51,178.654 $m^3$.The clear out out mattress is designed with dimensions Lenth-6ft, width-6ft, Depth-4ft and its value is anticipated as 9000 Rs for every borewell. The will bring about enhancing the floor water circumstance and enhance the release fee of the borewells also.**

***Keywords*: Ground water, Bore well recharge, Filter bed system, water quality,**

## I. INTRODUCTION

Water may be a essential aid for lifestyles. property improvement and economical management of this scares assets has find yourself a venture in India. Increasing population. developing urbanization and quick industrialisation mixed with the need for agriculture producing generates competitory desires for water. spring water has more and more emerged as a result of the came back bone of India's agriculture and overwhelming water security. Contribution of floor water is kind of 62% in irrigation, 85% in rural water deliver and 45% in town water deliver.

The fast improvement of floor water assets for varied utilization has contributed in growth of irrigated agriculture, commonplace money improvement and in enhancing the superior of lifestyles in India. Ground water, that's the provision for extra than 85% of home water wants, 50% of town water necessities and additional than 50% of irrigation necessities of the country, is depleting fast several regions attributable to its large scale withdrawal for various sectors.

## II. NEEDS FOR ARTIFICIAL RECHARGE TO WATER

- The factitious recharge to aims at augmentation of ground water of ground water reservoir by modifying the natural movement of surface water utilizing civil construction, techniques unremarkably address to following issues.
- To boost property in areas wherever over development has depleted the aquifer.

### ARTIFICIAL RECHARGE TECHNIQUES

- Direct surface technique.
  - Flooding.
  - Ditch and furrow system.
  - Basins or percolation tanks.
  - Stream augmentation.
- Direct sub surface technique.
  - Recharge pits and shafts.
- filter method.
  - Dug well recharge.
  - Bore hole flooding.
  - Naturally openings, cavity fillings.
- Combination surface -sub surface techniques.
  - Basin or percolation tanks with pit shaft or wells.
- Indirect techniques.
  - Induced recharge from surface water.

## III. OBJECTIVES

- To review the hydrological options of the chosen site.
- To estimate the quantity of runoff
- To style the filter system for bore well recharge and its value estimation.

## IV. STUDY AREA :

In present study, the bore wells located in the Lokikere main road near yaravanagthi halli village, Davangere (dist) &(tluk).figure as shows the location map of study site.

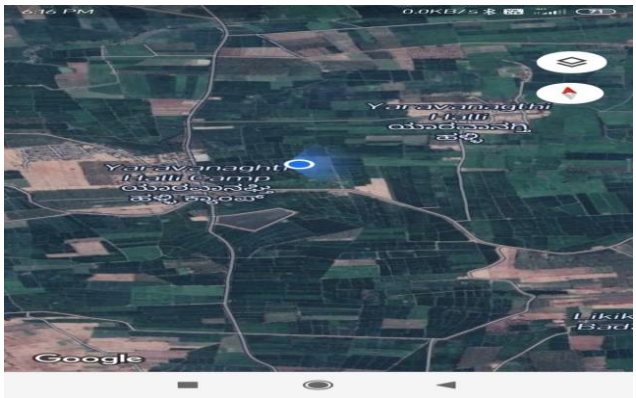


Fig 1: Location map

## V. MATERIALS AND METHODOLOGY

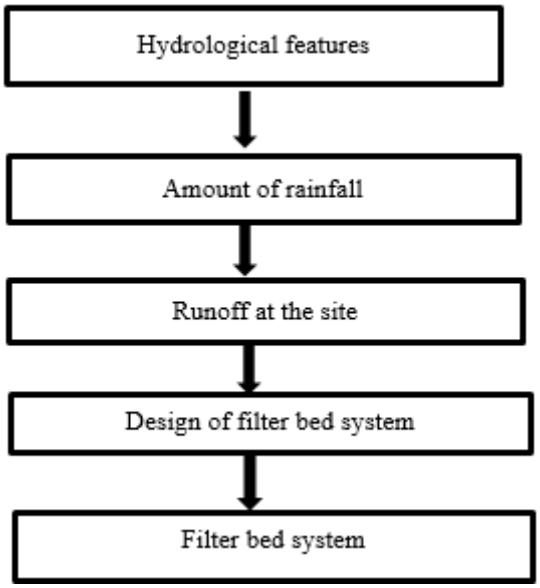


Fig 2: Flow chart.

Before undertaking a recharge scheme, it is important to first assess the availability of adequate water for recharge. Following are the main sources, which need to be identified assessed for adequacy.

- Precipitation (rainfall) over demarcated area.
- Large roof areas from where rainwater can be collected and diverted for recharge.

## VI. STUDY OF HYDROLOGICAL FEATURE

Hydrologic feature is that the unit of water info needed to convey establish of real water objects through the info process chain from observation to water information.

a. Soil Type

- Sandy soil.
- Slit soil.
- Clay soil.
- Loamy soil.

b. Rainfall

The rainfall details of the study area are collected by means of manuals available in central ground water board and Karnataka state national disaster monitoring centre.

The details show that in general, southwest monsoon contributes 58% of total rainfall and northeast monsoon contributes 22% rainfall. The remaining 20% rainfall is received as sporadic rains in summer months. Monthly distribution of rainfall of Davangere city for 13 years is represented graphically and average annual rainfall is calculated. Rainfall data of 13 years Monthly rainfall data of Davangere city for 13 years (Source: CGWB: Central Ground Water Board, KSNDMC: Karnataka State Natural Disaster Monitoring Centre).

Table 1: Rain fall data

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2007 | 0 | 0 | 4.6 | 5.3 | 36.3 | 113.4 | 97.2 | 123.3 | 164.5 | 177.9 | 6.5 | 0.7 | 729.7 |
| 2008 | 0 | 1 | 90.2 | 98.2 | 90 | 61.8 | 60.2 | 116 | 194.2 | 82 | 34.6 | 0.4 | 728.6 |
| 2009 | 0 | 0 | 31.7 | 20.3 | 130.8 | 99 | 137.3 | 160.9 | 120.4 | 117.4 | 39.4 | 58.2 | 1015.4 |
| 2010 | 17.7 | 0 | 5.2 | 58.4 | 61 | 74.4 | 130.5 | 193.2 | 139.5 | 142.9 | 218.5 | 0 | 1044.3 |
| 2011 | 0 | 0.5 | 49.9 | 74.7 | 96.3 | 79.9 | 70.9 | 90.4 | 47.3 | 92 | 9.7 | 0 | 620.6 |
| 2012 | 0 | 0 | 0 | 122.1 | 21.2 | 35.7 | 59 | 118.1 | 65.5 | 29.1 | 37.8 | 0.3 | 488.8 |
| 2013 | 0.2 | 4.5 | 15.6 | 37.2 | 147 | 110.9 | 149.1 | 115.5 | 160.9 | 70.6 | 4.2 | 0 | 816.5 |
| 2014 | 0 | 34.8 | 21.2 | 14.4 | 122.2 | 156 | 175.4 | 85.5 | 121.2 | 15.5 | 10 | 0 | 756.5 |
| 2015 | 3.7 | 58.9 | 64.8 | 35.9 | 13.2 | 145.2 | 121.2 | 16.5 | 147.5 | 116.5 | 75.8 | 19.5 | 819 |
| 2016 | 2 | 0.6 | 0.9 | 6.9 | 63.8 | 155.9 | 105.6 | 40 | 65.1 | 12.5 | 2.7 | 8 | 464 |
| 2017 | 0.1 | 0.1 | 4.9 | 14.3 | 54.7 | 57.7 | 74.4 | 94.4 | 219.4 | 196 | 2 | 0.8 | 721.8 |
| 2018 | 0 | 2.92 | 10.2 | 5.95 | 54.59 | 78.09 | 61.8 | 50.2 | 36.5 | 127.2 | 95 | 26 | 549.5 |
| 2019 | 5 | 1.6 | 1.2 | 101 | 245 | 245 | 196.6 | 133 | 213.9 | 451.9 | 91.6 | 26.9 | 2910.4 |

## VII. CONSTRUCTION PROCESS

Step (1): Excavation of recharge pit and Centering of casing pipe.

Around the designated bore well a large pit of dimensions 6ft*6ft*4ft (width*length*depth) must be dug. there's an opportunity of casing pipe slithering into the bore well when imaginary place is dug. To avoid this danger, cement concrete to tightly hold the casing pipe from slipping into the bore well as shown within the figure.


Fig 3: Excavation of recharge pit.

Step (2): Drilling filter holes on casing pipe covering with mosquito mesh.

a. Around pipe

Using iron pipe as casing pipe cause issues like corroding in few years, in such we must always replace them with pvc pipe and build three hundred to four hundred holes of size 6mm with 3inch distance every up to a length of 3ft from very cheap of nether region as shown within the figure. we tend to may use slotted pipes offered in the market. These holes got to be lined with nylon mesh and were tied tightly to the casing pipe to stop the passage of mud dust.


Fig 4: Holes on casing pipe.

Fig 5: Cover with mesh.

Step (3): Filled with big sized boulders:

The pit is stuffed with stones of various sizes (30-40, 15-20, and 5-7) gravel (2-4) and coarse sand to create 5 bedded filter unit. The stones and different filter materials were organized fastidiously round the casing pipe to avoid harm to it. From rock bottom of infernal region 1st 3ft filled with 30-40 cm rough stones and next 2ft with rough stones 15-20cm size as in figure.


Fig 6: Big size of boulders.

Step (4): spreading the jelly stones:

Later 1/2ft with stones of 5-7cm size and further1/2ft with gravel of 2-4cm size. Remaining 1ft is crammed with coarse sand another 1ft ought to be left empty as in figure.

Fig 7: Spreading

Step (5): Covering with nylon mesh and spreading sand layer:

The nylon web is adjoin the gravel layer to separate it from sand layer and to stop mud particles filling the void areas in lower layers. The nylon net helps to permit solely clean water to labor under it as in figure.

Fig 8 : Covering with mesh.

Fig 9: Spreading soil Layer Nylon mesh.

Step (6): ponding water around the pit:

A protection wall of height one foot is made with bricks or size round the recharge pit with two tiny inlets (to enable rain water in to perdition and excess water might leave from the pit) to guard the recharge pit from the force of run-off. A slit lure was created at the doorway of the recharge pit to arrest the slit and mudentering into the pit.

Fig 10: Protection wall for ponding water.

VI. Cost Estimation of Borewell Recharge:

The cost of different components of filter bed is accounted to workout the total cost. The unit cost estimates of different components are set out in Table.

Table 2: Unit cost estimates of borewell recharging

| **Budget** | **Amount** |
|---|---|
| a) Materials / Consumables (Please specify) | 4000 |
| b) Labor (Describe) | 2000 |
| c) Travel (Describe) | 1000 |
| Miscellaneous (Please specify) | 2000 |
| Total | 9000/- |

VII. RESULTS AND DISCUSSION:

In Davangere district, semi-dryness and weather condition prevails in major a part of the year. the realm falls below central dry agro-climatic zone of province state and is classified as drought prone. Variation of annual rain from the year 1988 to 2019 is pictured within the figure. The variation of natural annual rainfall in Davangere district for the amount of 1988 to 2019 is 680 millimetre as shown in the figure. Hence, Total average rainfall = 680mm

Within the last decade (2002-2011) the district received a median annual rainfall of the 674.14 mm and 654.58 mm throughout 2011-2018.

Total Runoff generated from Study area.

It is calculated mistreatment the formula alphabetic character = Central Intelligence Agency (Rational method, Source: Columbia Country Stormwater Management style Manual and ODOT mechanics Manual).

Water harvest potential from tight space = downfall ( m ) × area catchment($m^2$)×runoffcoefficient= 0.680×31,550.83×0.9=19,309.1m3 Water harvesting potential from permeable area = rainfall (m) × area of catchment($m^2$) × runoffcoefficient =0.680×156223.308×0.3=31,869.554 $m^3$
Total Runoff Volume =19,309.1+31,869.554=51,178.654 $m^3$ Total Runoff volume calculable as 51,178.654 $m^3$

CONCLUSIONS:

As demand of water increases, water managing associate degreed coming up with got to be done to enhance water management and augment water supply.

Hence artificial recharge may be one possibility in an integrated strategy to optimize total water resource management.

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