**Rain Water Harvesting Potential at Galle Face Hotel, Colombo**

*February 2018*



# Introduction:



Following a request for a feasibility study to assess the potential of rain water harvesting from Galle Face hotel Colombo, a visit was made by Dr Tanuja Ariyananda, CEO, LRWHF on the 15/12/2017 to the premises.

During the visit and later following information were obtained

* Roof Area of the hotel: estimated: 7871 m2 (84,7265 ft2)
* Storage available: South Garden 42 m3 + 61m3 + 124m3 = 227 m3
* Front of veranda, Restaurant garden= 150 m3
* Monthly average water consumption: 7,395,667 liters

Water needed for laundry, gardening, dish washing, toilet flushing

* Number of rooms: 156
* Drinking water for hotel guest and workers are provided by bottle water



# Rain Water Harvesting Potential Calculation

# Rain fall or Colombo

Chart

**Runoff Potential as Per Annual Rainfall**

|  |  |
| --- | --- |
| **Annual rainfall (mm)** | **Total RWH potential**  **(Liters) from All roofs** |
| **2,404** | **16,081,558** |

Table

**Storage Potential as per Catchment Variation**





Chart 2

## Runoff Potential (Monthly) from Roofs (table 1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Months** | **Monthly Rainfall (mm)** | **Monthly potential rainfall (liters)All Roof top** | **Monthly potential rainfall (liters)Roof Area A** | **Monthly potential rainfall (liters) Roof Area B** | **Average Monthly demand ( liters)** |
| **Jan** | **62.00** | 414,749 | 52,173 | 44,953 | 7,395,667 |
| **Feb** | **69.00** | 461,576 | 58,064 | 50,028 | 7,395,667 |
| **Mar** | **130.00** | 869,635 | 109,395 | 94,257 | 7,395,667 |
| **Apr** | **253.00** | 1,692,444 | 212,900 | 183,438 | 7,395,667 |
| **May** | **382.00** | 2,555,389 | 321,453 | 276,969 | 7,395,667 |
| **Jun** | **186.00** | 1,244,247 | 156,519 | 134,859 | 7,395,667 |
| **Jul** | **125.00** | 836,188 | 105,188 | 90,631 | 7,395,667 |
| **Aug** | **114.00** | 762,603 | 95,931 | 82,656 | 7,395,667 |
| **Sep** | **236.00** | 1,578,722 | 198,594 | 171,112 | 7,395,667 |
| **Oct** | **369.00** | 2,468,426 | 310,514 | 267,543 | 7,395,667 |
| **Nov** | **310.00** | 2,073,745 | 260,865 | 224,766 | 7,395,667 |
| **Dec** | **168.00** | 1,123,836 | 141,372 | 121,808 | 7,395,667 |
|  | 2,404.00 | 16,081,558 | 2,022,966 | 1,743,020 | 88,748,000 |

Table

Chart 3 potential RW collection from roof A to Storage Tank A

Chart 4 Potential RW collection from Roof B to Storage Tank B

## Description of Proposed Roof Water Collection Plan



## Feasibility Calculation:

* Total roof area 7871 m2
* Roof Area A= 990 m2 (figure 1)
* Roof Area B = 853 m 2 (figure 1)
* Average Monthly demand: 7395.7 m3
* Average Annual demand = 7395.7 m3 x 12 = 88,748 m3
* Annual Rain Water harvesting Potential from all Roofs = 16, 082 m3
* Annual roof water potential from roof A only = 2023 m3
* Annual roof water potential from roof B only = 1743 m3

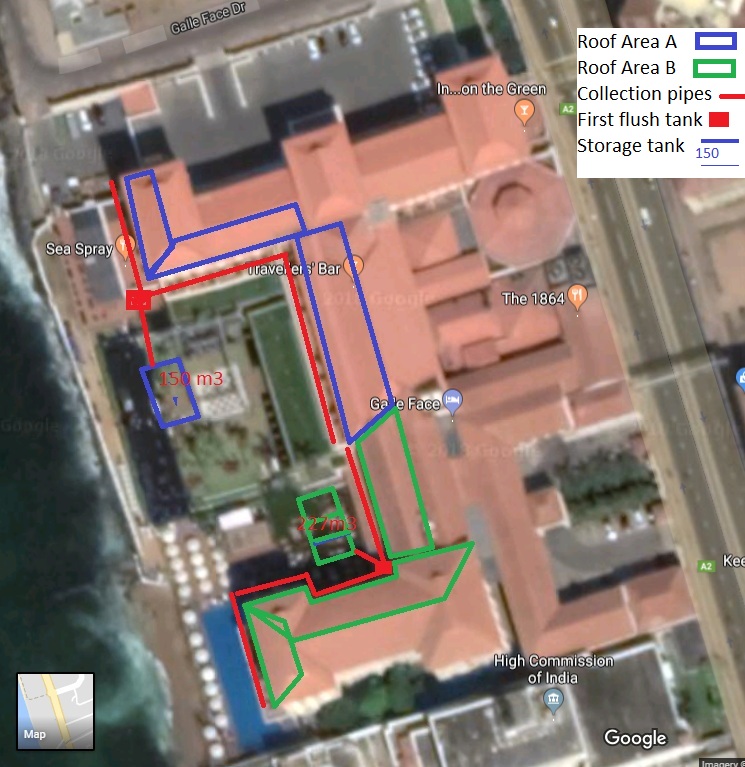


Figure 1

Since the water demand is high, it is not possible to collected total water demand of the hotel by collecting roof rain water. Only an estimated average 8% of the demand can be met by collecting rain water from all the roofs, with adequate storage.

However, with existing storage of 227 m3 and 150 m3 and collection from roof area of A and B (figure 1) around 4% of the water demand can be met.

Roof water from roof areas A and B can be collected from gutters through down pipes and delivered by a PVC/Concrete pipe of larger diameter (6-8 inches) which can be places inside the existing drains or underground pipes, as in the figure 1. PVC /Concrete pipe should be connected together and deliver into existing storage tanks placed in the location as in the figure 1.

The first flush tank, collecting any dust and possibly salt deposits in the roof due to the hotels proximity to the sea, washed off with the first rains, will prevent any such contaminants deposited in the roofs entering into the storage tanks, which is discarded. This can be done by directing the first 2mm of rain (1.7 - 2 m3 volume) from each roof into at tank before the rain water goes into storage tank (Figure 2). There are also commercially available filters which will automatically prevent these contaminant entering the storage tanks (see attached annex: vortex filter)

Economic feasibility of this option should be calculated taking into account present cost of water, future increases taking into account that after the system is installed there will only be maintenance cost to the system, which is very minimal.



**Estimated Cost**

1. Storage: Existing underground tank: no cost
2. Delivery: length of 6-8 inch PVC/concrete around the buildings of roof areas A and B and laying of underground pipes from roof area A and B to storage tank location (since the distances are not know, it is not estimated)
3. First flush tank: 2 m3 capacity Rs, 30,000 or
4. Vortex filter: please contact <http://www.rainconcepts.com/index_files/systems.htm>



# Recommendation

1. It is recommended to use the existing storage capacity at the initial stage with plan for future installation of additional storage capacity with use of additional roof areas, if and when needed
2. All water storage facilities should be kept closed to prevent mosquito breeding and algae forming.
3. First flush tank can be placed underground. Vortex filter can be added if quality of the water collected is not meeting the standard required.
4. Quality of the collected water is to be tested, for chemical and bacteriological standard if it is being used for human consumption or comes in contacted with humans.

**Figure 2; Design of First flush tank and vortex filter**

Outlet to storage tank

washout

Inlet -from delivery pipe 6”

2000 liter tank of Concrete/brick/PE

**Annex 1: Vortex Filter**Text Box: RH9521-12 - 12" Outlet Vortex Rainwater Fine Filter for 
Above or Below Grade Applications

For a Roof Area Up to 32,000 Square Feet
Used in installations where multiple downspouts are connected together to a single pipe into the vortex filter. The vortex rainwater filter can filter up to a 32,000 square foot roof area for site irrigation, toilet and urinal flushing, janitorial use, laundries, fire protection, evaporative cooling tower make-up, process water, or other non-potable uses.
￼

Function: The vortex rainwater fine filter is installed in the underground piping system to remove debris to the storm water system and divert 90% of clean rainwater to an underground storage tank. (An above grade application is possible). The filter operates as a first flush device. The filter assembly consists of a 20 inch stainless steel lift handle, removable stainless steel 380 micron fine mesh filter, steel housing lid and baseplate, and polypropylene filter housing with closing ring. The mesh filter should be cleaned at least twice a year. The housing lid (as specified) carries loads up to 60 tons (DIN 1072/SLW60).
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