St. Stanislaus High School, Bandra, 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:

RWH = P × A × C

Where:

- **P** = Mean annual rainfall (in meters)
- **A** = Surface area (m^2)
- **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	3,831.02	3.831
2023	2,833.63	2.834
2022	3,560.75	3.561

- **Mean Annual Rainfall (P) = (3.831 + 2.834 + 3.561) / 3 = 3.4087 m/year**

- **Surface Area Data**

Surface Type	Area (m^2)	Runoff Coefficient
Roof	4,113.29	0.875
Paved	3,418.36	0.7
Unpaved	4,565.47	0.6
Green	3,040.22	— (excluded from RWH)

RWH Calculations

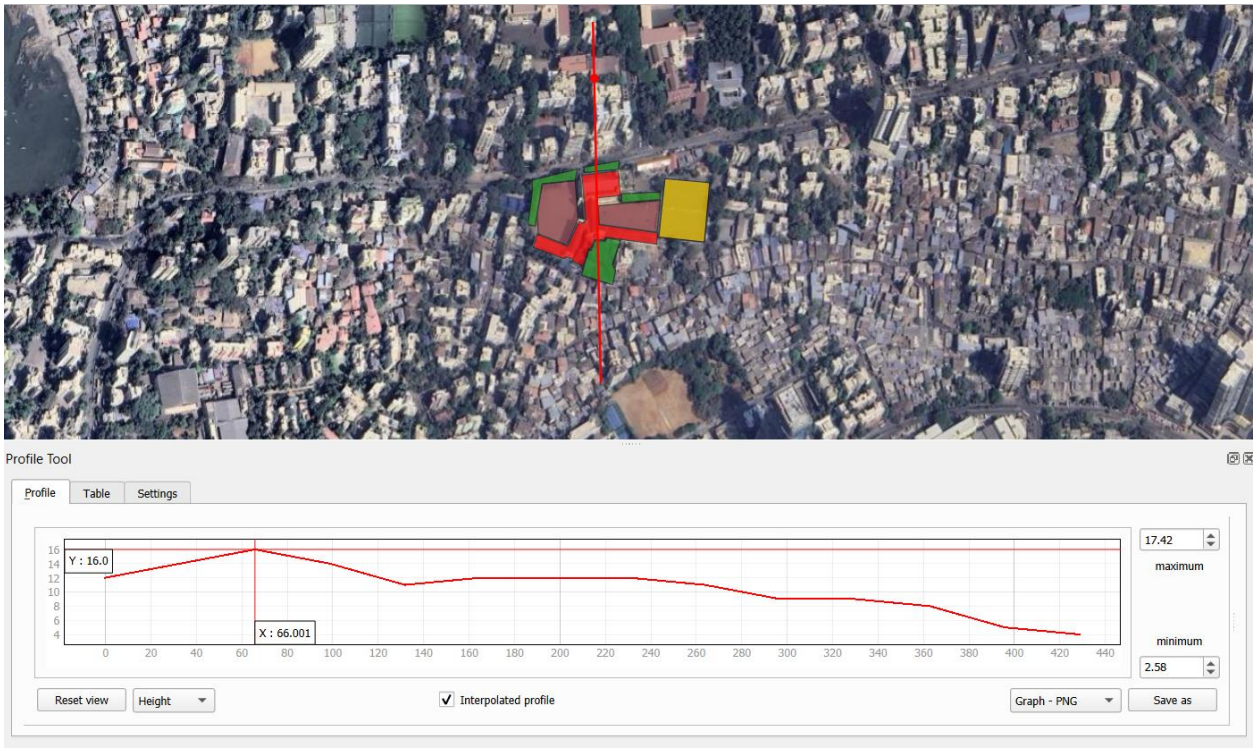
- RWH (Roof) = 3.4087 × 4,113.29 × 0.875 = 12,289.28 m^3
- RWH (Paved) = 3.4087 × 3,418.36 × 0.7 = 8,357.92 m^3
- RWH (Unpaved) = 3.4087 × 4,565.47 × 0.6 = 9,342.60 m^3
- **Total Annual Harvestable Rainwater (Total RWH) = 12,289.28 + 8,357.92 + 9,342.60 = 29,989.80 m^3 = 29,989,800 liters/year**

TERRAIN PROFILE ANALYSIS

Profile 1: North–South

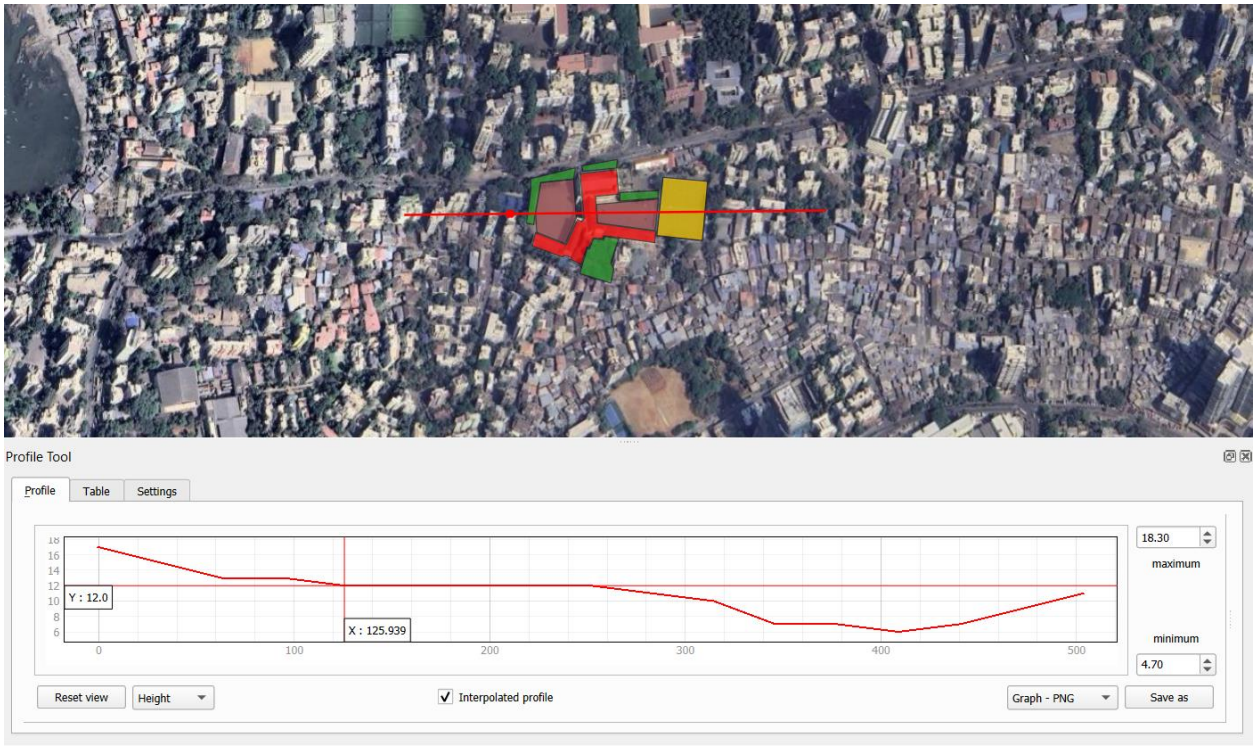
- **Elevation Range**: 2.58 m to 17.42 m → **Relief: ~14.84 m**
- **Slope Pattern**:
  - Central ridge (~17 m), declining gradually southward
  - Lower zone near southern boundary (~2.6 m)
- **Drainage Implication**:

- Prominent runoff slope from center to south
- **South edge ideal for storage tanks or infiltration pits**



Profile 2: East–West

- **Elevation Range**: 4.70 m to 18.30 m → **Relief: ~13.60 m**
- **Slope Pattern**:
  - Gradual slope down from center to east
  - Depressions along mid-east and northeast zones
- **Drainage Implication**:
  - Best recharge zones: **eastern edge and southern margin**
  - Can support **distributed water harvesting structures**



Recommendations: Storage & Recharge Zones

- **Primary recharge zone**: Southern edge (lowest point from both profiles)
- **Secondary zones**: Eastern perimeter and inner courtyard near central ridge
- **Combine runoff from roof and paved areas** into bio-swales and percolation pits
- Use **green zone** for signposting RWH awareness and **eco-selfie points**

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

- Rain Water Harvesting Potential: 29,989.8 m^3/year
- If RWH water is used *for toilet flushing* then the number of students whose flushing needs can be met in a year is: 11,360
- If RWH water is used *for Gardening* then the garden area that can be supported annually is : 16,433 m^2
- If RWH water is used for watering of trees, then the number of trees that can be irrigated annually is: 4,998

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 (ETc). FAO Irrigation & Drainage Paper 56 (Allen et al.) gives the ETc 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** = **3,040.22 m²**
- Using IPCC standard sequestration rate: **0.9 kg CO_2/m²/year**
- **Estimated Annual CO_2 Sequestration** = 3,040.22 × 0.9 = **2,736.20 kg/year** = **2.74 metric tons CO_2/year**

4 SOLAR INSTALLATION

- Refer to : https://ecosjwestzone.org/solar-dashboard/ for Province/School information.
- Installed On Grid kW Capacity : 74 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.