SNDT Women's University

Shreemati Nathibai Damodar Thackersey Women's University

AQAR 2020-21

Criterion VII

Supporting documents

For

7.1.4- Water conservation facilities available in the Institution:

INDEX 7.1.4

Water conservation facilities available at the institute

1. Rain water harvesting:

Brihan Mumbai Mahanagarpalika is supplying water for drinking and flushing purpose only. However due to increase in demand and shortage in the no. of reservoirs it will not be possible to provide entire water in next few years. As per standards, it is necessary to supply 180 litres of water for residential premises. However corporation can supply only 135 litres water as on today. The supply will be brought down to 90 litres within 2 to 3 years. According to BMC, Mumbai's present water demand, 4200 MLD (Million Litres Daily) is expected to rise to 5400 MLD by 2021, today the water supply being only 3400 MLD. It will not be very long for Mumbai to come in line with Delhi, Bangalore or Chennai cities which get water every alternate or third day. As surface water sources fail to meet rising demands, ground water reserves are tapped, often to unsustainable levels. Almost all cities depending on ground water are faced with rapid depletion of their water tables. In addition to quantity, the cities also faced problems of water quality

Main reason for loosing potable water from existing sources is linked with the development in Mumbai. Concretization of Mumbai to reduce problems of traffic has lead to such terrific situation. Mumbai has an annual rainfall of 2100 mm.

With an area of 437 sqkm can harvest approximately 964.40 Billion liters annually. This amount can meet water requirement for 300 days for the entire city.

LOCATION

The plot is located at SNDT WOMEN'S UNIVERSITY1,NATHIBAI THACKERSEY ROAD CHURCHGATE, MUMBAI-400020.

PLOT

The area of plot is 6000Sqm. Proposed university building is of Stilt + 8 storied . Total gross built up area of the building is 2600Sqm. The plot is fairly level. The plot will be paved and slope will be provided towards storm water drainage. All the roof top water & surface water will also direct in the same way

Rain water harvesting system at SNDTWU, Churchgate Campus

Rain water harvesting system at SNDTWU, Churchgate Campus

Maintenance of water bodies and distribution system in the campus

RAINWATER HARVESTING SYSTEM FOR SNDT WOMEN'S UNIVERSITY.1,NATHABAI THACKERSEY ROAD, CHURCHGATE, MUMBAI-400020.

Brihan Mumbai Municipal Corporation is founded in 1888 by BMC Act. It is now over 120 years since formation. There are many improvements in Mumbai as well as in BMC since then. The area is extended from city to extended suburbs. Population has gone multiple times. Only thing that has not changed much is the reservoirs for Mumbai. There is addition of hardly two reservoirs post independence where as one of the reservoirs has rendered un-useful for drinking water purpose. There is already shortfall in water supply by BMC. It is therefore Rain Water Harvesting is introduced by Brihan Mumbai Mahanagar Palika in Mumbai for plot area more than 300 m2. It is obligatory to provide the arrangement for rain water harvesting.

NEED

Brihan Mumbai Mahanagarpalika is supplying water for drinking and flushing purpose only. However due to increase in demand and shortage in the no. of reservoirs it will not be possible to provide entire water in next few years. As per standards, it is necessary to supply 180 litres of water for residential premises. However corporation can supply only 135 litres water as on today. The supply will be brought down to 90 litres within 2 to 3 years. According to BMC, Mumbai's present water demand, 4200 MLD (Million Litres Daily) is expected to rise to 5400 MLD by 2021, today the water supply being only 3400 MLD. It will not be very long for Mumbai to come in line with Delhi, Bangalore or Chennai cities which get water every alternate or third day. As surface water sources fail to meet rising demands, ground water reserves are tapped, often to unsustainable levels. Almost all cities depending on ground water are faced with rapid depletion of their water tables. In addition to quantity, the cities also faced problems of water quality. Dug wells or bore wells are expected to supply only salty water. The wells or bore wells, which cater for today's needs, are gradually loosing the water quality as potable water. The reason being ingress of sea in soil water which is increasing gradually. The solutions are required to be worked out. So Save Water today. Water will save you tomorrow.

REASONS

Main reason for loosing potable water from existing sources is linked with the development in Mumbai. Concretization of Mumbai to reduce problems of traffic has lead to such terrific situation. Mumbai has an annual rainfall of 2100 mm. However the rate of recharge of ground water is limited because more and more permeable soil surface are being converted into concrete roads & pavements. This poor recharge rate combined with heavy extraction has led to a sharp fall in water table in many areas. All the storm water is drained through SWD and nallahs to sea. This concrete has reduced percolation of water in to the soil and thereby reduced the quantity and quality of sub soil water. It is thus necessary to find out the ways to improve this water quality and quantity. Rain water harvesting has a huge potential in Mumbai. With an area of 437

sqkm can harvest approximately 964.40 Billion liters annually. This amount can meet water requirement for 300 days for the entire city.

ADVANTAGES

1. Provides self-sufficiency at least reduce load on water supply.

2. Reduces the cost for pumping of ground water as it raises GWT.

3. Provides high quality water, soft and low in minerals.

4. Improves the quality of ground water through dilution when recharged to ground water.

5. Reduces soil erosion in urban areas.

6. The roof top rainwater harvesting is less expensive.

7. Rainwater harvesting systems are simple which can be adopted by individuals.

8. Roof top rainwater harvesting system is easy to construct, operate & maintain.

9. In saline 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 interface.

METHODS

The methods for harvesting rainwater are commonly referred to as "Rain water harvesting". There are two approaches to harvest water, storing of water for direct use or recharging of ground water. Water in the ground is stored in the interstices (interparticulate spaces) of the soil or rock that forms the earth. In rain water harvesting, water is collected from roof tops and taken to the aquifers after necessary treatment like filtration, sedimentation. If it is not possible to charge the aquifers, the water can be let in the soil alongwith surface storm water to improve the ground water. Due to concretisation, there is ingress of sea water in soil. The rain water harvesting will repel the sea water. Since recharging of ground water is more feasible for the cities like Mumbai, more attention has to pay for ground water recharging aspects of water harvesting. It simply means catching and holding rain where it falls and using it. Your groundwater will be recharged. But as groundwater moves, your neighbourhood will gain too. So for best results, get all your neighbours to become rainwater harvesters as well.

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NECESSARY DATA

The data required is of two types

1. Requirement of water and availability of water

2. Properties of soil

1. Requirement of water

It is necessary to have adequate knowledge of requirement of water to be arranged through rain water harvesting. All the requirements other than drinking & bathing can be relied on rainwater harvesting. Having total 800 Students and office staff, water requirement as per norms is 800 X 135 i.e. 108000 litres/day. Out of this drinking and bathing water will be about 800 X 90 i.e. 72000 litres/day. Therefore, 36000 litres/day of water from rainwater harvesting can be relied upon. For other water, sullage recycling will be advisable.

2. Properties of sub-soil

It is necessary to have adequate knowledge about the various layers of subsoil along with their physical, engineering and chemical properties. The physical and engineering properties will decide the design of the various structures for the rainwater harvesting whereas the chemical properties will decide the usefulness of water for charging aquifer through soils. DATA AVAILABLE As on today, no data is available. The designs are therefore based on the roof top water, which can be used for storage and surface water flowing on pavement, directly to be used for percolation in soil.

WATER AVAILABILITY

Average annual rainfall in Mumbai is 2100 mm. Total run-off from entire plot will be about 12,60,0000 liters every year. Runoff from terrace of the building will be about 54,60,000 liters every year. It is proposed that the part of water from terrace can be used for storage & water from surface runoff is to be used for percolation in soil.

DESIGN

The water from rooftop can be collected through rain water down takes, gully traps and underground pipes. The same shall be passed through sedimentation tank, filtration chamber & then connect to underground ring well storage unit. The pipes are connected to ring well storage unit through filtration arrangement as shown in drawing. This water can be use for non potable

purposes during monsoon period. For surface run-off on open spaces around building, water can be harvested through percolation trenches.

COLLECTING SYSTEM

For this plot, catchments will be terrace, paved & unpaved surfaces etc. All the down takes pipes are already fixed. Now at the Ground level, for the rain water down take pipe, a gully trap shall be provided. These shall be connected with inspection chambers. The water collected from the down takes to inspection chambers will then be taken to sedimentation tank & then be taken to ring well storage unit after passing through the filtration chamber provided. First flush device should be provided to rain water pipe bottom to prevent leaves, plastic bags, paper pieces & debris from entering the system. Also, provide mesh filters at the mouth of rain water pipes. For surface run-off on open spaces around building, water can be harvested through percolation trenches. Water flowing on pavement area can be directed to percolation trenches forpercolating in the soil. Sedimentation tank Sedimentation tank 0.60m X 0.60m X 0.75m depth, clear dimensions shall be provided. Filtration chamber Filtration chamber 0.60m X 0.90m X 0.90m depth, clear dimension shall be provided before ring well storage unit. The filtration chamber will have layers as given below: Layers from top - First Layer 0.15m thickWashed, cleaned fine sand Second Layer 0.30m thick Washed, cleaned pebbles /stone aggregate 20mm size Third layer 0.30m thick Washed,

cleaned Gravels / stone aggregate 40mm size Ring well storage unit Ring well storage unit of size 1.50 m diameter, 6.00 m depth shall be provided. Percolation trench Percolation trench of 0.90m X 1.50m X 2.30m depth, clear dimensions shall be provided. The percolation trench will have layers as given below: Layers from top - First Layer 0.20m thick Washed, cleaned fine sand between 1.5 to 2 mm Second Layer 0.40m thick Washed, cleaned coarse sand Third Layer 0.40m thick Washed, cleaned pebbles /stone aggregate 20mm size Fourth layer 1.00m thick Washed, cleaned Gravels /stoneaggregate40mm size The layers will be separated with fibre mesh. Percolation trenches should be of brick masonary wall 150 / 230mm thick, cement mortar plastered. Perforated concrete slabs shall be provided on the trenches.
Rainwater flowing on pavement can be percolate in soil through percolation trenches. There shall be 10'- 0" deep bore for accelerating the percolation rate.

DO'S AND DON'TS

Harvested rain water is used for direct usage or for recharging aquifers. It is most important to ensure that the rainwater caught is free pollutants. Following precautionary measures should be taken while harvesting rain water, Roof or terrace uses for harvesting should be clean, free from dust, algal plants etc. Roof should not be painted since most paints contain toxic substances and may peel off. Do not store chemicals, rusting iron, manure or detergent on the roof. Nesting of birds on the roof should be prevented. Terraces should not be used for toilets either by human beings or by pets. Provide gratings at mouth of each drainpipe on terraces to trap leaves, debris

& floating material. Provision of first rain separator should be made to flush off first rains. Do not use polluted water to recharge ground water.
Ground water should only be recharged by rainwater. Before recharging, suitable arrangements of filtering should be provided. Filter media should be cleaned before every monsoon season.

PRECAUTION

It is necessary to maintain the terrace, pavements, R.G area & other plot area clean, avoid dumping of any waste material in the premises & there should not be any leakages from sewage network in the ground to avoid contamination of ground water. The sewage inspection chambers should be carefully constructed & plastered to eliminate possibility of leakages. The rainwater harvesting structures shall be constructed such that no dampness is caused in any part of the walls or foundation of the building or those of an adjacent building. Rainwater harvesting structures shall be situated as not to endanger the stability of building or earthwork. The water collected / recharged shall be used for non-drinking and non cooking purpose.

LIMITATIONS

The report is limited for rainwater collected from rooftop & surface runoff flowing on pavement area. For Swami Samarth Enterprises**.**