DESIGN OF RAIN WATER HARVESTING SYSTEM FOR JETHAVANARAMAYA HORONA, SRI LANKA

MAY 2023

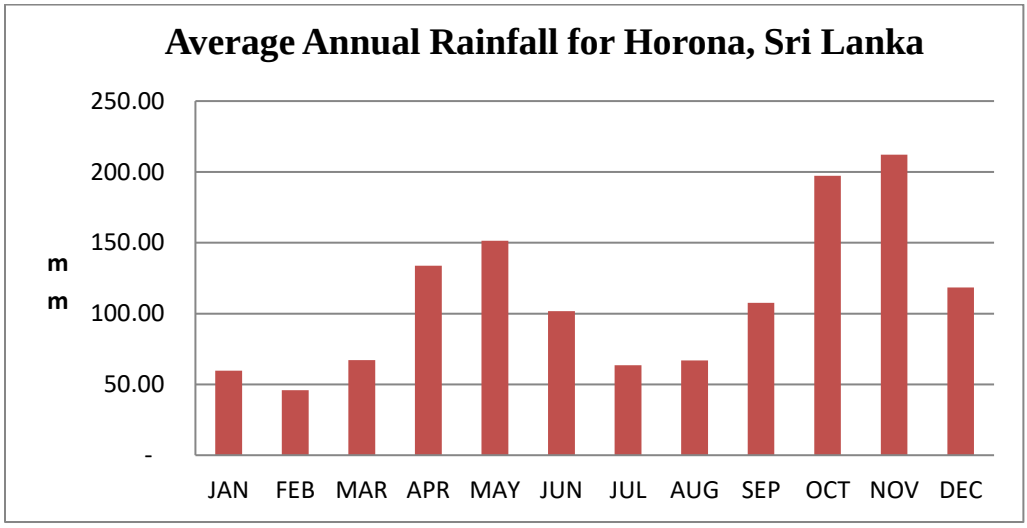
Lanka Rain Water Harvesting Forum

DESIGN OF RAIN WATER HARVESTING SYSTEM FOR NOBLESWEAR (PVT) LTD., HORONA, SRI LANKA

Rainwater harvesting in the context of a watershed means collecting runoff from within a watershed area, storing it, and employing it for different purposes. Rain water harvesting is wide variety of interventions to use rainfall through collection and storage, either in soil or in man-made dams, tanks or containers bridging dry spells and droughts. The effect is increased retention of water in the landscape, enabling management and use of water for multiple purposes. An appreciable amount of the rain that falls on land is lost due to run off (78.8% from the Wet zone)and only around 40-60% of the total rainfall is infiltrated into the soil profile.

Site Location: Jethavanaramaya, Horona
Roof area of the 5 large buildings 1833 m^2
Annual Rainfall for Horona 1325.70 mm

Rainfall for Horoana



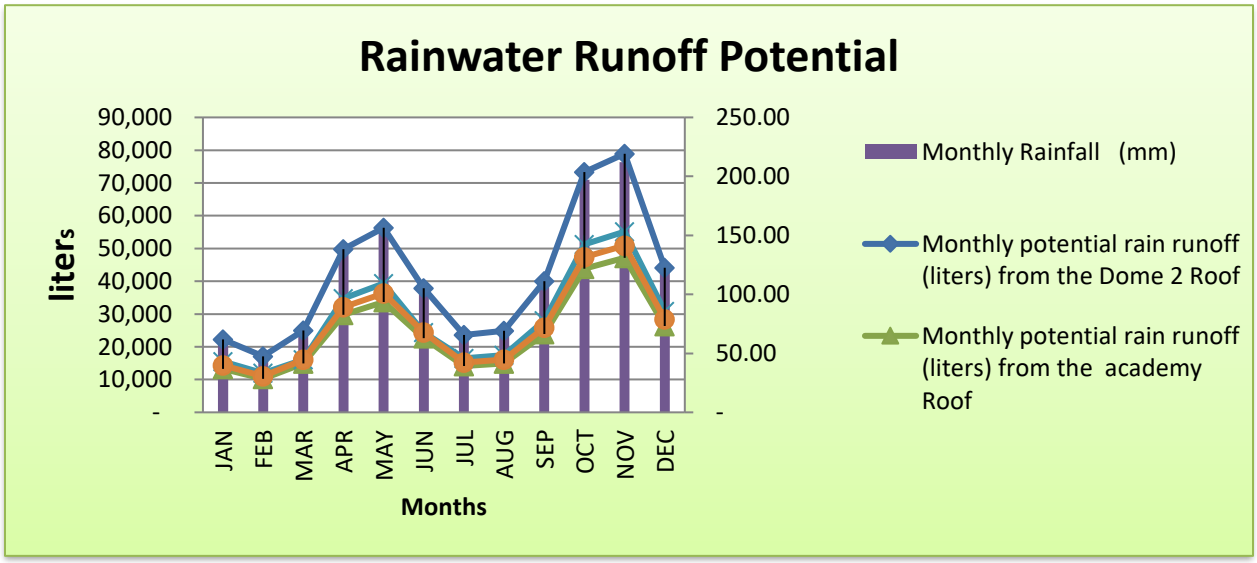
Source: www.weather-atlas.com

Catchment Calculation

Type of Catchment	Area (Sqm)
Dome 1	465
Dome 2	465
Academy	278
Rehabilitation	325
Sangawasa	300
Total	**1,833**

Runoff potential from Large Roofs in the Premises

Months	Monthly Rainfall (mm)	Monthly potential rain runoff (liters) from the Dome 1 Roof	Monthly potential rain runoff (liters) from the Dome 2 Roof	Monthly potential rain runoff (liters) from the academy Roof	Monthly potential rain runoff (liters) from the Rehabilitation Roof	Monthly potential rain runoff (liters) from the Sangawasa Roof	Total potential volume of water (Meter cube)
JAN	59.70	22,208	22,208	13,277	15,522	14,328	87.54
FEB	46.00	17,112	17,112	10,230	11,960	11,040	67
MAR	67.10	24,961	24,961	14,923	16,104	16,104	97.05
APR	133.80	49,774	49,774	29,757	34,788	32,112	196
MAY	151.40	56,321	56,321	33,671	39,364	36,336	222
JUN	101.80	37,870	37,870	22,640	24,432	24,432	147
JUL	63.50	23,622	23,622	14,122	16,510	15,240	93
AUG	67.00	24,924	24,924	14,901	17,420	16,080	98
SEP	107.60	40,027	40,027	23,930	27,976	25,824	158
OCT	197.20	73,358	73,358	43,857	51,272	47,328	289
NOV	212.10	78,901	78,901	47,171	55,146	50,904	311
DEC	118.50	44,082	44,082	26,354	30,810	28,440	174
Total	1,325.70	493,160.40	493,160.40	294,835.68	341,304.00	318,168.00	**1,941**
Average monthly		41,096.70	41,096.70	24,569.64	28,442.00	26,514.00	
Recommended storage		**41.10**	**41.10**	**24.57**	**28.44**	**26,514**	



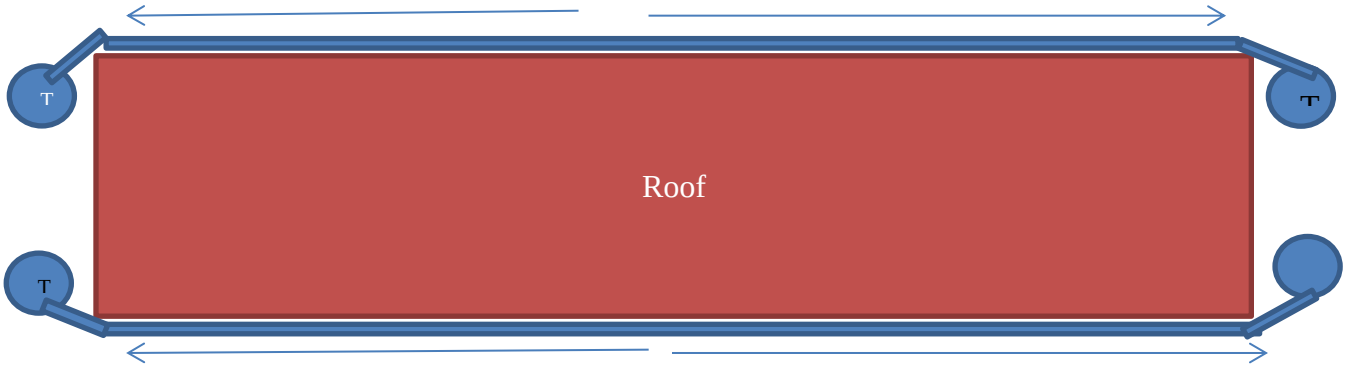
Feasibility of Rainwater Harvesting at

Option 1: Rainwater Collected from roof of Dome 1 and Dome 2

Annual run off from Dome 1 and Dome 2 is 493, 160 liter from each roof

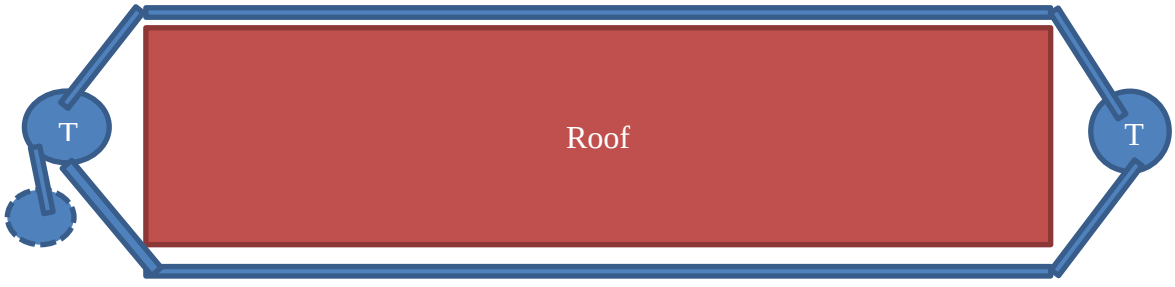
Average Monthly run off : 41,096 liters or 41 m^3

It is proposed to have 4 x 10 m^3 PE tanks (if the roof height is more than 11 ft) collecting roof water from each building. The tanks can be placed on either side of the building. The over head of the tank is to be directed to a pond/lake or allowed to infiltrate to the ground.



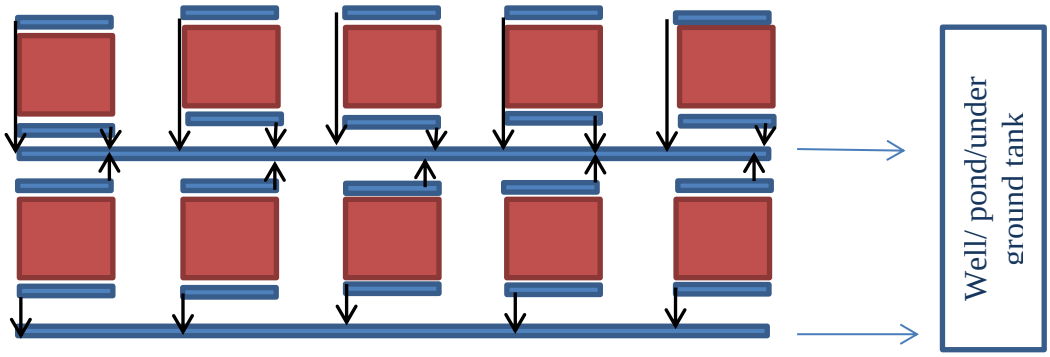
Option 2 Rainwater Collected from roof of Academy Building, Rehabilitation and Sangawasa Building

Annual run off from each of these building is in the range of 295,000 – 340,000 liters. Average monthly run off from each of these building are 30- 35 m^3. Therefore 3 or 4 x 10 m^3 PE tanks or 2-3 x 16 m^3 can be placed to collect the run off from the roof. The over flow of the tanks is to directed to a near by well or pond.



Option 3 Rain water collected from roof of Kuti

Roof water collected form Kuti can be directed through gutters and down pipes to a under ground tank , nearest pond or well to recharge the ground water table.



Option 4 Construction of Ponds or Lakes to retain the run off water

To construct these small lakes the FAO Manual on small earth dams (http://www.fao.org/docrep/012/i1531e/i1531e00.htm) , which can be down loaded from the Internet free on small lakes is recommended. The FAO hand book gives the volume of a small lake as:

1/6 x length x width height of the Dam.

To construct a Dam use of earth will be most economical. However in constructing an earthen dam attention should be made to the following:

- An over flow should be big enough prevent any spill over the earthen dam
- Toe of the earth dam should have a toe filter to prevent the toe eroding. (Figure 4)

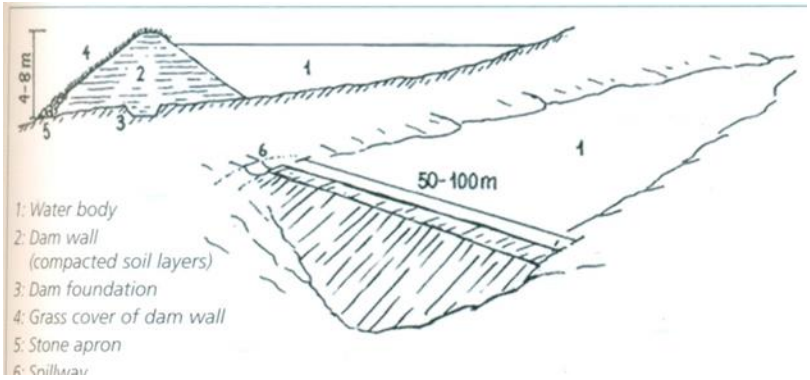


Figure 3: Small Earth Dam

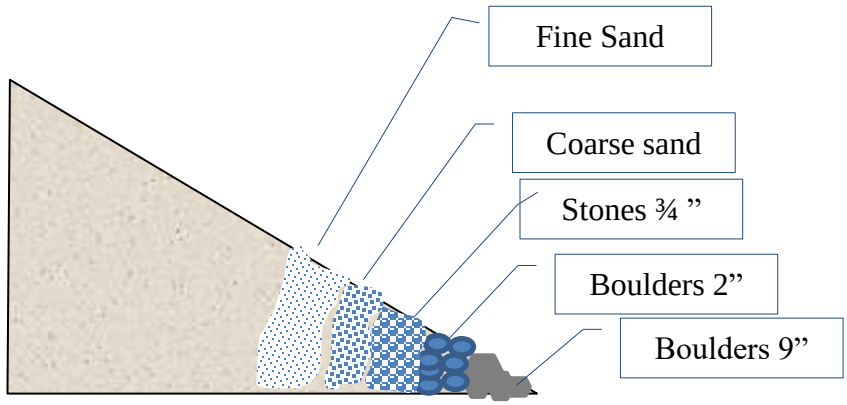


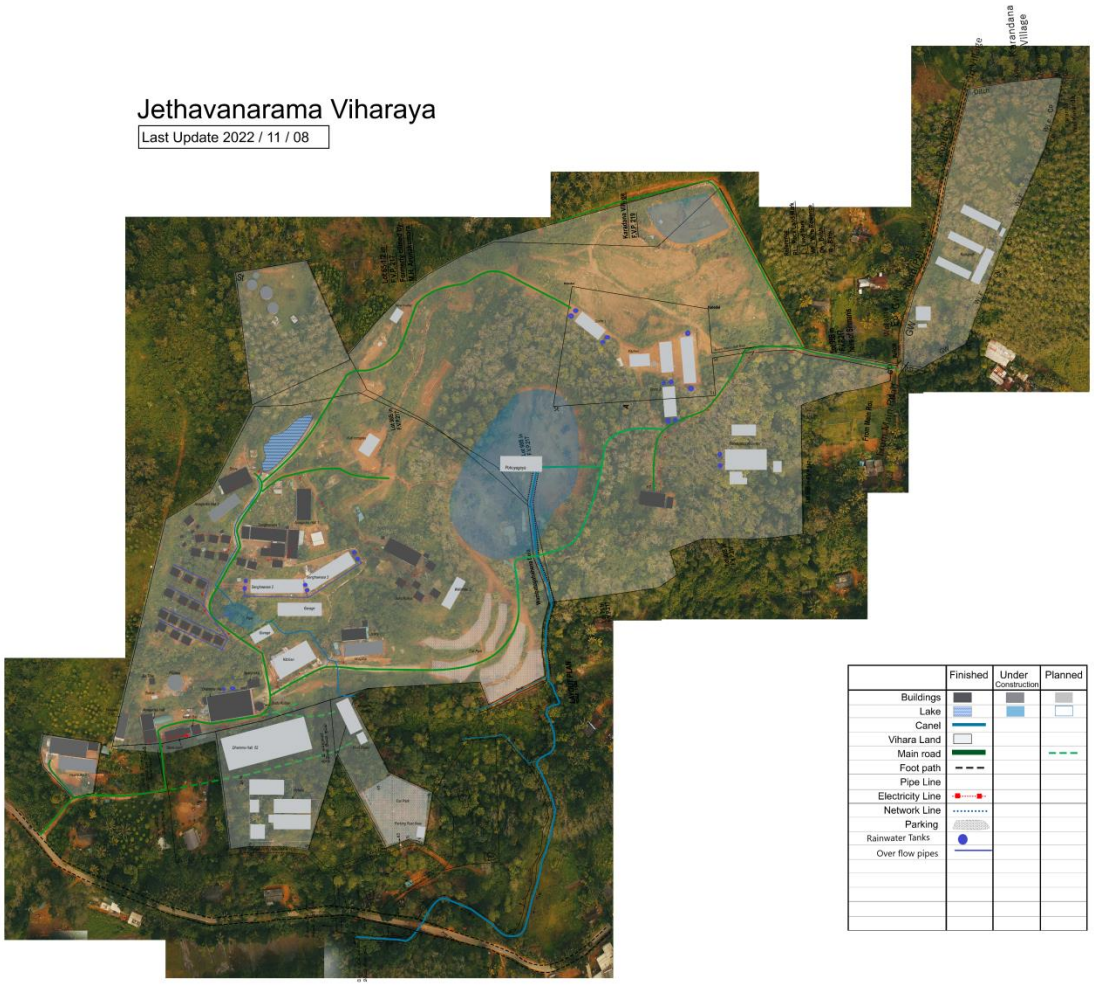
Figure 4 : Detail of Toe Filter of a Earthen Dam

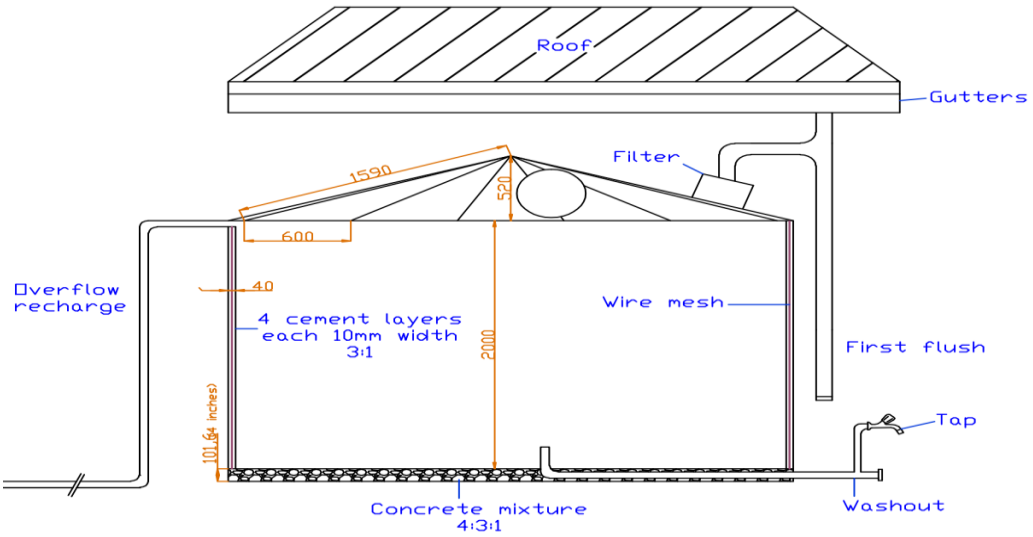
Important Notes:

1. Since this is a residential area and prone to dengue mosquitoes breeding, adequate precaution need to be taken, such as to rear fish in the ponds to prevent mosquitoes larvae breeding.
2. Adequate precaution need to be taken to prevent any persons or animals falling into the water.
3. During heavy rain the pond can over flow and cause flooding in the area, therefore overflow has to be adequate
4. Special attention should be made to prevent facilitating any landslides especially in landslide prone areas. In the construction of underground dams and high elevation lakes, relevant options should be informed to the relevant authorities for advice.
5. Pond lining is recommended for sandy soil areas.

Estimated Cost Option 1-2

Material cost	Unit cost	No. of units	Total
1.Rainwater Collected from roof of Dome 1 and Dome 2 (PE tank 10 m^3 with 4 length of gutters, first flush, filter and base without labour cost)	272,000	8	2,176,000
2.1 Rainwater Collected from roof of Academy Building, Rehabilitation and Sangawasa Building (PE tank 10 m^3 with 4 length of gutters, first flush, filter and base without labour cost)	272,000	9	2,448,000
2.2. Rainwater Collected from roof of Academy Building, Rehabilitation and Sangawasa Building (16 m^3 ferrocement tank. 4 length of gutters, first flush filter and labour)	250,000	6	1,500,000


Jethavanarama Viharaya
Last Update 2022 / 11 / 08
Finished
Under Construction
Planned
Buildings
Lake
Canel
Vihara Land
Main road
Foot path
Pipe Line
Electricity Line
Network Line
Parking
Rainwater Tanks
Over flow pipes



LRWHF	DESIGN OF FERRO CEMENT RAIN WATER HARVESTING SYSTEM			
	LANKA RAIN WATER HARVESTING FORUM			
	16,000 litre Ferrocement tank			
DRAWN BY K. I. U. T. De Silva	DESIGN ADAPTED BY IRPAA – Brazil	CHECKED BY	DRAWING NO.	DATE July, 2018

THE PARTS OF THE PLASTIC TANK (10 M³ /5 M³)