



St. Joseph's Technical Institute, Pune

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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:

$$RWH = P \times A \times C$$

Where:

- **P** = Mean annual rainfall (in meters)
- **A** = Surface area (m²)
- **C** = Runoff coefficient

Runoff Coefficients:

- Rooftop: **0.875**
- Paved: **0.7**
- Green/Unpaved: *Excluded from RWH (used for carbon sequestration only)*



Data Considered:

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

Year	Rainfall (mm)	Rainfall (m)
2024	950.66	0.9507
2023	713.53	0.7135
2022	1009.75	1.0098

- **Mean Annual Rainfall (P):** $(0.9507 + 0.7135 + 1.0098) / 3 = 0.8613$ m/year

- **Surface Area Data**

Surface Type	Area (m ²)	Runoff Coefficient
Roof	862.70	0.875
Paved	1063.58	0.7

RWH Calculations

- **RWH (Roof)** = $0.8913 \times 862.70 \times 0.875 = 672.28$ m³
- **RWH (Paved)** = $0.8913 \times 1063.58 \times 0.7 = 662.18$ m³

Total Annual Harvestable Rainwater = $672.28 + 662.18 = 1,334.46$ m³ = **1,334,460 liters/year**

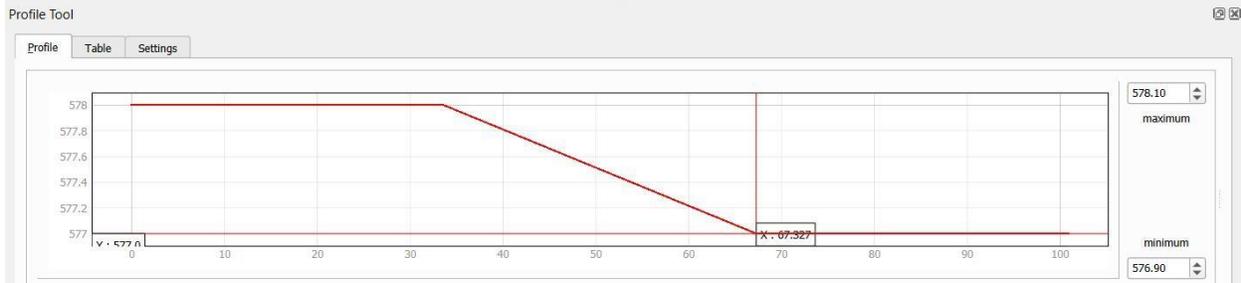
TERRAIN PROFILE ANALYSIS

Profile 1: North–South

- **Elevation Range:** 578.10 m to 576.90 m → **Relief:** ~1.2 m
- **Slope Pattern:** Flat to slightly southward slope
- **Drainage Implication:**
Gentle gradient implies limited surface flow; point drainage or percolation pits

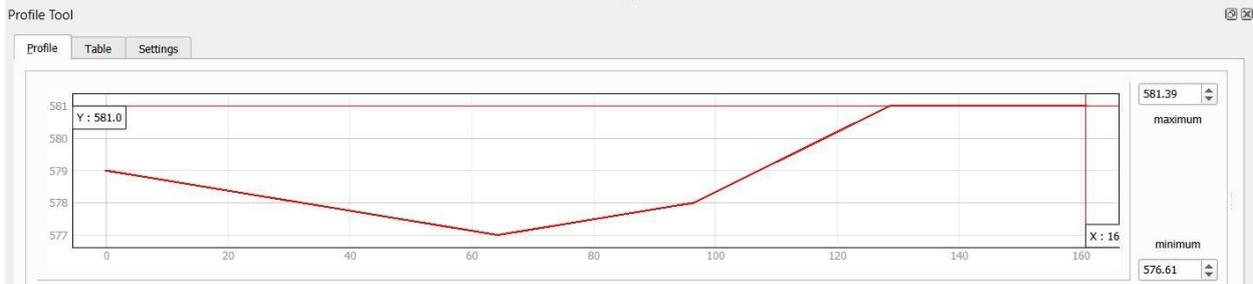


recommended along southern edge



Profile 2: East–West

- **Elevation Range:** 581.39 m to 576.61 m → **Relief:** ~4.78 m
- **Slope Pattern:** West-to-east fall
- **Drainage Implication:**
Construct shallow trenches or recharge pits along eastern boundary to slow runoff and promote infiltration



Recommendations: Storage & Recharge Zones

- Prioritize **eastern boundary** for recharge pits or tank placement
- Use **small retention basins** or **permeable pavements** for paved area runoff
- Install basic eco-awareness signage near paved drainage features for educational value

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

- Rain Water Harvesting Potential: 1,334.46 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: 505
- If RWH water is used *for Gardening* then the garden area that can be supported annually is : 731 m²
- If RWH water is used for watering of trees, then the number of trees that can be irrigated annually is: 222



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 = $RWH (L) / (6 L/flush \times 2 flushes/student/day \times 220 days)$

Garden area watering supported annually :

Assumption: 5 L/m²/day year-round (365 days)

Garden Area = $RWH (L) / (5 L/m^2/day \times 365 days)$

Number of trees watering supported in the dry season :

Assumptions: 50 L/tree/day, dry season = 120 days

Trees Supported = $RWH (L) / (50 L/tree/day \times 120 days)$

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

- No green area reported; carbon sequestration not applicable.

4 SOLAR INSTALLATION

- Refer to : <https://ecosjwestzone.org/solar-dashboard/> for Province/School information.
- Installed On Grid kW Capacity : Not Available
- Installed Off Grid kW Capacity : Not Available
- 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.