##### **CERTIFICATE COURSE IN WASH**

##### **Course Code: C003**

##### **Module two assessment**

Submitted by: **MALIS WILSON EDWARD**

*Mobile Contact: +256776659984/+256772701053*

*Email:* [*malisilegba@gmail.com*](mailto:malisilegba@gmail.com)

**Answers to question one**:

**Social impressive more onerous to girl’s torture**

In many cultures, girls are expected to walk hours each day to collect water for the whole household. Families prefer to send girls to collect water instead of sending them to school. hence their health, education, and opportunity to earn a livelihood are extremely deprived.

**Refutation.**

girls have the traditional role of collecting water, often from great distances However, in the majority of cultures they are excluded from decision-making, and participation in community consultations as such their specific needs and priorities are not taken into consideration

**Health risks of girls.**

They are in greatest physical contact in the domestic environment with contaminated water and human waste, exposing them to a host of biological pathogens and chemical hazards, when fetching water.

**Physical distress**

Continuous carrying of heavy weights of up to 20 kilograms of water can lead to injuries and long-term damage to backs, joint problems as well as sprains and fractures from falls due to long distances, high raised and slipping grounds at the water sources.

**Life Intimidation**

Girls have many time leaf to do domestic works for collecting water from far distances which have pose their life in danger of been attack by wide animals and sting insects at the water sources.

**Sexual assault**

Girls are many times victims of Sexual abusedwhen the source of collecting water is far and inconveniencing. Men usual ambush and rape girls in the process of fetching water. As such the victims can be traumatic which may lead to schools drop-outs, ectopic pregnancies and spread of STDs &STIs.

**Answers to question two**.

We need an alternative source of water in rural and slum areas because Most of their water sources are more susceptible to sewage or surface-contamination due to old dug wells, septic systems, and too-dense housing.

**Dug and bored Shallow wells**

These wells have a large diameter and expose a large area to the aquifer. These wells are able to obtain water from less-permeable materials such as very fine sand, silt, or clay. they are shallow and lack continuous casting, making them subject to contamination from nearby surface sources, and they go dry during periods of drought if the water table drops below the well bottom.

**Inadequate water yield**

Seasonal fluctuations in ground-water storage which can result from the variations in precipitation that may causes a progressive decline in ground-water levels. During periods of above-average precipitation, the water table may rise close to the land surface and interfere with home construction and waste disposal.

**Quality of Water/Salt contamination**

Salt contamination is difficult and expensive to remedy. Most well draws saline water from a freshwater aquifer at lesser depth. Salt is readily soluble in water and runs off highways into lakes, springs rivers and streams and percolates to the water table.

Also the stockpiling of uncovered salt and sand mixtures. This practice produces concentrated saltwater runoff that percolates to underlying aquifers and nearby wells. Many stockpiles are within small villages or slum areas where nearby domestic wells can become contaminated.

**Bacteria**

The most common water-quality problem in rural and slum areas water supplies is bacterial contamination from septic-tank effluent. Septic-tank effluent that enters the aquifer supplying the water sources introduces bacteria and other contaminants. Many rural and slum homeowners also discharge other waste products, including toxic material, into their septic systems, and these products gradually accumulate in the aquifer. Supplying water to wells.

**Farmyard runoff**

The most serious water-contamination problem in rural and slum areas homes is from farmyard waste. If the farmyard is upslope from the well, farmyard waste that infiltrates to the aquifer may reach the water sources. Also the common farming practice of applying fertilizers and pesticides to croplands immediately adjacent to the farmyard. Residue from these applications can infiltrate to the aquifer and can be drawn into a water sources.

**Housing location:**

Most slums locations are in lowland which are waterlogged and would receive effluent from the uphill side plus any contamination generated along the road, laundries, auto-repair shops, and industries that discharge wastes.

**Options are available:**

**Rainfall harvesting**

Rainwater harvesting is an important source of water supply for domestic purposes, especially in rural and slum areas

The application of an appropriate rainwater harvesting technology can provide a source of water at the point where it is needed which is owner operated and managed. Rainwater harvesting has been practiced for more than 4, 000 years in most developing countries, the technology is flexible as the systems can be built to meet almost any requirements, Poor households can start with a single small tank and add more when they can afford them.

Rainwater harvesting is necessary in areas having significant rainfall but lacking any kind of conventional, centralized government supply system, and also in areas where good quality fresh surface water or groundwater is lacking.

**Boreholes/production wells:**

Boreholes are wells constructed by rotary-drilling machines. These wells draw water from deeper aquifers with an acceptable yield that can cater for estimated 300 people per installation. **Submersible** pumping unit is placed then water is pumped to an elevated storage and then distributed through pipe line to yard taps and public post.

**Decentralized safe water systems**

Decentralized safe water systems can be deployed at either the household or community level in the rural and slum areas. Various water treatment technologies from chlorine and UV disinfection to ceramic filtration to simplified coagulation-flocculation that can purify enough water to meet the drinking water needs of a single family. These small-scale systems are typically owned and operated by individual households.

**Hauled water system/vendors**

These systems comprise of water tanker, water vendors who can collect potable water from a clean and treated water sources that are certified and distribute to local in rural and slum areas at affordable cost. also Water from this tank can be pumped into a pressure tank/elevated tanks of certain quantity and into public distribution system.

**Question 3** (**the process of harvesting rain water in rural areas**)

A rainwater harvesting system consists of three basic elements:

1. **Catchment area**

The collection area in most cases is the roof of a house or a building. The effective roof area and the material used in constructing the roof influence the efficiency of collection and the water quality.

1. **Conveyance system**

A conveyance system usually consists of gutters and pipes that deliver rainwater falling on the rooftop to cisterns and other storage vessels. Both drainpipes and roof surfaces should be constructed of chemically inert materials such as wood, plastic, aluminum, or fiberglass, in order to avoid adverse effects on water quality.

1. **Storage facilities**

The water ultimately is stored in a storage tank or cistern, which should also be constructed of an inert material. Reinforced concrete, fiberglass, or stainless steel are suitable materials. Storage tanks may be constructed as part of the building, or may be built as a separate unit located some distance away from the building.

Additionally, all rainwater tank designs should have a minimum requirement like

* Solid secure cover,
* Coarse inlet filter,
* An overflow pipe
* Manhole, sump, and drain to facilitate cleaning
* Soak away to prevent spilled water from forming pools near the tank
* Device to indicate the amount of water in the tank
* Sediment trap, tipping bucket, and
* lockable tap.

**Question 4 (Explain how community water catchment areas are protected in rural areas from extinction and from contamination**)

Rural community usually protect their water catchment areas from hazards such as floods, pollutions/contamination from human activities and damages.

Springs are protected from flooding and storm run-off pollution by constructing a deep diversion ditch above and around the spring. The ditch collects storm water running towards the spring and diverts, it away.

Wells are protected against flood damage by providing a sloping surface around the well for drainage and raising the head wall high enough with cover slabs and the outside of the wells and springs are sealed to block surface run-off.

Where the existing source is an open, unprotected well, it can be improved by sealing the walls and providing a cover, to seal the well, earth is excavated all-round the existing well and reﬁlled with clay that has been thoroughly mixed with a little water and sand to the consistency of a thick paste, which is then compacted into position.

The surrounding areas are fenced to protect it from animals and reduce the risk to trample and defecate contaminating drinking-water. Fencing maintained and demarcate the human and animal watering places and protect the water supply public access to the most prohibited areas.

Trees and shrubs can be planted around catchment to limit the entry of windblown materials and dust to protect water quality by providing buffer zones of pristine bushland around water source and immediate catchment areas.

the community health committee, environmental health and the primary health-care workers can socially established rules that are culturally acceptable by the community to coordinate and governed the catchment areas.

Human activities near the [drinking water catchments](https://www.waternsw.com.au/supply/Greater-Sydney/system) that can harm water quality are restricted

Activities like cutting trees/bushfires, farming, horse riding, trail biking, camping and four-wheel driving can lead to erosion.

The community can social adopted and established rules to segregate water uses (drinking, bathing, livestock watering) in terms of both time and space to reduce water pollution from human and animals accessing the local water source.

**Question 5 (why it is unwise for drinking water to be in contact with sewerage)**

One requirement of drinking water is that it should be completely free of pathogenic micro-organisms that can cause diseases and yet many Disease-causing germs can be spread from sewage if it is not disposed properly. If a sewerage disposal system is not **properly maintained** it will not be able to get rid of the sewage safely. Hence water lines which are laid in close proximity or in contact with sewage can be highly deteriorated.

pressure different in the drinking water lines due to Frequent power outages and inadequate supply relative to demand may result in low flow rates and low pressure, whereas flow rates and pressure are consistently high in sewerage lines. Hence very higher chances of seepage profusely and recontamination of drinking water.

**Question 6 (types of sewerage system discussed and their applicability)**

Sewerage is the system by which sewage is carried point from individual houses, industries and institutions and transporting it to a common point where it can be treated as per the needs before disposal.

It may be classified into the following three types:

**Separate system.**

In this system two sets of sewers are provided, one for carrying domestic or sanitary sewage and industrial sewage, and the other for carrying storm water. The sewage from the first set of sewers is carried to the treatment plant, and the storm water from the second

set of sewers is directly discharged into a natural stream without any treatment.

**applicability of separate system**.

**Separate Outlets for Sewage and Storm Water**

The separate system can be justified when domestic sewage and industrial sewage is to be collected and conveyed to a particular point for treatment and there is a separate outlet in the form of a natural stream or river for the disposal of storm water.

**Pumping Requirement:**

When it is necessary to pump domestic sewage and industrial sewage, adoption of this system will reduce the load on pumps.

**Limitations of Available Funds:**

If sufficient funds are not available in the beginning, sewers may be constructed to carry only domestic or sanitary sewage and industrial sewage, and the storm water (or rain water) may be conveyed through open drains. These drains can be converted into regular sewers later when additional funds are available.

**Flat Topography:**

If the area is flat, the sewers will have to be laid at a certain depth below the ground surface in order to achieve the required gradient. In such cases separate sewers are more economical

**Gradient of Sewers:**

If it is not possible to lay sewers at suitable gradients, there is a danger of backing up of sewage into the houses. Under such circumstances, it is desirable to adopt separate system.

**Subsoil Condition:**

If the subsoil is hard, it would be difficult and costlier to lay combined sewer which is usually of large size. Thus in such cases separate system would be preferable.

**Combined System**:

In this system only one set of sewers is provided for carrying domestic sanitary sewage and industrial sewage as well as storm water. Thus in this case sewage and storm water are carried to the sewage treatment plant before its final disposal.

Applicability

The combined system is applicable in areas which have a small rainfall and scattered evenly throughout the year and in the towns where quantity of the sewage is small. In such places self-cleaning velocity will be available almost in all the sections.

**Pumping Requirement:**

When it is necessary to pump domestic sewage and industrial sewage as well as storm water combined system may be adopted.

**Restriction of Space:**

When space available for laying sewers is restricted, it is desirable to lay a combined sewer.

**Partially Separate System:**

In this system domestic sewage and industrial sewage, and the storm water which is drained from back yards and roofs of houses are carried in the same set of sewers, while the storm water drained from house fronts as well as from streets and roads is collected and conveyed in a separate set of open drains.

The sewage and storm water carried by the sewers is usually delivered to a sewage treatment plant, and the storm water carried by the open drains is delivered to a natural stream for disposal.

Applicability

The combined system is applicable in areas which have a small rainfall and scattered evenly throughout the year and in the towns where quantity of the sewage is small. In such places self-cleaning velocity will be available almost in all the sections

**Pumping Requirement:**

When it is necessary to pump domestic sewage and industrial sewage.

**Question 7 (the considerations that one has to bear in mind before choosing a particular sewerage system)**

there are several factors which govern the choice of the sewerage system. Thus each type of sewerage system to be adopted should be carefully studied.

**Maps, Town Plans and Drainage Records**

Government regularly publishes maps and town plans from which information can be extracted on land use and the topography of catchment areas.

**Site investigations**

Good site investigation practice and Guide to Rock and Soil Description for guidance on the description of rocks and soils should be considered.

**Hydrographic studies**

Hydrographic studies should be carried out to provide information for the

determination of submarine sewage outfall locations and the design of diffusers. These comprise the collection of data on water depths, tides, current, salinity and the temperature gradient of the water column.

**Capacity**

A sewer is subjected to a wide range of flow conditions. It must have sufficient capacity to cater for the designed peak flow. On the other hand, it must also minimize the deposition of solids under low flow conditions.

**Alignment**

The designer should check carefully whether the alignment of sewer will be

obstructed by other utilities This is especially important if the sewer is deep, or is to be laid along a steep carriageway, a heavily trafficked carriageway, a single-lane one-way carriageway, and so on. The traffic authority shall be consulted to ensure that an acceptable traffic scheme for sewerage construction can be worked out.

**Minimum Pipes Size**

To facilitate inspection and cleaning, pipes of diameter less than 200mm should normally not be used as sewers unless agreed by the operation and maintenance agents.

**Pipeline materials**

Choice of Pipe Material factors should be taken into account in selecting the type of pipe for a

hydraulic design, gravity or pressure flows, structural design: crushing test strengths and pressure ratings in the case of pressure pipelines that are available.

**Pipe Joints**

Most of the pipes supplied by the manufacturer have their own design of joint. In the past many pipe joints were welded, bolted or made by caulking with cement mortar or run lead. These joints allowed no movement of the pipes after laying. Any movement of the pipeline resulting from ground settlement, or of differential settlement between the pipelines and the structure, highly stresses the pipe and joints, leading to fracture and joint leakage.

**Community Physical Factors**

**Community density,** these systems are not suitable for high density settlements, since high density poses danger in terms of wells for drinking water and sanitation facilities to be close together

**Access to Water Supply and Levels of Service**

The types of water services in a given community can be hand-carried supplies, yard taps or in-house connections. These levels categorize the different sanitation options. circulation and access networks, and available services within the community influence the selection of sewerage systems.

**Social and Cultural Factors**

Sanitation systems, even when they are properly designed, may not be appropriate when social and cultural factors affecting sanitation and hygienic practices of the community members are not considered. For instance, technologies involving re-use of excreta are unfeasible in communities where sight or handling of waste is culturally and socially unacceptable.

**User Hygienic Practices**

The material used for anal cleaning affects the choice of sewerage systems. In the sanitation such as the composting toilets, do not allow the use of water. When water is used for anal cleaning in pit latrines built in low-permeable soil, poor percolation and water logging occurs.

**Site Specific Environmental Factors**

The environmental factors are the key determinants for considering the types of sewerage system for communities. These factors, which include the condition of surface water and soil conditions

**Question 8 (how the water distribution system can be a source of diseases to the water cycle and how it can be reversed)**

Even so, on infrequent occasions, operational inadequacies result in the recontamination of treated water

during distribution, resulting in outbreaks of various infectious waterborne diseases

Even where centralized systems do exist, inadequate institutional resources at the municipal level may give rise to ongoing problems Treated water from plants may be of adequate quality water is readily decontaminated during distribution. Frequent power outages and inadequate supply relative to demand result in low flow rates and low pressure in water distribution lines, whereas flow rates and pressure are consistently high in sewerage lines. The high pressure and compromised containment in sewerage lines leads to the abundant contamination of the subsurface with sewage, while chronically low pressure and the dilapidated condition of water distribution lines result in the widespread ingress of sewage-contaminated groundwater. Ultimately, the water arriving to the urban consumer is unfit for consumption. Also Uncovered or broken tanks which allow to escape mosquitoes to breed, meaning that disease-causing germs and parasites can be allowed in and people are exposed

**Question 9 (how the distribution system of water in an urban center should take care of hydrants)**

**Hydrants**

Hydrants are primarily part of the firefighting aspect of a water system. Proper design, spacing, and maintenance are needed to insure an adequate flow to satisfy fire-fighting requirements. Fire hydrants are typically exercised and tested annually by water utility or fire department personnel. Fire flow tests are conducted periodically to satisfy the requirements of the Insurance Services installed in areas that are easily accessible by fire fighters and are not obstacles to pedestrians and vehicles. In addition to being used for firefighting, hydrants are also for routine flushing programs, emergency flushing, preventive flushing, testing and corrective action, and for street cleaning and construction projects

**Fire Flow Provision**

In particular, the universal application of automatic sprinkler systems provides the most proven method for reducing loss of life and property due to fire, while at the same time providing faster response to the fire and requiring significantly less water than conventional fire-fighting techniques. There is a growing recognition that embedded designs in most urban areas have resulted in distribution systems that have long water residence times due to the large amounts of storage required for firefighting capacity. They hypothesized that eventually the drinking water industry would be in conflict over protecting public health and protecting public safety.

Fire hydrants are a familiar sight, we should all be aware of the importance of each hydrant to the community not only for firefighting, but also for operation and maintenance of the water system.

Because they are so important, the fire hydrants Water Works distribution system should receive a lot of attention. Each public fire hydrant receives regular maintenance on a three-year rotating schedule.

In addition, each year in each fire hydrant is inspected to ensure it is not holding water that could freeze and to confirm that it has not been hit by vehicles or damaged in some other way.

Keep cars, bikes, toys and other objects away from fire hydrants at all times.

During winter months, shovel snow away from fire hydrants.

Flushing the water system through our Fire Hydrants on a routine basis removes sediment from lines and keeps the entire distribution system refreshed.

**Answers to question 10 (the uses of storage tanks)**

**Provision of storage facility**

Storage tanks can store of both [potable](https://en.wikipedia.org/wiki/Potable) water for consumption, and non-potable water for use in agriculture. Municipal water can be directed to a water tank before entering the building and kept full as an emergency supply back-up of drinking water in case of water supply cuts. however, they cannot supply the water for a long time without power, because a pump is typically required to refill the tower. A water tanks also serves as a reservoir to help with water needs during peak usage times. The water level in the tower typically falls during the peak usage hours of the day, and then a pump fills it back up during the night.

**provide steady pressure**

water tanks can provide stable pressures in the distribution system. water can be pumped and stored in elevated water tanks and [hydrostatic pressure](https://en.wikipedia.org/wiki/Hydrostatic_pressure) produced by elevation of water and due to [gravity](https://en.wikipedia.org/wiki/Gravity) can push the water into domestic and industrial water distribution systems of varying heights, according to pressure requirements

**Treatment facility.**

Water tanks can be used as a primary point of treating borehole/dam/river water and then tested for pot ability before allowing it to enter the mains supply lines.

**Safety**.

Water tanks keeps treated water safe for intended purpose from recontaminations against animals and human actions and environmental pollutions.

**Reference**

1. The Right to Water and Sanitation a practical guide.
2. CED (1992). The Port Works Manual. Civil Engineering Department, Hong Kong Government.