Course Code: ESC106A
Course Title: Construction Materials and Engineering Mechanics

Lecture No. 4:
Water Supply, Plumbing and Rainwater Harvesting

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Lecture Intended Learning Outcomes

At the end of this lecture, student will be able to:

- Define plumbing and fittings
- Describe uses of rainwater harvesting
- Explain the methods and components of rainwater harvesting
- Distinguish water supply and sewage

Contents

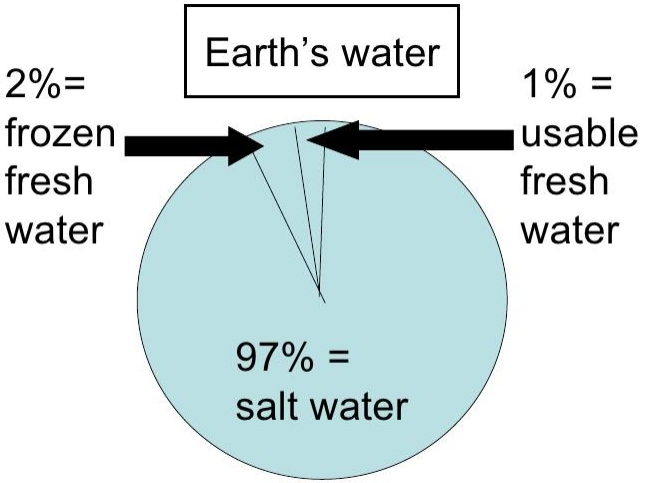
- **Construction materials and technology:**

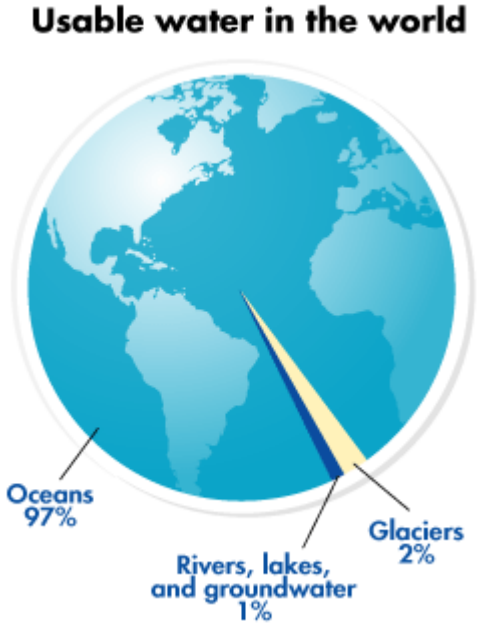
  Plumbing and fittings, water supply and sewage, water harvesting - sources, classification, properties and uses

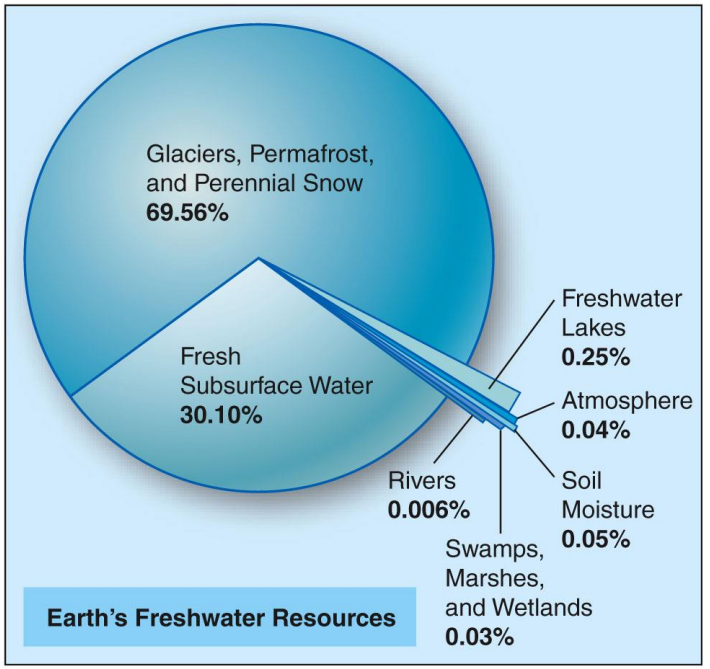
Plumbing and Fittings

A **fitting** is used in pipe plumbing systems to connect straight pipe or tubing sections, to adapt to different sizes or shapes, and for other purposes, such as regulating or measuring fluid flow.

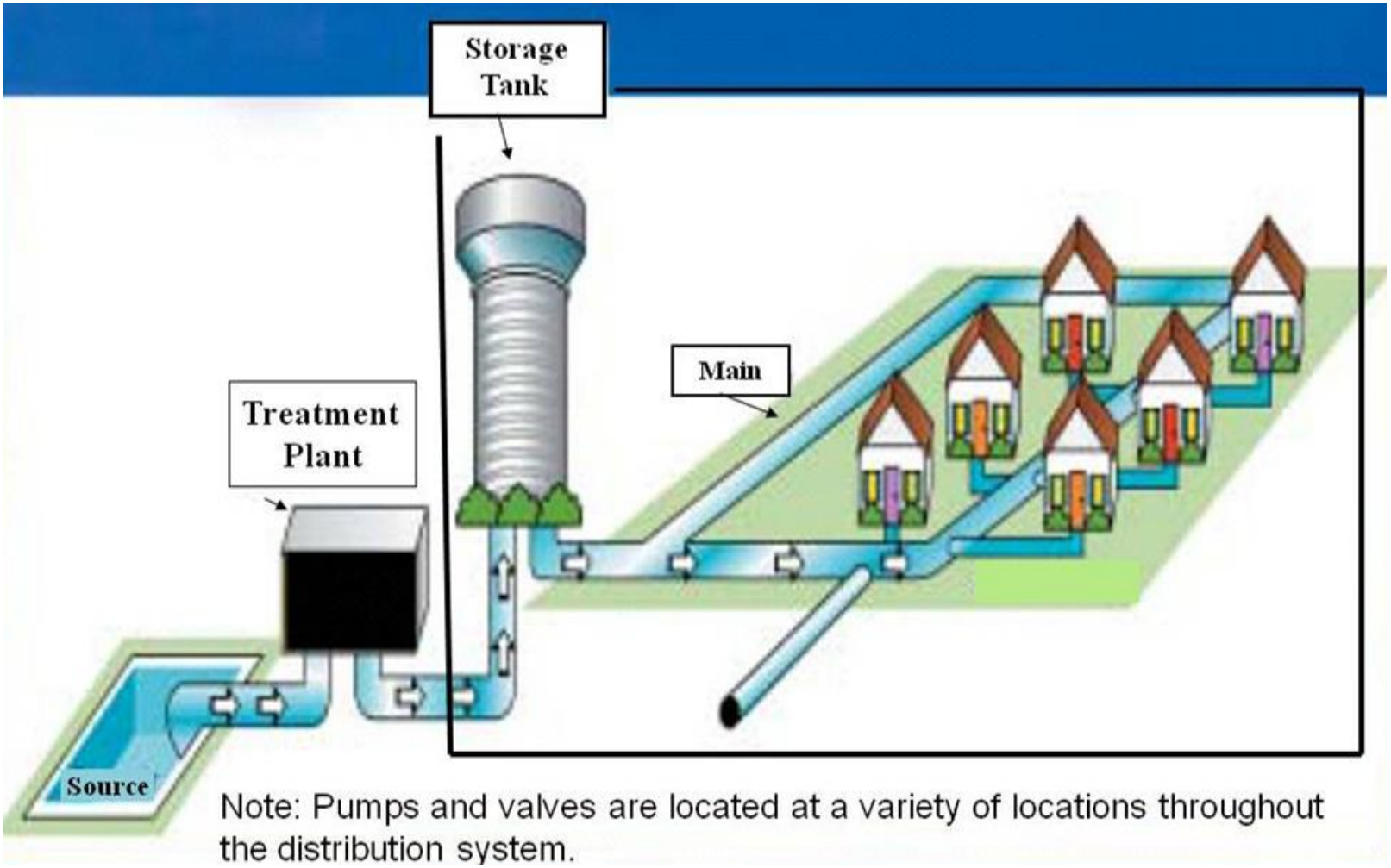
Water Supply







Water Supply Distribution System

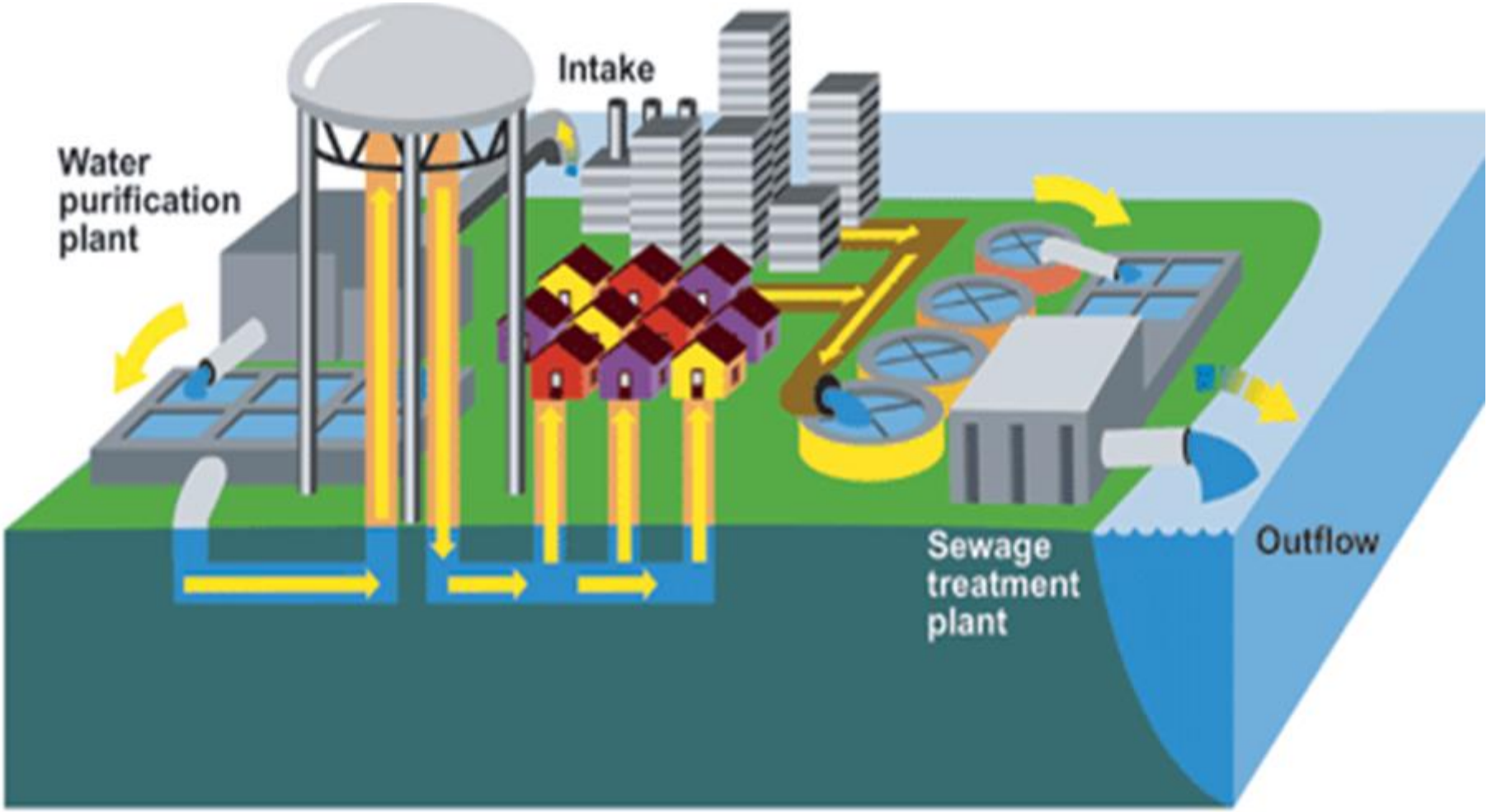


Note: Pumps and valves are located at a variety of locations throughout the distribution system.

Sewage

- Sewage is a mixture of domestic and industrial wastes.
- It is more than 99% water, but the remainder contains some ions, suspended solids and harmful bacteria that must be removed before the water is released into the sea.

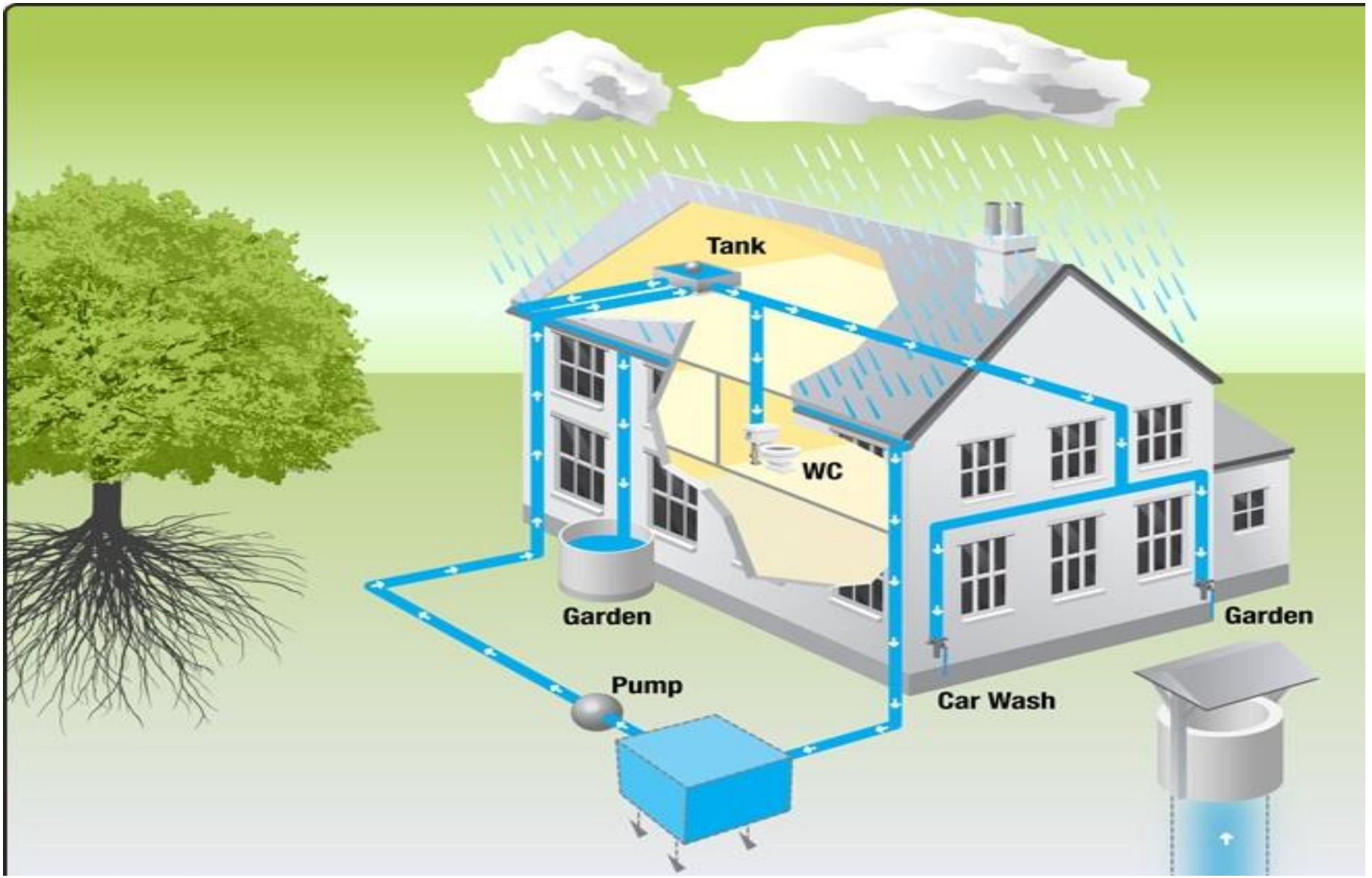
Municipal Water Supply and Sewage Treatment



Rain water harvesting

Rain water harvesting is the process of collecting, conveying and storing water from rainfall in an area

Water Harvesting

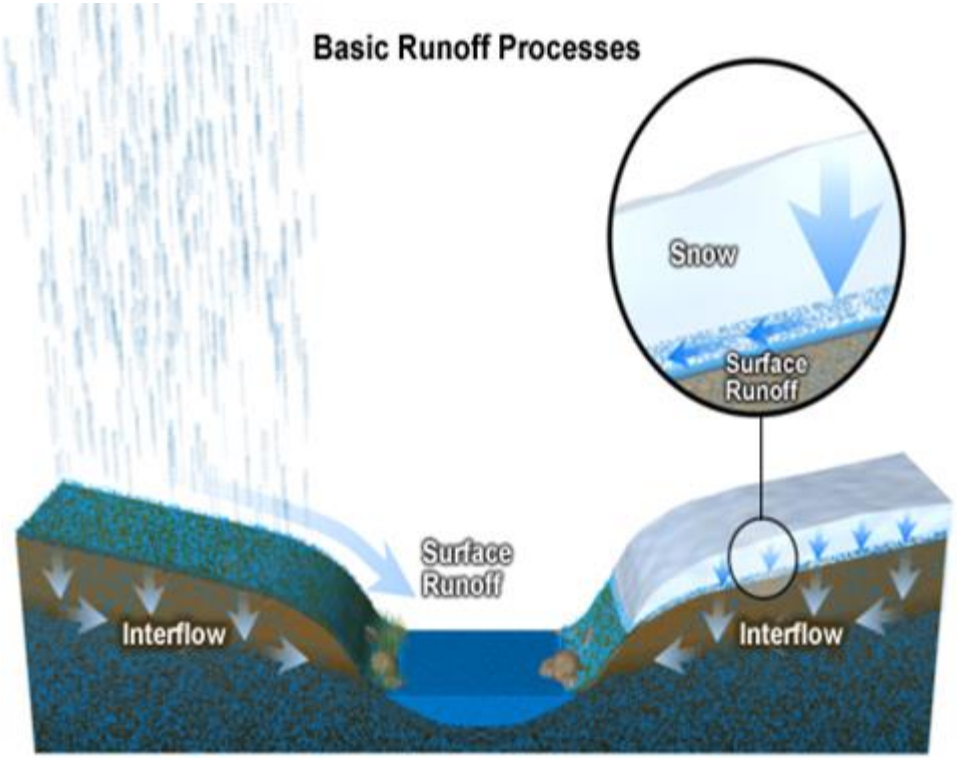


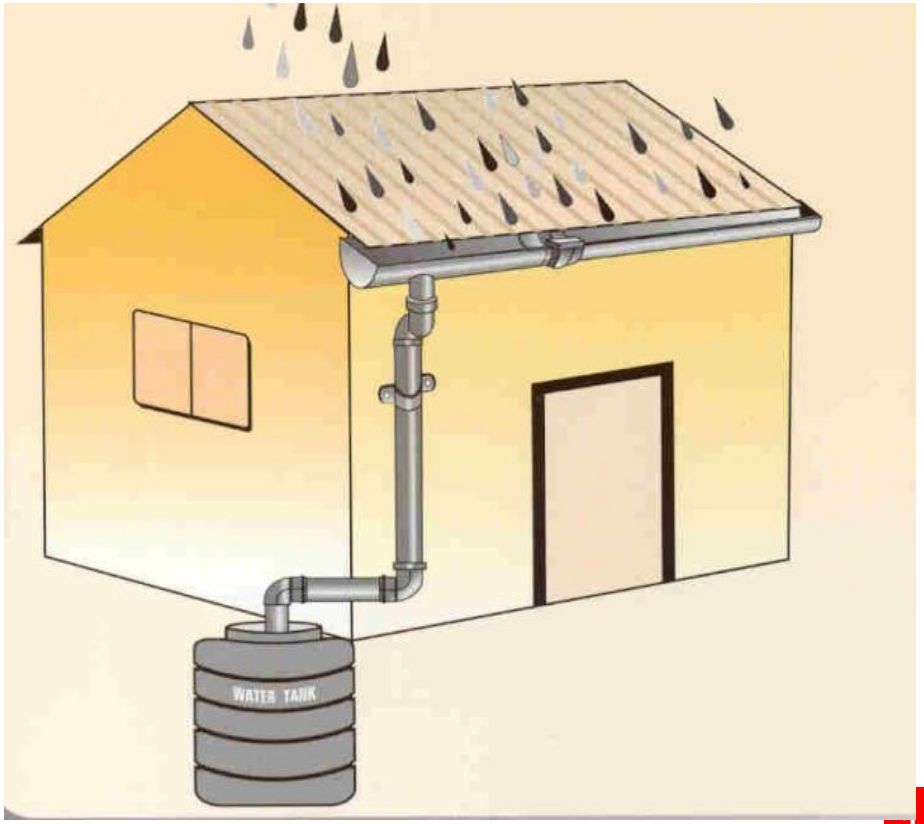
Necessity of Rainwater harvesting

- To increase ground water table
- To beneficiate water quality in aquifers
- To conserve surface water runoff during monsoon
- To reduce soil erosion
- To inculcate a culture of water conservation
- To solve water problems

Classification of Rainwater Harvesting

- Surface Runoff Harvesting
- Roof top rainwater harvesting



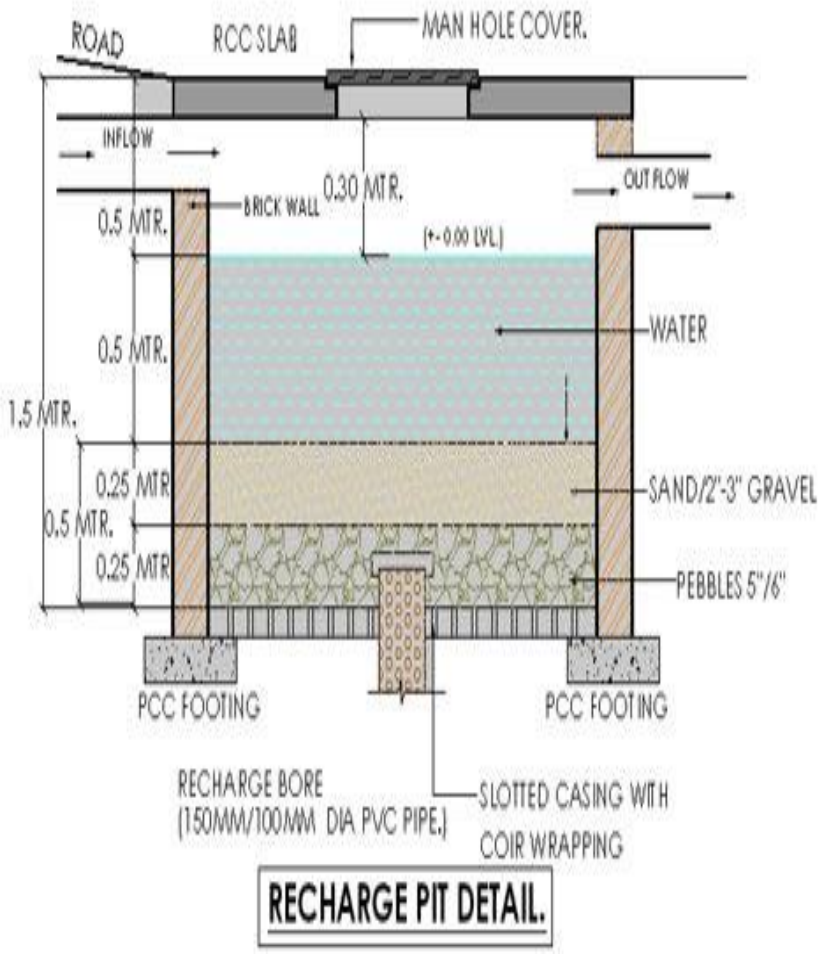


Methods of Roof Top Rainwater Harvesting

- **Storage for direct use:**
  - In this method rain water collected from the roof of the building is diverted to a storage tank.
  - The storage tank has to be designed according to the water requirements, rainfall and catchment availability

Recharging ground water Aquifers

- Ground water aquifers can be recharged by various kinds of structures to ensure percolation of rainwater in the ground instead of draining away from the surface



Advantages of Rain Water Harvesting

- To meet the ever increasing demand for water
- To reduce the runoff which chokes storm drains and to avoid flooding of roads
- To reduce groundwater pollution and to improve the quality of groundwater through dilution when recharged to groundwater thereby providing high quality water, soft and low in minerals
- Provides self-sufficiency to your water supply and to supplement domestic water requirement during summer and drought conditions
- Extracting water is really simple: Open tap- water flows!!!

Advantages of Rain Water Harvesting

- It reduces the rate of power consumption for pumping of groundwater.
- Reduces soil erosion in urban areas
- The rooftop rainwater harvesting is less expensive, easy to construct, operate and maintain
- In saline or coastal areas, rainwater provides good quality water and when recharged to ground water, it reduces salinity and helps in maintaining balance between the fresh-saline water interfaces
- In Islands, due to limited extent of fresh water aquifers, rainwater harvesting is the most preferred source of water for domestic use
- In desert, where rainfall is low, rainwater harvesting has been providing relief to people

Summary

- A fitting is used in pipe plumbing systems to connect straight pipe or tubing sections
- Sewage is a mixture of domestic and industrial wastes
- Rain water harvesting is the process of collecting, conveying and storing water from rainfall in an area
- Rain water harvesting can be classified into surface runoff harvesting and roof top rainwater harvesting