

REPORT ON RAINWATER HARVESTING PROJECT PROPOSED FOR
CENTRAL RAILWAY SCHOOL & Jr. COLLEGE KALYAN (W)

REPORT ON ROOF TOP RAIN WATER HARVESTING PROJECT
FOR
CENTRAL RAILWAY SCHOOL & Jr. COLLEGE KALYAN (W)
Murbad Road, Kalyan (w)-421301. Dist. Thane. Maharashtra.

Phase-1 & 2

A Report Prepared
BY

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May 2019

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CENTRAL RAILWAY SCHOOL & Jr. COLLEGE KALYAN (W)

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RAINWATER HARVESTING

1) INTRODUCTION

The increasing demands for water in Kalyan have brought forward the realization that the underground reservoirs formed by the aquifers constitute invaluable water supply sources as well as natural water storage facilities.

The planned augmentation of water storage in the ground water reservoirs by Suitable Rain Water Harvesting techniques are useful for reducing over-draft, conserving surface runoff and increasing available water supplies.

Recharge to water sources may be incidental, when it is a bi-product of normal land and water utilization measures and planned when the work is carried out with the sole objective of augmenting ground water storages to improve water availability or water quality, reduce impact of floods or preventing/stopping sea water intrusion.

Ground water recharge techniques have been developed world over through large number of experimental projects. Whereas the aim of majority projects was to augment water sources which will benefit the water quality, conserving surface water.

Scheme for Rainwater Harvesting has three components:-

- (i) Augmentation for source water.
- (ii) Well-designed structures to transfer the source water into the undergroundwater reservoir.
- (ii) Action Plan to use the stored ground water by suitable means.

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GUIDELINE FOR PLANNING OF THE SCHEME:-

- (i) In general Rock formations are of volcanic origin (Basaltic Rocks) with secondary porosity and permeability. Low permeability reduce intake rate whereas high permeability do not allow retention of recharged water for a longer time to make use of it during dry season.
- (ii) Augmentation of Ground water sources are most preferred conservation measure as they need very little maintenance. They are free from contamination. In addition the evaporation losses are minimal and the environmental problems arising out of water stagnation under the schemes are avoided.
- (iii) In the area under scheme Average Annual Rainfall is 2500 mm. Availability of rainfall water from the roof tops of CENTRAL RAILWAY SCHOOL & Jr. COLLEGE KALYAN (W) Murbad Road, Kalyan (w)-421301. Dist. Thane. Maharashtra is high. The quantity of Rainwater used under Rainwater Harvesting will not only increase ground water availability but will also help to overcome the problem of disposal of storm runoff.

2) OBJECTIVES :-

The objectives of Rainwater Harvesting scheme:

1. To utilize rooftop and rainwater for recharging existing bore well during rainy season.
2. To augment the ground water sources.
3. Conserving water in sub-surface, improving soil moisture retention for longer period to facilitate plant growth.
4. To conserve the ground water at the point of use.
(This is particularly suited to hard rock areas.)
5. To prevent saline intrusion in coastal aquifers.
6. To spread awareness amongst students and citizens for water Conservation.

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**3) GEOLOGICAL CONSIDERATIONS FOR RAINWATER HARVESTING
TO AUGMENT GROUND WATER STORAGE.**

Basaltic rocks of volcanic origin cover Thane District. Basaltic Rocks popularly known as Deccan Trap consist of vast pile of lava flows lying over one another and include other volcanic products as tuffs, breccias, ashbeds and sedimentary intertrappean deposits formed during the period of quiescence between two lava flows.

The lava flows have generally two distinct horizons –massive and vesicular basalts. The massive part is hard and compact whereas the vesicular part is characterized by vesicles filled with secondary minerals. The massive traps are fractured and jointed at places. The weathering of massive and vesicular basalts forms favorable locales of surface and sub-surface water circulation. An interesting feature of the different basaltic lava flows is the contrast in their water bearing properties.

The massive basalts with their fracture porosities, the vesicular basalts with their minutely interconnected and partly filled vesicles and intertrappean sediments with their primary porosities have all a decisive role to play in determining the storage capabilities and suitable recharge structures of different regions. However, the capacities of the rock types, the storage capability of particular type of layers basaltic rocks are greatly influenced by the overlying thickness, texture and structure of the soils and their location with reference to existing topographic features.

Rain Water Harvesting system designed around existing bore wells are most common recharge useful in rock terrain

Features of low permeability of Basalts, their multi - layer occurrence, fractured nature, presence of vesicular and amygdaloidal character besides attitude and the nature of rock formation need to be considered for formulating Rainwater Harvesting scheme.

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**3.1) Broad Features for consideration with regard to “Ground Water Hydrology”
In Basaltic Terrain.**

The success of a Rainwater Harvesting scheme depends on a combination of various favorable situations. However, the following considerations act as guiding principles.

- (i) Hydrogeology of Basalt: - Weathered fractured and vesicular basalts will constitute most favorable hydrogeologic set-ups.
- (ii) Hydraulic conductivity: - Weathered, jointed and vesicular basalts are expected to have high hydraulic conductivity and will constitute favorable environs in comparison with massive basalts.
- (iii) Thickness of soil cover: - Granular soil cover will have high infiltration rate in comparison to fine clay/matrix.
- (iv) Aquifer Type: - Phreatic aquifers will receive rain harvested water more easily than in confined systems. Phreatic conditions tend to accelerate the recharge rate. Hydraulic connectivity of Infiltration and percolation rate in unsaturated zone will contribute to accelerated recharge in the process of Rainwater Harvesting.

Rate of Recharge in favorable conditions in vesicular and fractured basalt is expected to attain recharge @ 10% -15%, whereas in non-favorable physiographic locales the rate may be as low as 2 - 3%.

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4) PROPOSED SCHEME FOR ROOFTOP RAINWATER HARVESTING

- Name of Scheme: - Rainwater Harvesting To Augment Ground Water Sources.
- Location of project: - CENTRAL RAILWAY SCHOOL & Jr. COLLEGE KALYAN (W)
Murbad Road, Kalyan (w)-421301. Dist. Thane. Maharashtra.
- Selection of Locations: -
 - a) Area selection is based on availability of Roof top Rainwater for recharging into Proposed Bore wells at site.
 - b) The Rainwater collected from rainwater down take pipes From terrace of the buildings.
- Installations: -
 - a) Proposed recharge structures around Proposed bore wells.
- Annual Rainfall:-Average 2500 mm

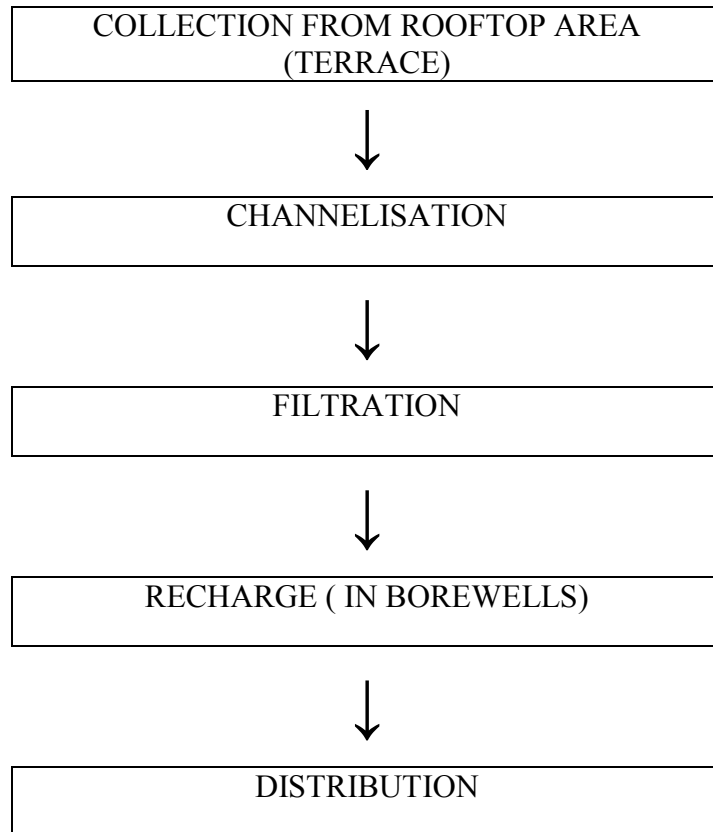
GENERAL NOTE:

- To ensure Quality of water from Rain Water Harvesting system to be clean, free from contamination and have compatibility with quality of Native ground water in aquifers, the sand filter media is to be used in the proposed Rainwater Harvesting.
- A Topographical and Physiographic consideration for suitability of Rain Water Harvesting Structures locations with regards to terrace water is worked out.
- The use of ground water through pumping from proposed bore wells recommended for secondary purposes by using separate storage and distribution facilities at site.
- The Ground water Quality and Quantity to be checked by testing the samples and measurement water level in bore wells, periodically to ensure the benefits of Rainwater Harvesting project executed at above site.

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ANNEXTURE – A

DRAWING – FLOW DIAGRAM OF RAINWATER HARVESTING SYSTEM FOR CENTRAL
RAILWAY SCHOOL & Jr. COLLEGE KALYAN (W) Murbad Road, Kalyan (w)-
421301. Dist. Thane. Maharashtra.



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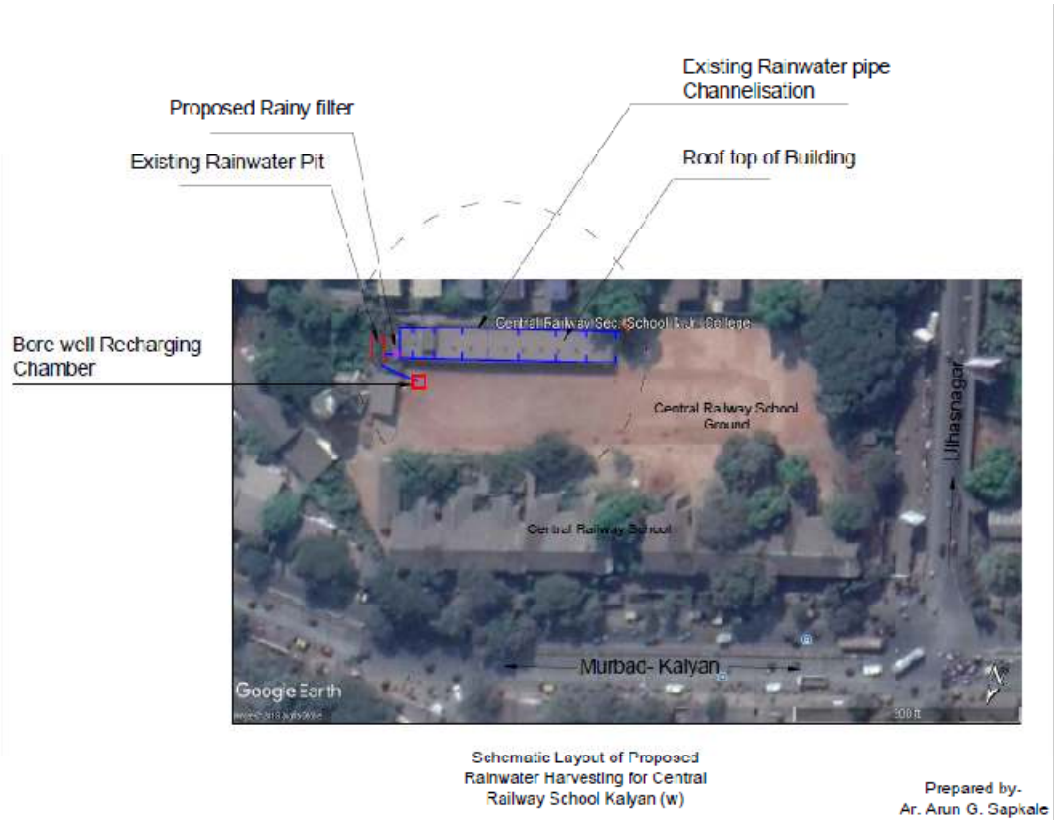
1. Rain Water Harvesting Potential (Science Building) Phase1

ROOFTOP AREA (Sq.m aprox.)	RAIN FALL (m)	COEFFICIENT	POTENTIAL (CU. M)
820	2.5	0.8	1640
TOTAL RAIN WATER HARESTING POTENTIAL =			1640
	1640000 Lit/Year		
	20500 Lit/Day		(Considering 80 Rainy Days)

Rain Water Harvesting Potential Phase- 2

ROOFTOP AREA (Sq.m aprox.)	RAIN FALL (m)	COEFFICIENT	POTENTIAL (CU. M)
381	2.5	0.8	762
TOTAL RAIN WATER HARESTING POTENTIAL =			762
	762000 Lit/Year		
	9525 Lit/Day		(Considering 80 Rainy Days)

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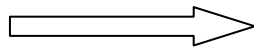
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Phase -1

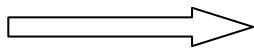


← School Building and Roof area

Existing Bore well



School Ground



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System Installation Photograph

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Phase -2



Recharge Pit Construction

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Rainy Filter Installations

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Thank you

Entire Staff of Central Railway School for your Support During execution of Project

Thanking You,

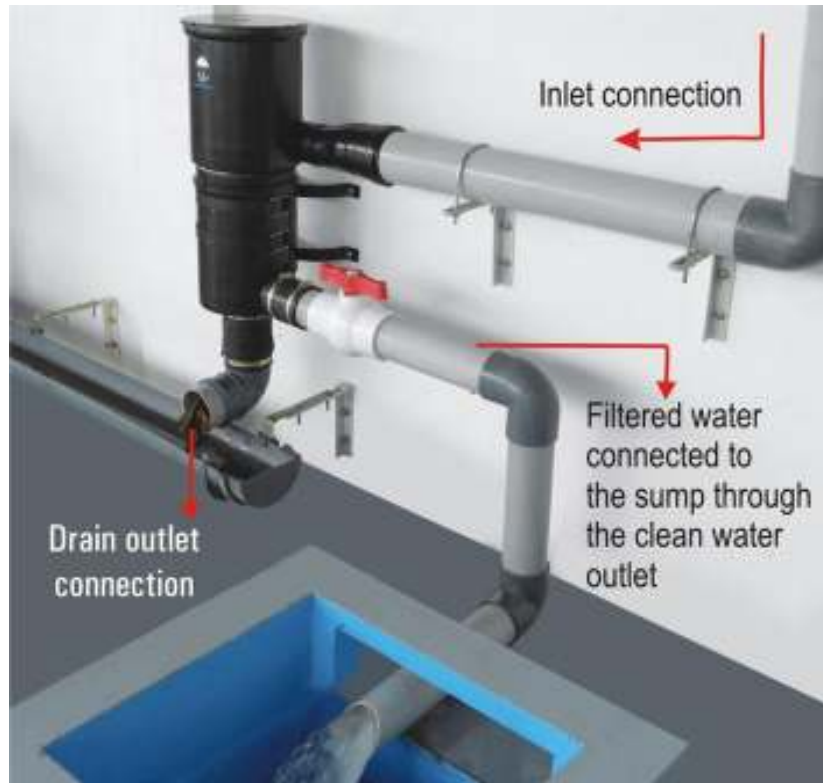
Yours truly,

Ar. Arun G. Sapkale

Consultants for Rain Water Harvesting
Ground Water Management.

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Rainy Filter Details



> Rainy Filter - FL 500

Technical Specifications & Parameters of Model FL 500

Overall Dimension

On Site Installation



Suitable up to area:	500 SQMTRS
Max: Intensity of Rainfall:	75 mm/hr
Working Principle :	Cohesive Force & Centrifugal force
Operating Pressure:	Less than 2 feet of head (0.060kg/cm ²)
Capacity:	480 LPM
Filter Element:	SS-304 Screen
Mesh Size:	250 Microns
Inlet:	110 MM
Clean Water Outlet:	90 MM
Drain Outlet:	110 MM
Housing:	High Density Polyethylene
Efficiency of Filter:	Above 90%
Source of Power:	Gravity

The characteristic features of FL Series Dual Intensity RWH Filter is its capacity to take up the load up to 10 to 500 square meters of Roof area with variable intensity of rainfall of 5 to 75 mm/ hour with a discharge capacity of 10 To 480 Liters per minute. This filter can be conveniently used for Harvesting Rainwater for apartments, Institutions, Hospitals, Commercial Buildings, Industries, Corporate houses of Medium and large sizes.

Arun G. Sapkale(B.Arch)
Environmental Consultant

29th May 2019

Kind Attn,
Resp.Principal
Central Railway School
Kalyan -W

Sub: -Completion Certificate of Roof top Rainwater Harvesting Project for Central Railway School Kalyan (W) Phase- 1 & 2

CERTIFICATE

Sir,
This is to certify that Rainwater Harvesting System for installed completely in all respects as per detailed attached herewith.

We express our satisfaction for its completion at above site fulfilling criteria as mentioned in directions given under TPB-432001/2133/CR-230/01/UD-11 dated 10th March 2005 and in the notification No.TPB-4307/396/CR-124/2007/UD-11Dated 6th June 2007 issued by Government of Maharashtra Urban Development.

Thank you,

Yours truly

Arun G. Sapkale (B. Arch.)

09220705098

Consultants for **Rain Water Harvesting**