



Holy Family High School & Junior College, Andheri, Bombay

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(Data Generated for JAAI West Zone Conference 14-16 Nov 2025)

Rainwater Harvesting, Terrain-Based Recharge Assessment Solar Installation, Carbon Sequestration Study



1 RAINWATER HARVESTING ANALYSIS

RWH Formula:

$$\mathbf{RWH = P \times A \times C}$$

Where:

- **P** = Mean annual rainfall (in meters)
- **A** = Surface area (m²)
- **C** = Runoff coefficient
 - Rooftop: 0.875
 - Paved: 0.7
 - Unpaved: 0.6



- Green: Excluded from RWH (used for carbon sequestration only)

Data Considered:

- **Rainfall Data (CHIRPS – Last Three Years)**

Year	Rainfall (mm)	Rainfall (m)
2024	3,869.31	3.869
2023	2,798.47	2.798
2022	3,529.47	3.529

- **Mean Annual Rainfall (P) = $(3.869 + 2.798 + 3.529) / 3 = 3.3987$ m/year**

- **Surface Area Data**

Surface Type	Area (m ²)	Runoff Coefficient
Roof	2,754.37	0.875
Paved	984.66	0.7
Unpaved	6,430.26	0.6
Green	1,746.32	— (excluded)

RWH Calculations

- **RWH (Roof) = $3.3987 \times 2,754.37 \times 0.875 = 8,201.90$ m³**
- **RWH (Paved) = $3.3987 \times 984.66 \times 0.7 = 2,338.49$ m³**
- **RWH (Unpaved) = $3.3987 \times 6,430.26 \times 0.6 = 13,112.15$ m³**

Total Annual Harvestable Rainwater

- **Total RWH = $8,201.90 + 2,338.49 + 13,112.15 = 23,652.54$ m³ = 23,652,540 liters/year**

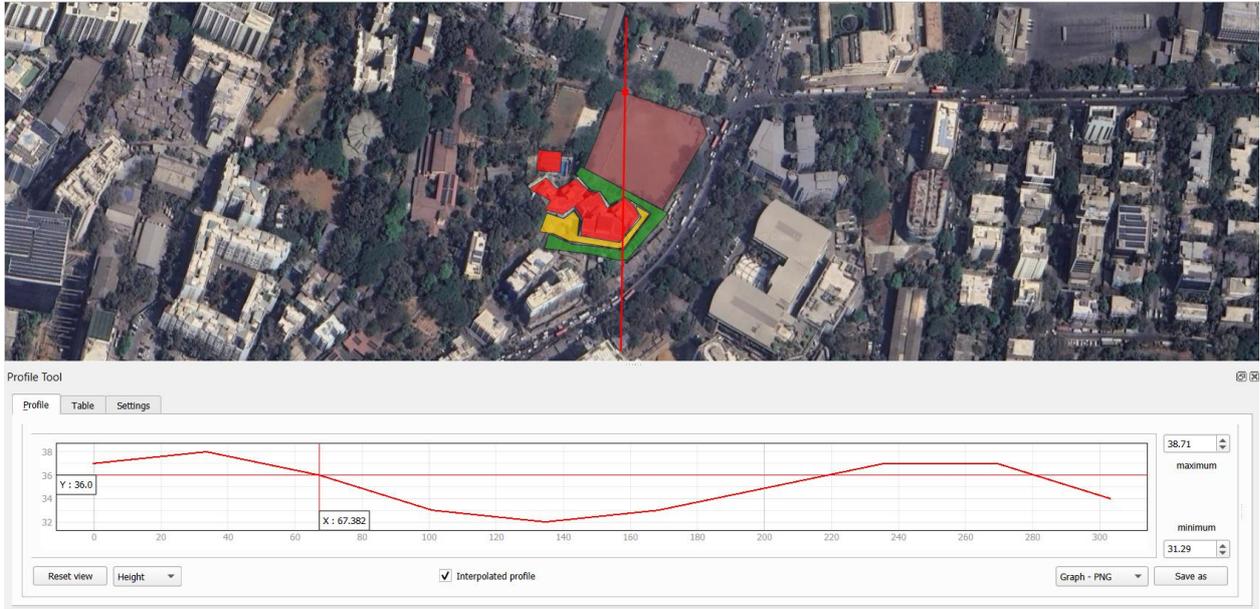
TERRAIN PROFILE ANALYSIS

Profile 1: North–South

- **Elevation Range: 31.29 m to 38.71 m → Relief: ~7.42 m**

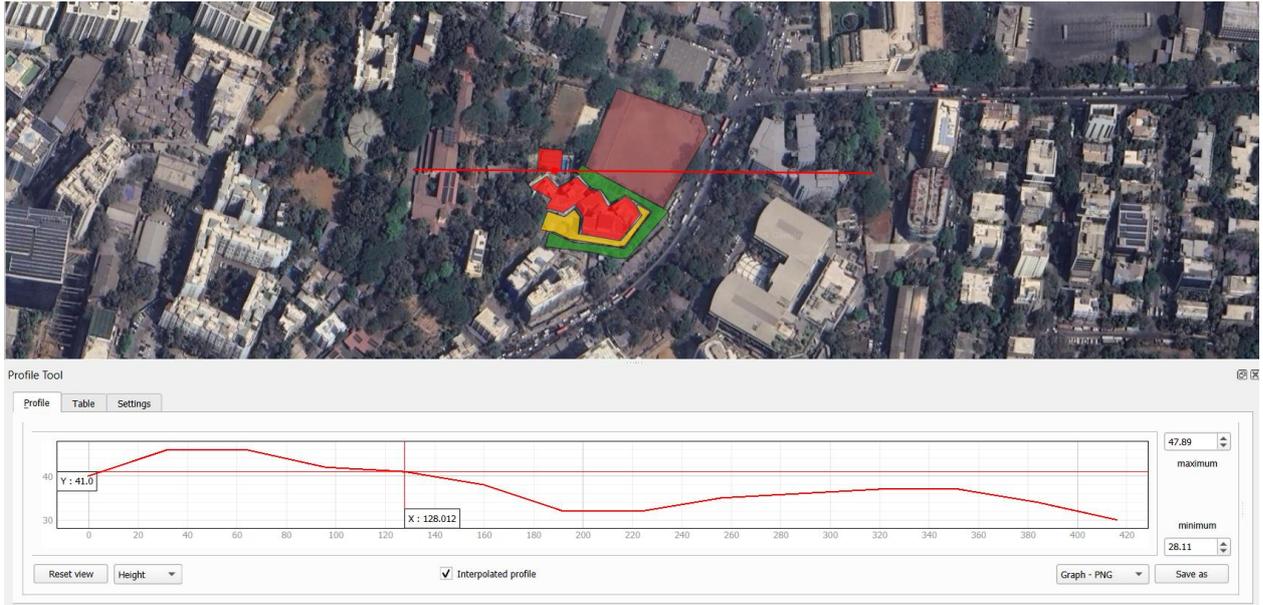


- **Slope Pattern:**
 - Central ridge; slopes gradually toward both north and south
- **Drainage Implication:**
 - Runoff likely diverges from central high point
 - Low zones on both ends can support **recharge or retention zones**



Profile 2: East–West

- **Elevation Range:** 28.11 m to 47.89 m → **Relief: ~19.78 m**
- **Slope Pattern:**
 - Pronounced slope from western edge upward to a high ridge, followed by flattening toward east
- **Drainage Implication:**
 - Runoff flows dominantly **east-to-west**
 - **Western low edge** ideal for **storage tanks or infiltration systems**



Recommendations: Storage & Recharge Zones

- **Western and southern edges** provide most suitable elevations for collection
- Use slope to your advantage for **gravity-fed recharge pits**
- Explore placement of **signage and education spots** near recharge zones or green areas for awareness

2 POTENTIAL OF RWH WATER THAT CAN BE USED FOR TOILET FLUSHING, GARDENING, TREES

- Rain Water Harvesting Potential: 23,652.54 m³/year
- If RWH water is used *for toilet flushing* then the number of students whose flushing needs can be met in a year is: 8,959
- If RWH water is used *for Gardening* then the garden area that can be supported annually is : 12,960 m²
- If RWH water is used for watering of trees, then the number of trees that can be irrigated annually is: 3,942



Formulas (with planning assumptions) :

Number of students who can flush for the school year :

Assumptions: 220 school days, 6 L per flush, 2 flushes per student per day
Supported Flushing = RWH (L) / (6 L/flush × 2 flushes/student/day × 220 days)

Garden area watering supported annually :

Assumption: 5 L/m²/day year-round (365 days)
Garden Area = RWH (L) / (5 L/m²/day × 365 days)

Number of trees watering supported in the dry season :

Assumptions: 50 L/tree/day, dry season = 120 days
Trees Supported = RWH (L) / (50 L/tree/day × 120 days)

Notes:

Unit equivalence used: **1 m³ = 1 kL = 1,000 liters.**

If a school uses low-flow fixtures (e.g., 4 L/flush), swap **6** with **4** in the formula to show a conservative/efficient scenario.

References:

Flush volume (6 L/flush baseline): WHO/UNICEF Joint Monitoring Programme (JMP) documentation and sector guidance indicate typical modern cistern volumes of **~6 L/flush** (with dual-flush/low-flow options ~3–4.5 L).

Garden water demand (5 L/m²/day): Based on FAO irrigation planning practice using crop evapotranspiration (ET_c). FAO Irrigation & Drainage Paper 56 (Allen et al.) gives the ET_c methodology.

Tree water need (50 L/tree/day): Practical planning baseline used in municipal/urban forestry guidance for **medium-sized** trees under warm conditions. This aligns with typical dry-season irrigation allowances derived from canopy size and ET; it's an assumption you can scale by species/size if schools provide

3 CARBON SEQUESTRATION POTENTIAL

- **Total Green Area = 1,746.32 m²**
- Using IPCC standard sequestration rate: **0.9 kg CO₂/m²/year**
- **Estimated Annual CO₂ Sequestration = 1,746.32 × 0.9 = 1,571.69 kg/year = 1.57 metric tons CO₂/year**

4 SOLAR INSTALLATION

- Refer to : <https://ecosjwestzone.org/solar-dashboard/> for Province/School information.
- Installed On Grid kW Capacity : 80 kW
- Installed Off Grid kW Capacity : 0
- Zero Bill Status: Not clear



5 Legend

- RWH: Rain Water Harvesting
- CHIRPS: Climate Hazards Group InfraRed Precipitation with Station data (It is a quasi-global dataset that blends satellite infrared imagery with ground-based rain gauge observations.)
- IPCC: Intergovernmental Panel on Climate Change (a United Nations body that assesses the science related to climate change, its causes, impacts, and possible solutions.)
- Carbon Sequestration: the process of capturing carbon dioxide (CO₂) from the atmosphere and storing it long-term in reservoirs like oceans, soil, trees. For the report the Trees/Greenery area in the school is considered.