

## **Proposal for Rainwater Harvesting at Vidya Prabodhini College, Alto-Parvari-Goa**

**Submitted by**

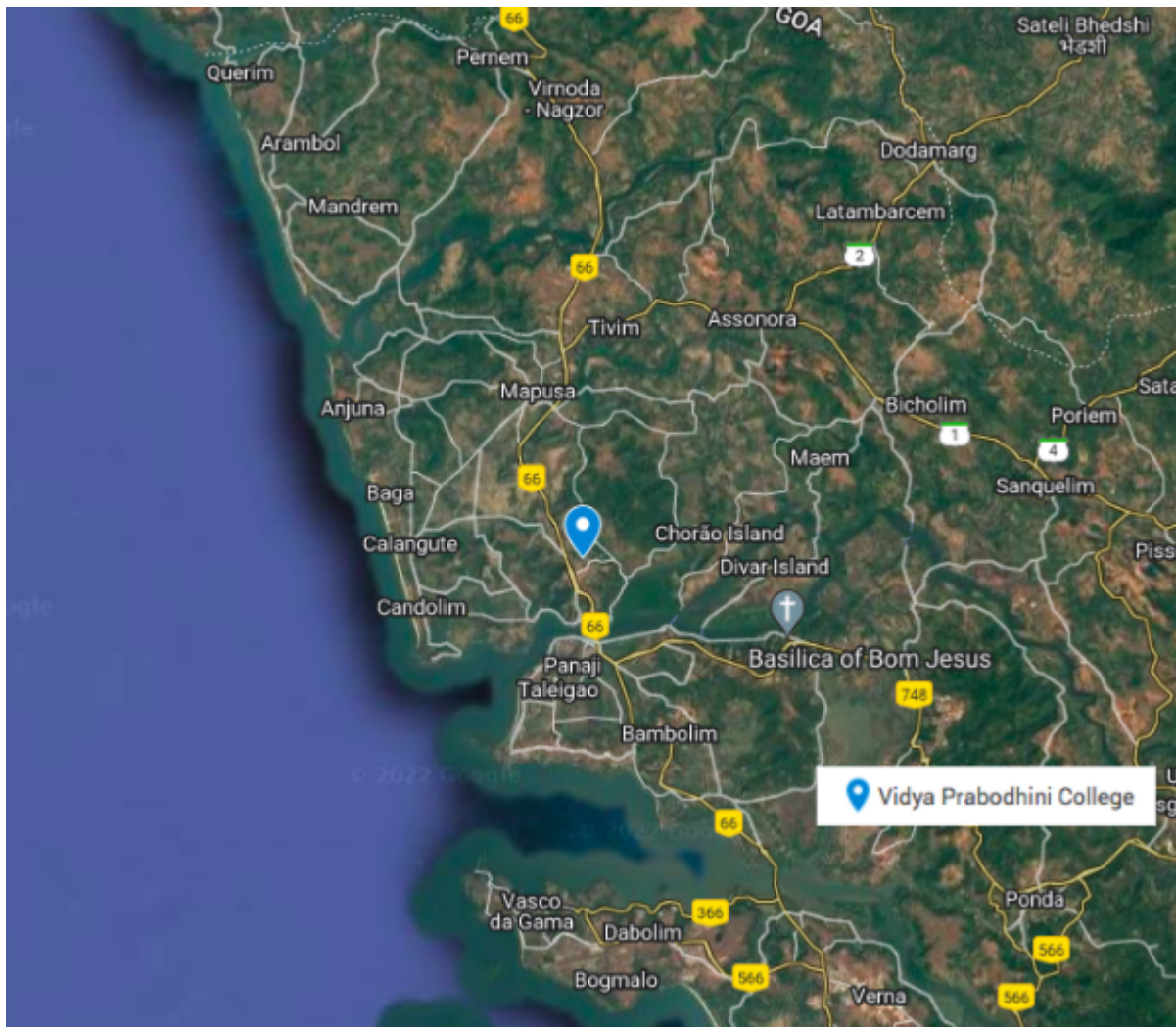
**Biome Environmental Trust,  
(Earlier Rainwater Club)**  
264, 6th Main Road, BEL Layout  
6th Block, BEL Layout, Vidyaranyapura,  
Bengaluru, Karnataka 560097

[www.rainwaterclub.org](http://www.rainwaterclub.org)  
[www.biometruster.org](http://www.biometruster.org)

## 1.0 Project and document details

<b>Enquiry from</b>	<b>Puravankara Group</b>
<b>Contact details</b>	<b>Vinay Kerur &lt;vinay.kerur@puravankara.com&gt;</b>
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## 2.0 Overview





*Vidya Prabodhini College, Porvorim, Goa*

**Location:** <https://goo.gl/maps/X1aq6Jm7d31JfQA8A>

<b>Name of Institution</b>	<b>Prabodhan Education Society, Vidya Prabodhini College of Commerce</b>
<b>GPS Coordinates</b>	15.527854282410031, 73.83124101550669
<b>Class level</b>	1st grade to B.Com
<b>Number of Students + Staff</b>	Total: 2893
<b>Medium of teaching</b>	English Medium

<b>Water Supply</b>	<ul style="list-style-type: none"> <li>● School has a municipal water connection and a borewell connection at the school for all their water requirements</li> </ul>
<b>Existing Infrastructure/ Facilities</b>	<ul style="list-style-type: none"> <li>● The school is in a 3850 sqm area. There are rooms on 3 floors with a central quadrangle with an adjoining 4000 sqm playground. RWH can be planned considering part of the rooftop keeping in mind the rainfall that Goa receives.</li> <li>● A 4000 sqm playground adjoins the college. This belongs to the panchayat. The school has the permission to use the space.</li> <li>● There are hand wash stations and toilets on each floor. There are 28 toilets, 20 hand wash stations, and 16 bathrooms in the school.</li> <li>● There are about 10 handwashes near the entrance to the playground.</li> <li>● There is a 60,000L sump at the entrance to the playground.</li> <li>● There are two overhead tanks of 10,000L capacity each.</li> <li>● There are 4 downpipes in each corner of the quadrangle.</li> <li>● There is a canteen at the school. Food is not cooked in the canteen.</li> <li>● Drinking water - Water from the OHT is passed through Aquaguard filters before drinking. There are 5 filters - 1 on the ground floor and 2 each on the first and second floors.</li> </ul>
<b>Water demand</b>	<ul style="list-style-type: none"> <li>● Total water demand per day is 40,000L. Water is used for Drinking, Handwashing, Toilet, Washing utensils in the canteen, Cleaning and Garden/pots.</li> </ul>
<b>Water Issues</b>	<ul style="list-style-type: none"> <li>● The college does not face shortage of water, however, due to the high water demand, using rainwater during monsoon will reduce the stress on the groundwater and municipal water. This project can also serve as a model/educational space for other institutions.</li> </ul>
<b>Borewell</b>	<ul style="list-style-type: none"> <li>● There is a borewell in the playground. The depth of the borewell is about 100m. This was installed 20years ago.</li> </ul>





*3-Storey Building*



*Borewell*



*10000x2 OHT*



*60000L Sump*



*Downtake pipes*



*Canteen*



*Water filter*

### **3.0 Rainwater harvesting potential**

The average rainfall that Goa receives has been recorded as 3000 mm with the average number of rainy days as around 95.7. The table below provides the distribution of rainfall over the months of the year.



<b>Rainfall Pattern 1981-2010</b>		
Goa		
	<b>Rainfall (mm)</b>	<b>Number of rainy days</b>
JAN	1.0	0.1
FEB	0.1	0
MAR	0	0
APR	4.3	0.3
MAY	81	3.8
JUN	892.3	21.2
JUL	907.4	25.6
AUG	596.6	23.1
SEP	260.3	12.8
OCT	145.8	6.5
NOV	26.7	2
DEC	2.5	0.2
<b>Annual</b>	<b>2918.0</b>	<b>95.7</b>

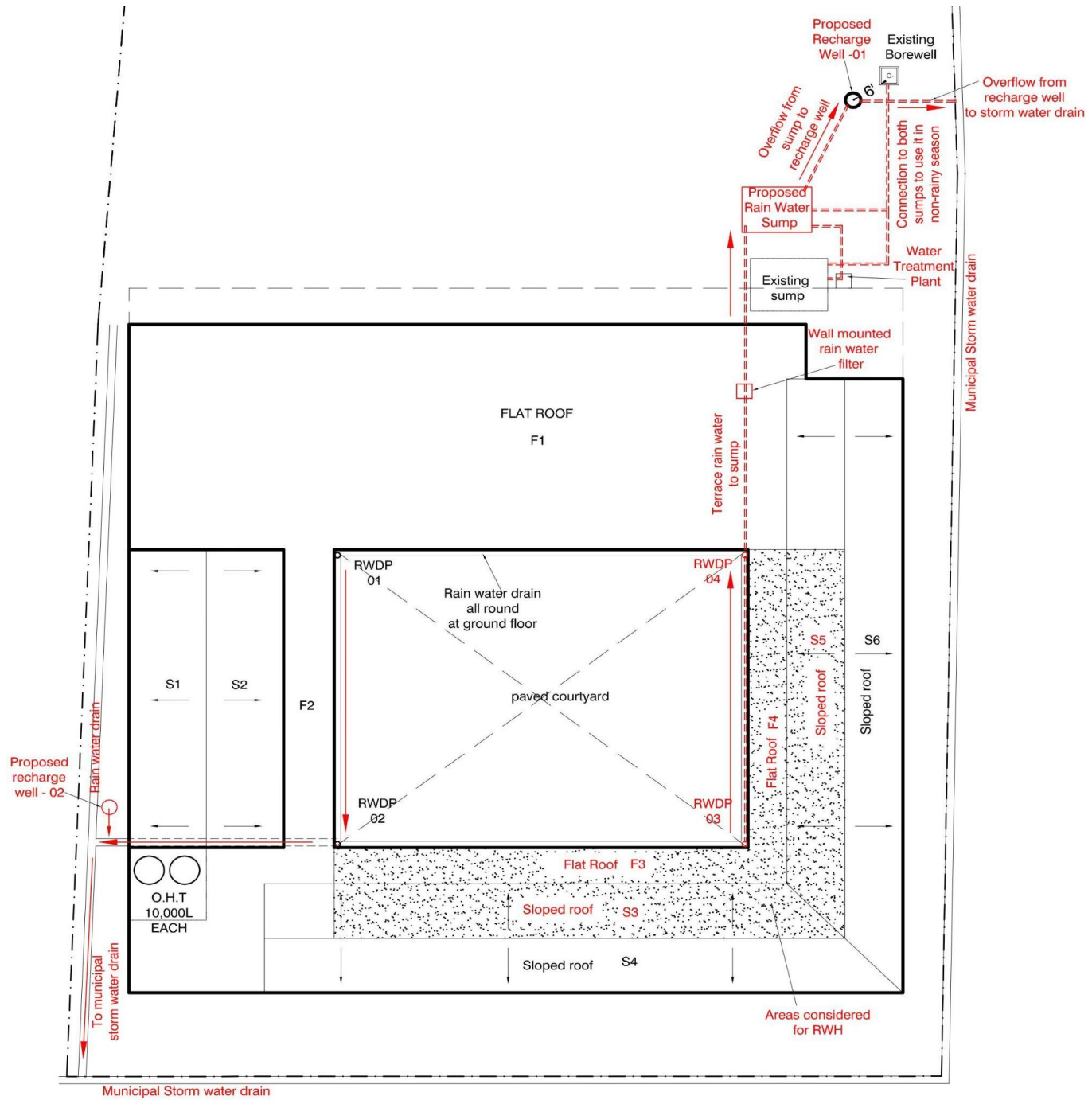
*Table 1: Average Rainfall received in Goa*

Reference:

<https://weather.com/en-IN/india/travel/news/2019-07-29-weather-in-go-a-annual-temperature-rainfall-trends-for-go-a>

The college has a roof area of 2500 sqm. However, only a part of the roof, 420 sqm, has been considered for rainwater harvesting. The reason for this is

- a) Goa received about 3000mm of rain, part of the roof considered for RWH is sufficient for using the rainwater in the college in monsoon season. Using the harvested rainwater during the monsoon season it will reduce the stress on the groundwater and municipal water.
- b) There is construction activity on the flat roof and hence the flat roof has not been considered.



*Proposed schematic design for RWH*

Legend: - Existing structure in **Black**  
 - New or existing structure for proposed RWH structure in **Red**



Type of catchment	Area (sqm)	Runoff coefficient	Runoff from 60 mm rain (KL)	Runoff from 80 mm rain (KL)	Runoff from 100 mm rain (KL)	Runoff from annual rainfall 2918 mm (KL)
Roof area above HOD cabin	210	0.9	11.34	15.12	18.9	551.502
Roof area above Staff room	210	0.9	11.34	15.12	18.9	551.502
<b>Total</b>	<b>420</b>		<b>22.68</b>	<b>30.24</b>	<b>37.8</b>	<b>1103.004</b>

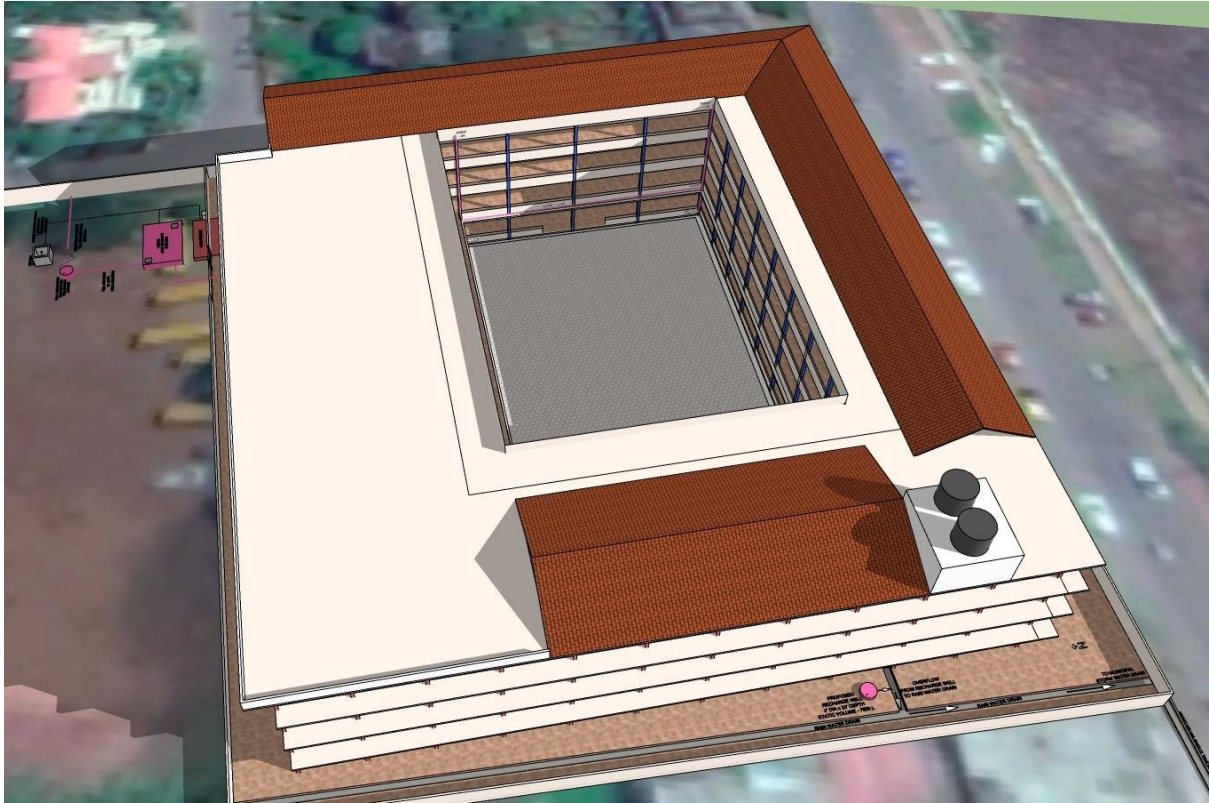
*Table 2: Rainfall runoff from various surfaces*

Based on the roof area considered for RWH, the annual runoff from this area is 1103 KL which is equivalent to the college's water demand for about 28 days of the year. Considering an average rainfall of 80 mm, following are the recommendations:

- A new sump of 40000L (23ftx20ftx3ft)
- The overflow from the sump will be connected to Recharge Well-01 with dimension of 4 feet diameter and 20ft depth (Static volume of 7.1KL)
- Another Recharge Well-02 at the southwestern side below the OHT with dimension of 4 feet diameter and 20ft depth (Static volume of 7.1KL) .

The sump will hold water for a day's requirement. Recharge wells will help replenish the groundwater.

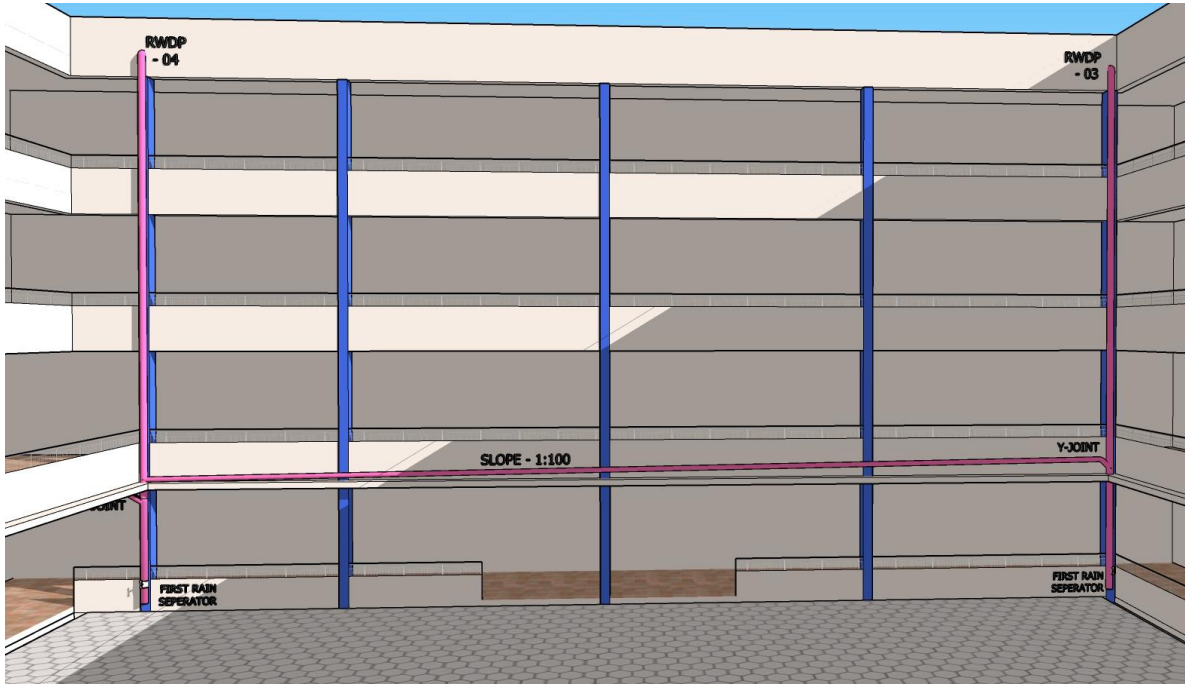
#### **4.0 Proposed activities**



*Fig : Overview of the school*

#### 4.1 Rain water harvesting

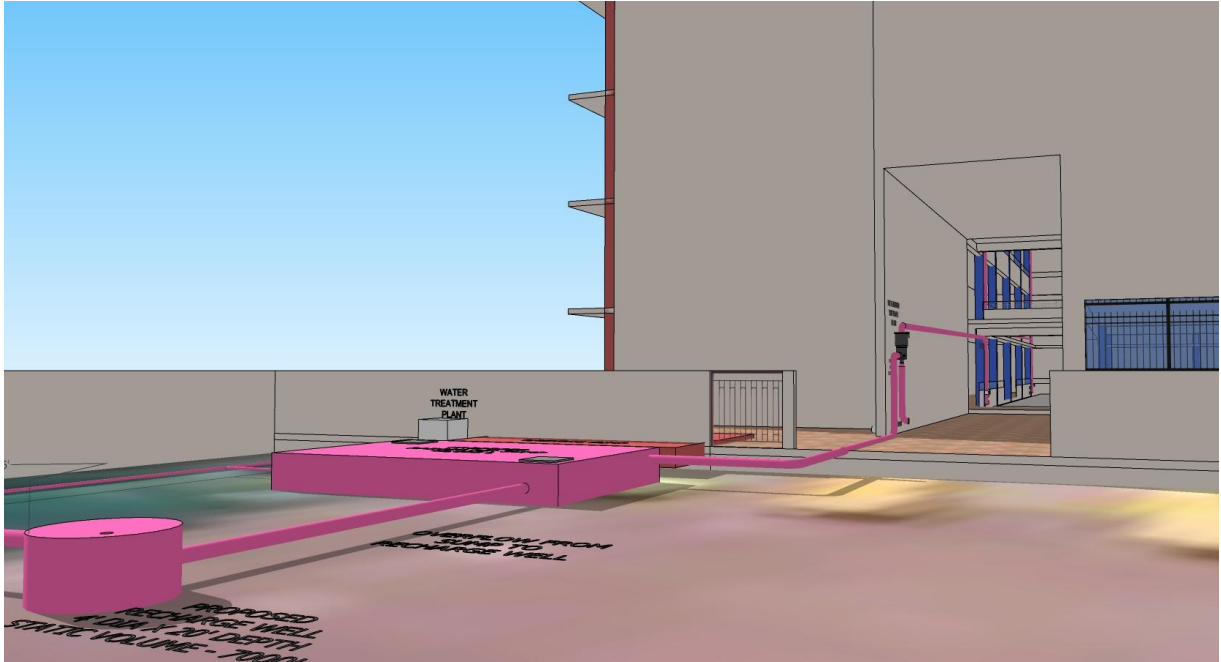
- Construct a 40000L sump next to the existing sump. Connect two downpipes RWDP03 and RWDP04 at the ground floor chajja level . Each of the 2 downpipes will have a valve to allow for the water to bypass the filter and flow outside. This is the First rain separator. Once both the downpipes are connected, the pipe diameter will be increased to 6 inches to account for the increased flow to the filter and then to the sump. The rainwater is passed through a wall mountable rainwater filter before the sump. The overflow from the sump is connected to a recharge well near the borewell. This stored water will then be pumped to the existing sump after passing it through a water treatment plant. This will then be pumped to the OHTs. Roof F3, F4, S3, and S5 are considered for harvesting rainwater.



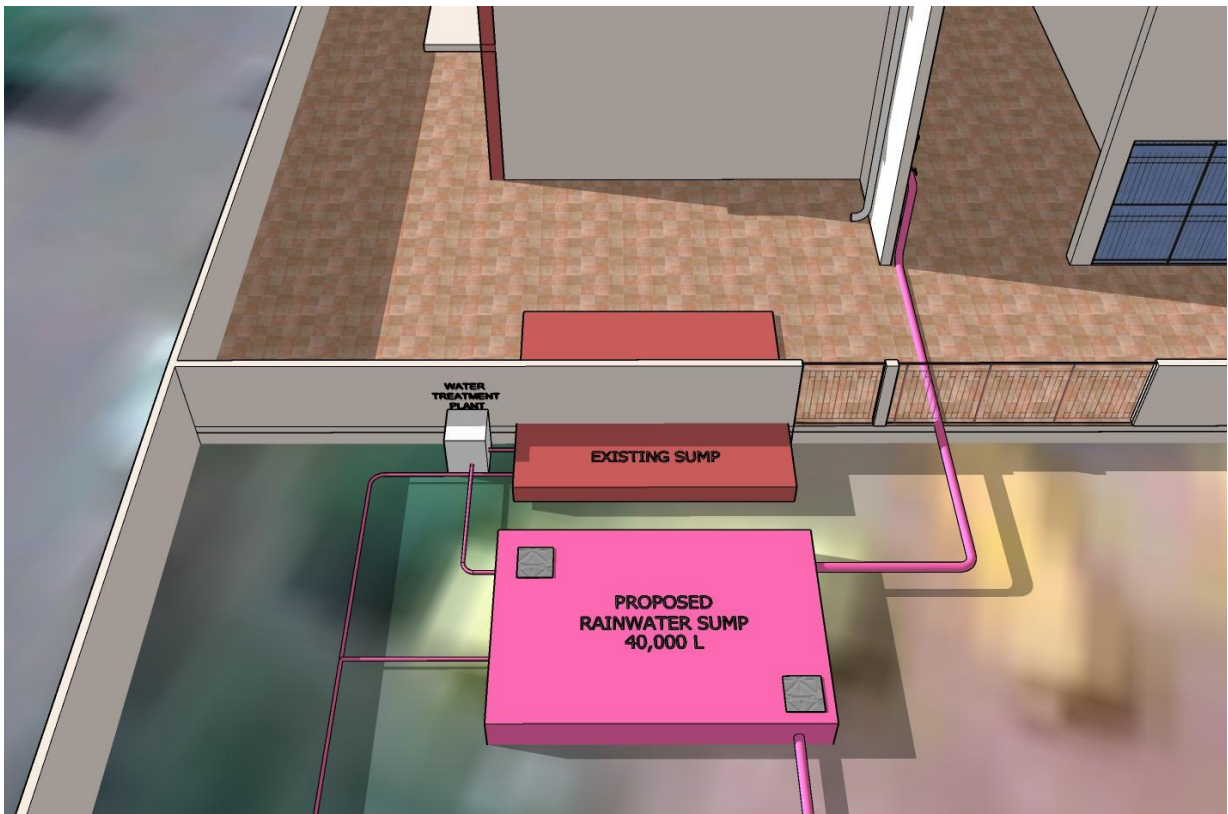
*Fig : Connecting the downpipes for harvesting rainwater*



*Fig : First rain separator and Wall mountable rainwater filter*



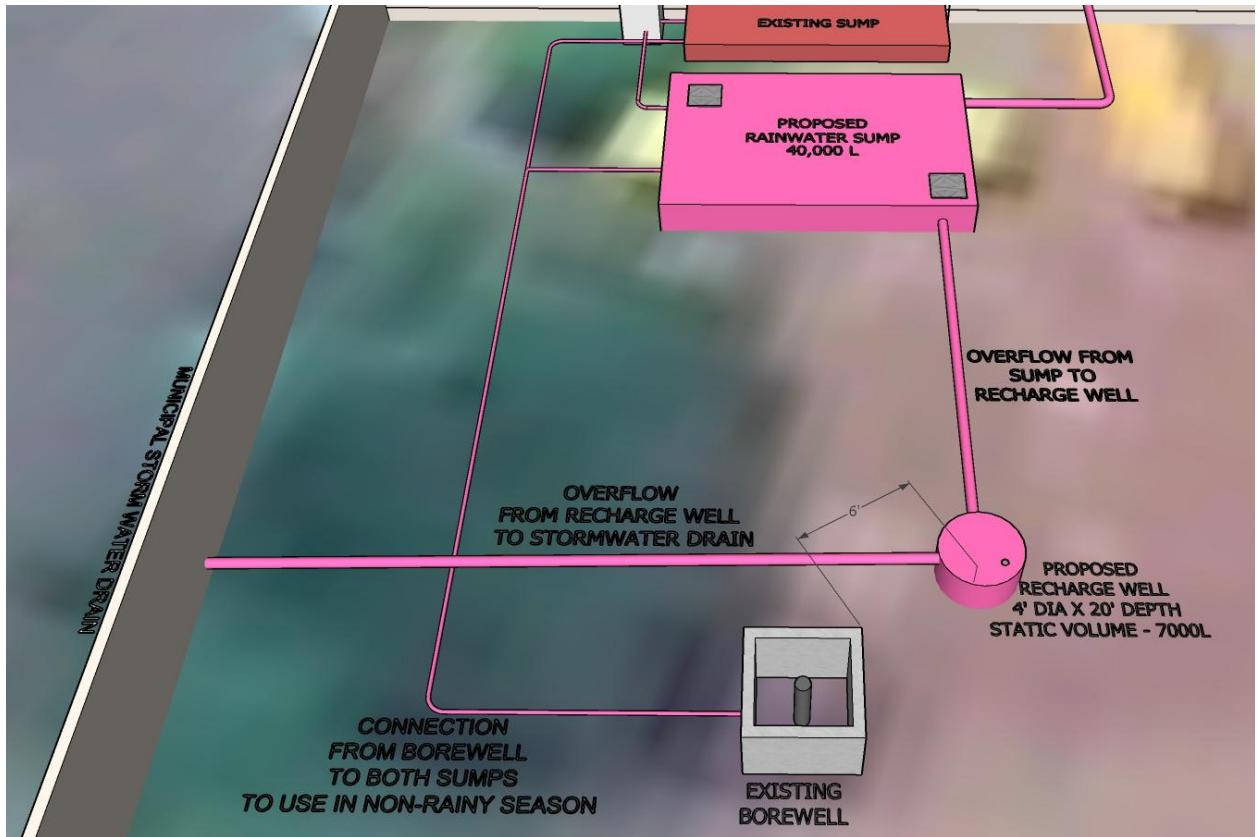
*Fig : Wall mountable rainwater filter>New sump>>Recharge well*



*Fig : New sump>Water purification system>Existing sump*

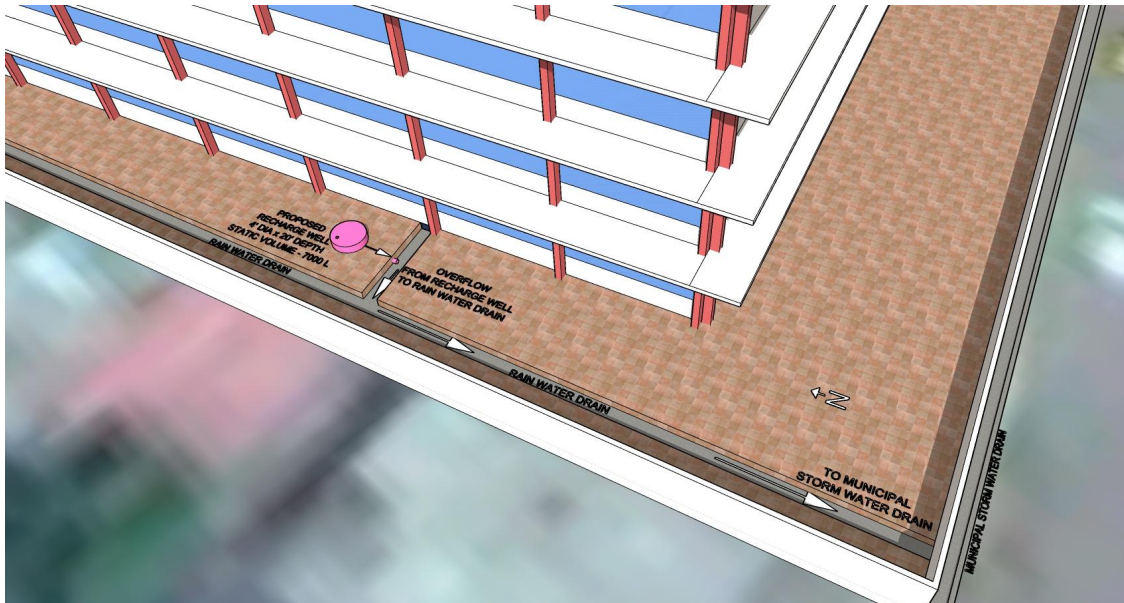


- A recharge well of 4ft x 20ft will be put close to the borewell in the playground. The overflow from the well will enter the municipal stormwater drain outside the premises.



*Fig : Overflow from the new sump > Recharge well > SWD*

- Water from RWDP 01 and RWDP 02 flows out of the college through a drain into the municipal storm water drain outside the college premises. A recharge well will be dug on the southwest side of the building next to the drain and some of the water will be directed to the well. Overflow of the well will flow back into the drain and out into the municipal stormwater drain.



*Fig : Water from the RWDP1 and 2 > Recharge Well 02 > SWD*

#### 4.2 Best practices and Water Demand Management

- It is proposed to fix a water metre to the existing borewell. This will give the volume of water being pumped every day.
- A metre for the new sump is also proposed at the outflow/pumped end. This will give the volume of rainwater harvested.
- Fixing aerators to all the taps. This will reduce the water consumption and hence help reduce the water demand.
- Signages to highlight the water management process adopted by the school
- Camera inspection of the existing borewell. This will help understand from what points and the quantity of water that is flowing into the borewell.

#### 4.3 Training and Awareness program

- A training session will be organised on water quality monitoring for the college staff. The college can then monitor the quality on a regular basis. Students can also be involved in monitoring the quality.
- An awareness program will be organised for the students and the community around the school about RWH, managing water demand and recharging the groundwater.

#### 6.0 Sequence of proposed activities highlighting relative roles and responsibilities of - Puravankara, BIOME and Vidya Prabodhini

- Biome will visit the site to identify the college's water requirements.

- Biome will create the schematic design keeping in mind its ease of use for RWH and discuss with the college authorities.
- The plan will have to be approved by Puravankara and Vidya Prabodhani.
- Vidya Prabodhini to help get the quotation from the contractor.
- Vidya Prabodhini to get the required permissions from the Panchayat
- Biome to share the schematic design and quotation with Puravankara for approval
- Vidya Prabodhini to monitor the day to day work.
- Biome to monitor the work to ensure adherence to the design.
- Biome to visit the site during implementation and on completion of the project.
- Biome to train the staff on
  - Maintenance of the system
  - Water quality monitoring
- Biome to present an awareness program on RWH. Vidya Prabodhini to facilitate the same.