

## **GROUND WATER RECHARGE**

**B. Manoj Yadav<sup>1</sup>, P.Jyothi<sup>2</sup>, Sandani Basha<sup>3</sup>**

<sup>1</sup>Professor, Department of Civil Engineering, QIS College of Engineering, AP, India

<sup>2</sup>Assistant professor, Department of Civil Engineering, QIS College of Engineering, AP, India

<sup>3</sup>Assistant professor, Department of Civil Engineering, QIS College of Engineering, AP, India

### **Abstract**

Day by day water scarcity is increasing due to increase in population urbanization, industries, educational societies, agricultural, domestic purpose and other reasons. Due to these reasons ground water decrease in drought prone areas like ONGOLE in prakassam district (A. P). The water is being pumped out at a considerably faster rate than it is being recharged. Many negative environmental repercussions of this overuse include lower well and spring water levels, soil subsidence, and water quality degradation. In order to overcome water scarcity in drought prone areas, different techniques adopted. Rain water harvesting is a one of the technique to recharge ground water in this technique the rain level. Artificial recharge on ground water is one method to collect the water to passes through ditches. Where the water will be stored and surrounding area gets recharged. Artificial recharge using short (or) long term underground storage.

**Key words:** Water, Techniques, Area, Recharge.

### **Introduction**

Groundwater is recharged naturally by rain and snow melt and to a smaller extent by surface water (rivers and lakes) and collecting the waste water from the from the, industries, educational societies, agricultural, domestic purpose and other reasons because of these reasons weConsider a site in drought pone areas because the ground water is decreased so we can choose this place. After the selected area by using the wheeled excavator to dig the soil as per the required dimensions after digging the soil up to the depth and length and width is our requirement after we are using the filter materials like, coarse aggregate gravel with size of our requirement and laid at an depth of our requirement and fine aggregate sand with size of our requirement laid at an depth of our requirement after placing the filter bed the rain water is allowed to ditch through the Pvc pipes by using rainwater harvesting method we can collect rain water. If rain water source is not available then we are using the waste water in industries, educational societies, house hold collect the water and treat the waste water by using root zone technology and the treated water is passed through the ditch by using Pvc pipes. All this water is going to ground through ditches. The surrounding area is recharged. By using this method, we can increase the ground water and maintain the water table constant.

### **Materials**

PVC Pipes

Fine Aggregates

Coarse Aggregates

Filter Mesh

Valves

Cement

### **A. PVC Pipes**

PVC pipes are produced using a variety of materials, including copper, iron, and wood. This kind of pipe is used to carry drinking water from a drainage system to a sophisticated fire-sprinkler system. Safety, economic effectiveness, environmental performance, and recyclability are the major characteristics of PVC pipes.

**1. PVC Pipes are safety**

PVC pipes are a safe option for transporting drinking water, but they may also serve as a haven for bacteria. Because they assist deliver clean water, PVC pipes are also good for the general public's health.

**2. PVC Pipes are durable& cost – efficient**

PVC pipes are a particularly cost-effective option because they have a considerably lower failure rate than other materials and require little upkeep and installation.

**3. 3.PVC Pipes are the best choice for the environment**

PVC pipes are easy to manufacture and use few resources and energy. They require less energy to transport because they are lighter. These PVC pipes require little maintenance

**B. Fine aggregates (less than 4.75mm size)**

Fine aggregate is a granular material composed of finally divided of rocks and mineral particles. In these the most common constituent of sand and the most defined by size. It is finer than gravel and larger than coarser than silt. Fine aggregate can also refer to a textural classis of soil or soil type. Fine aggregate is a non- renewable source and the fine aggregates are used for the filter bed in the process of ground water recharge.

**C. Coarse aggregate: (greater than 4.75mm size)**

Coarse aggregate is made up of the largest stone. These aggregates are retired on the 4.75mm sieve size and will process through 3-inch space are caused coarse aggregate. These coarse aggregates are commonly used in the concrete are gravels and pebbles. Coarse aggregates are used for the filter bed in the process of ground water recharge

**D. Filter mesh**

The pore size distribution and particle separation from gases and liquids are done using filter mesh. Metal, polymers, or natural materials can all be used to make it. The requirements specified by the filtration task are used to guide the selection of the mesh material.

**E. Valves**

A valve is a mechanical device that directs and regulates fluid flow by opening and closing. Fluid flows through an open valve from greater pressure to lower pressure. Modern control valves can lower steam flow or alter pressure. It can be used for a variety of things, including managing irrigation water and industrial activities. The military and transportation industries both employ it.

**F. Cement:**

A binder, or substance that binds other materials together, is what cement is used for in building. Typically, inorganic cements are utilised in building. Depending on the cement's capacity to set in the presence of water, it can be classified as hydraulic or non-hydraulic. In moist conditions or when submerged in water, non-hydraulic cement does not set. Setting of hydraulic cement in damp or submerged environments.

**III. TOOLS**

In this method we ae using different types of tools by soil excavation. There are

Hand tools

Machine tools

**A. Hand tools:**

These are generally used for excavation in small areas for smaller depth those tools are explained below.

**1. Spade:**

The long handle of a spade is often constructed of wood and has a metal plate with a sharp edge. This cutting edge makes it simple to dig through

**2. Shovel:**

Shovels are used to lift the soil that has been dug up. The sharp edge of a shovel distinguishes it from a spade. We can quickly and simply lift the earth by utilising this sharp edge.

**3. Hoe:**

Hoe is a long-handled digging implement with a metal plate fastened to one end and a long handle with an acute angle on the other. It is typically constructed of wood.

**4. Rake:**

The smaller dirt layer is removed with a rake, which has a horizontal rod with metal teeth.

**5. Pick axe:**

A pick axe is a tool used to dig small holes in the soil. It has a long handle that is often made of wood and is attached perpendicular to the handle. On one side, there is a broad blade and on the other, a pointed metal spike.

**B. Machine tools:**

These are generally used for excavation in large areas for larger depth those tools are explained below.

**1. Tracked excavator:**

Tracked hoe is another name for tracked excavator. The system as a whole can rotate 3600 times. This excavator is powered by traction, making it suitable for usage in the mining and pipeline industries.

**2. Wheeled excavator:**

Wheeled excavator is similar to tracked excavator and it is also moved 360<sup>0</sup>. These are used in road construction and not used in uneven ground.

**3. Back hoe excavator:**

In this excavator, the loader bucket is positioned in front of the truck, and the hoe arrangement is on the back side. Dig the earth with this hoe, then lift it with the bucket. Moving from one work location to another is this back hoe excavator.

**4. Dragline excavator:**

The dragline excavator has a long boom. It is utilised for deeper excavations such as the removal of underwater silt and port building, and the dragline excavator's economy is significantly higher than that of other excavators.

**IV TECHNIQUES**

To improve the ground water recharge by using different techniques. Those are

Recharge ditches

Check dams

Sub surface dams

Historical large well across streamlet

Farm ponds

Rain water harvesting

Recharge wells

Recharge pits & shafts

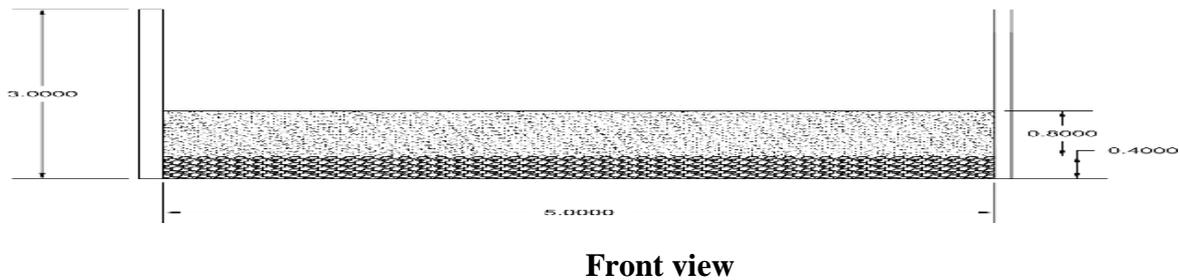
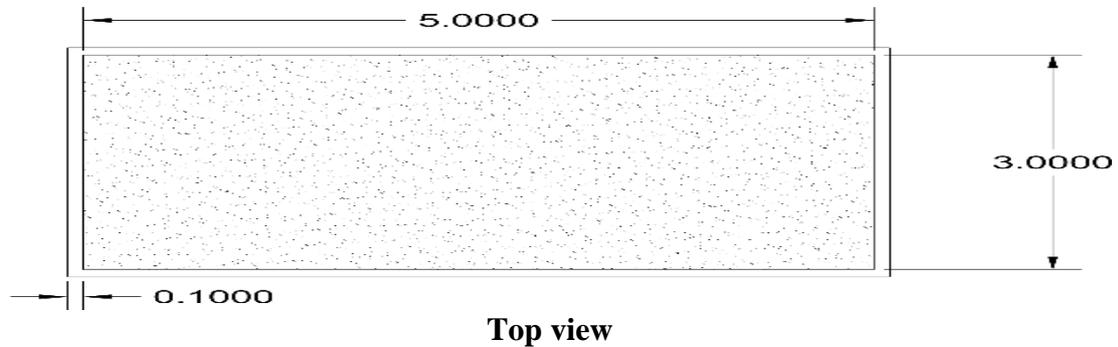
Spreading basins

We choose the ditch technique because to increase the recharge of ground water

**A. Recharge ditches:**

A ditch has a bottom that is narrower than it is deep. A ditch is a long, narrow trench that is created to fit the topographical and geological requirements at a specific location.

**V .DESIGN LAYOUT**



**A. Design layout:**

10mm-size coarse aggregate gravel made for the initial 0.4-meter layer.

Sand with a fine aggregate of 0.5mm made up the second layer, which was 0.8m thick.

**VI. DESIGN PROCEDURE OF RECHARGE DITCHES**

We consider a site in prakasam district because the ground water is decreased so we can choose this place. After the selected area by using the wheeled excavator to dig the soil as per the required dimensions after digging the soil up to the depth of 3m and length of 5m and width is 5m after we are using the filter materials like, coarse aggregate gravel with size of 10mm laid at an depth of 0.4m and fine aggregate sand with size of 0.5mm laid at an depth of 0.8m in crop field after placing the filter bed the rain water is allowed to ditch through the Pvc pipes by using rain water harvesting method we can collect rain water. If rain water source is not available then we are using the waste water in industries, educational societies, house hold collect the water and treat the waste water by using root zone technology and the treated water is passed through the ditch by using Pvc pipes. All this water is going to ground through ditches. The surrounding area is recharged. By using this method, we can increase the ground water and maintain the water table constant.

**A. Case study on vengamukkapalem:**

We selected a land in vengamukkapalem. After selecting, the open area and to dig the soil 25m length, 10m depth and 20m width by using back hoe excavator after place the filter materials like coarse aggregate in first layer of ditch and second layer is fine aggregate sand is placed in case of back hoe excavator the hoe arrangement is on back side and loader bucket

is arranged in front of vehicle. So two operations digging and lifting is done by hoe and loader. Back hoe excavator is used in now a day because of small size and versatility. This is moved with the help of wheels. So, moving from one workstation to another is quickly done.

In vegamukkapalem there are total 400 houses in that 300 pakka houses, 100 kacha houses, in whole village we arrange the pipe line system to collect the rain water from roof tops and surface runoff. This collecting water passing through the pipes to ditch after this water pass through filter bed to ground. This filter bed is used for to reduce the solid waste particles on collecting water, so the ground surface and surrounding area is recharged and to maintain water table constant by using recharge technique and also water recharged in every house by taking a ditch in their ground areas. To dig the soil up to the 2.5m length/ 2.5m width and 2m depth for ditch by using man made tools like crow bar, spade, hoe. In this small ditches we can provide filter bed by layer wise the first layer is of coarse aggregate gravel size of 10mm at a depth of 0.3m and second layer is of fine aggregate sand size of 0.5mm at a depth of 0.5m. The rain water passes through the sand layer it separates dust, leaves, soil etc.... from rain water it makes it clean. Then water passes through gravel lawyer which ensures that rain water is not carrying away sand from the upper layer then the water pass easily through the gravel layer of soil and get added to the underground water treasure. This small ditch also recharges the ground.

If rain water source is not available in that case we use waste water to recharge ground through ditch. Waste water can be collected from institutions and industries and it can be treated by using root zone technology. The treated water can pump through ditches with the help of pipes. The water slowly moves to the filter mesh and the surrounding area is recharged. This recharged water we are using for domestic purpose and the water can be treated by using reverse osmosis method for drinking purpose. By using this recharge technique, we can reuse the water and water scarcity is reduced and water table is maintained on proper way. This method is less cost compared to other methods and durability is high. if the water is heavy in ditch, we can easily extend the ditch and without wasting of money.

## **VII. CONCLUSION**

We completed a case study on vengamukkapalem village in prakasam district (AP). in this village scarcity of water because this is drought prone area.so we implement the ditch technique to recharge the ground water.in this we collected the rain water and waste water are passes through the ditch and to recharge ground and surrounding area.

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