St. Xavier's School, Beed, Pune

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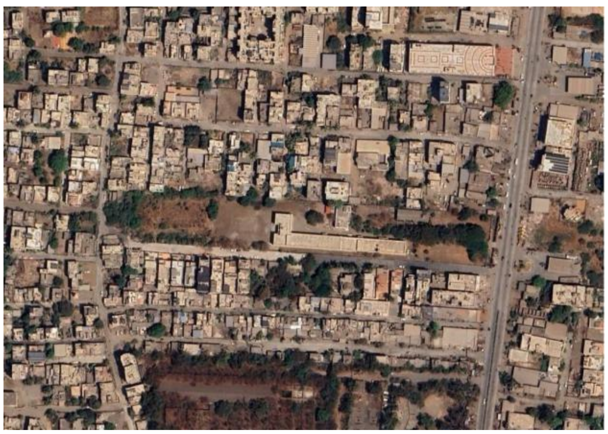
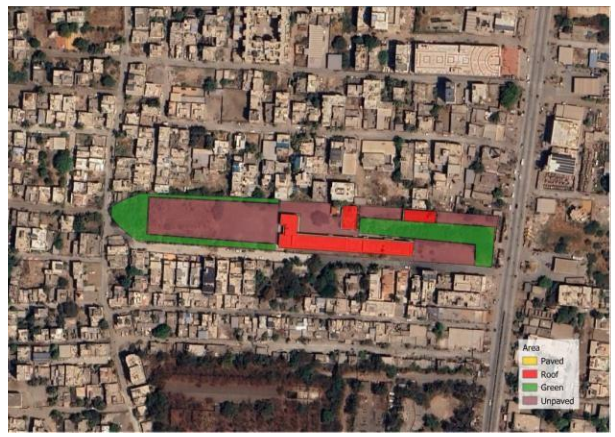
(Data Generated for JAAI West Zone Conference 14-16 Nov 2025)

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





1 RAINWATER HARVESTING ANALYSIS

RWH Formula:

RWH = P × A × C

Where:

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

Runoff Coefficients:

- **Rooftop**: 0.875
- **Paved**: 0.7
- **Unpaved**: 0.6
- **Green**: Excluded from RWH (used for carbon sequestration only)

Data Considered:

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

Year	Rainfall (mm)	Rainfall (m)
2024	1027.57	1.0276
2023	741.57	0.7416
2022	1094.23	1.0942

- **Mean Annual Rainfall (P)** = (1.0276 + 0.7416 + 1.0942) / 3 = **0.G545 m/year**

- ## Surface Area Data:

Surface Type	Area (m²)	Runoff Coefficient
Roof	2,438.57	0.875
Paved	—	—
Unpaved	7,328.04	0.6
Green	4,274.28	(excluded)

RWH Calculations

- **RWH (Roof)** = 0.9545 × 2,438.57 × 0.875 = **2,036.88 m³**
- **RWH (Unpaved)** = 0.9545 × 7,328.04 × 0.6 = **4,200.65 m³**

Total Annual Harvestable Rainwater

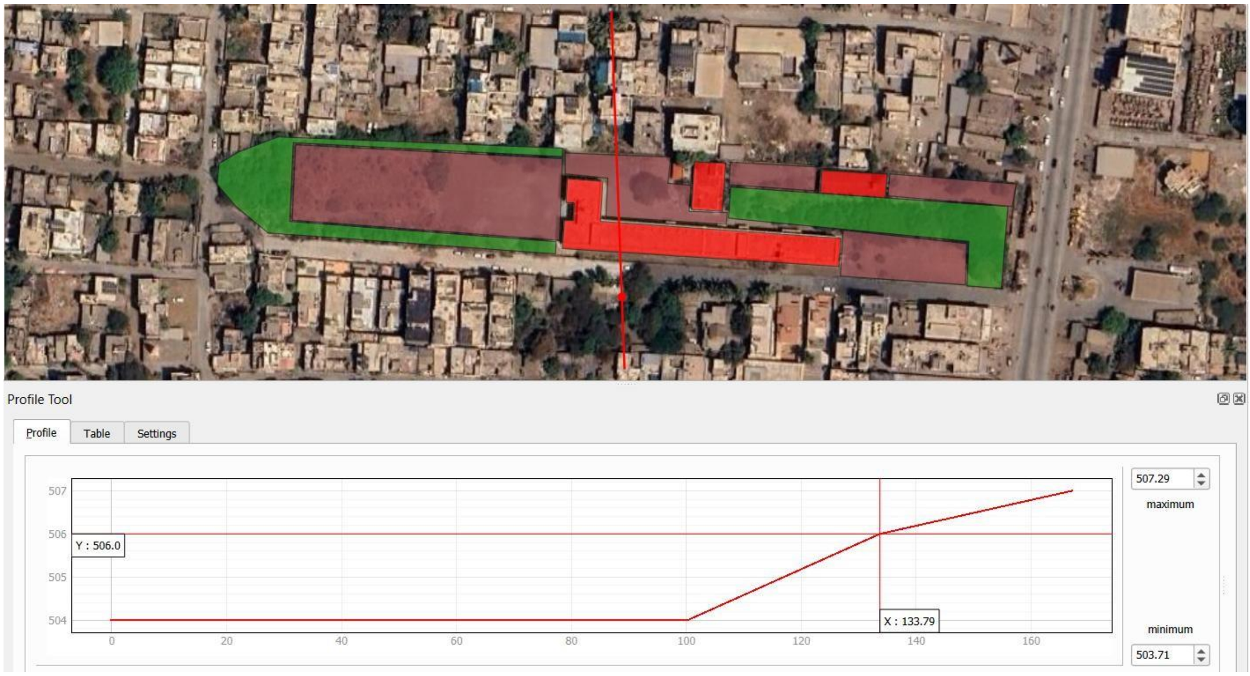
Total RWH = 2,036.88 + 4,200.65 = **6,237.53 m³**
= **6,237,530** liters/year

TERRAIN PROFILE ANALYSIS

Profile 1: North–South

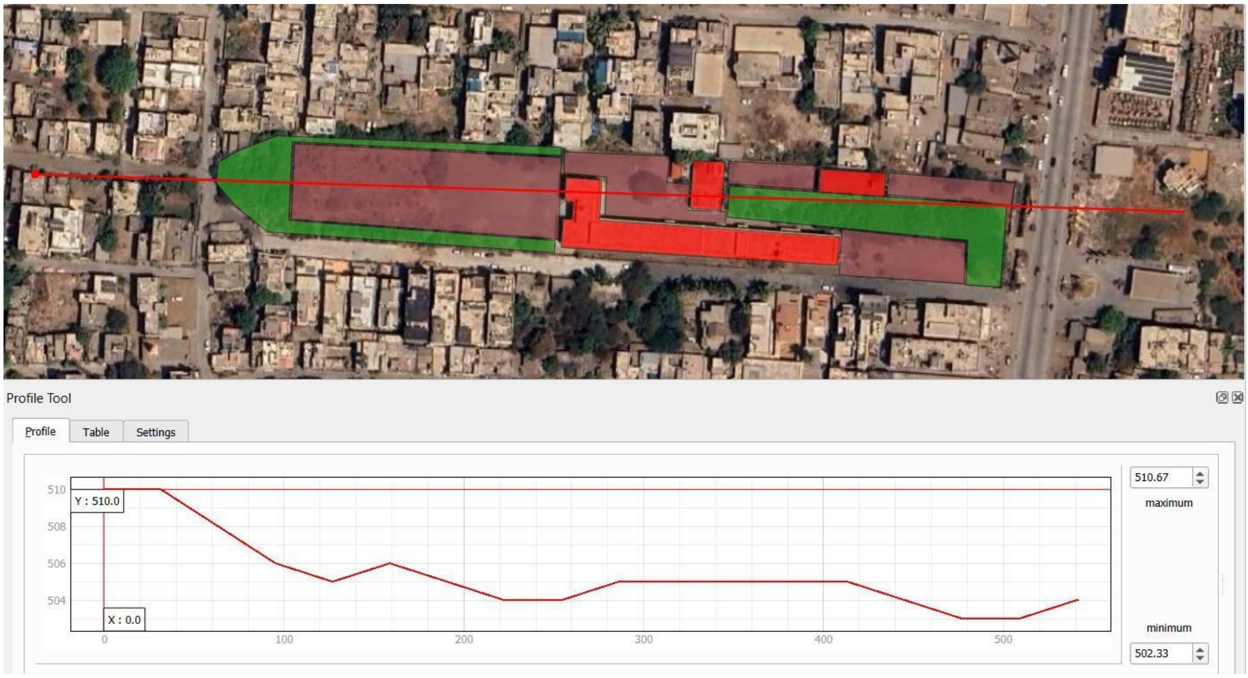
- **Elevation Range**: 503.71 m to 507.29 m → **Relief: ~3.58 m**

- **Slope Pattern**: Gradual incline towards the north
- **Drainage Implication**: Drainage is likely directed southward; storage/recharge zones recommended near southern boundary



Profile 2: East–West

- **Elevation Range**: 502.33 m to 510.67 m → **Relief: ~8.34 m**
- **Slope Pattern**: Declining terrain from east to west
- **Drainage Implication**: Water runoff likely flows westward; infiltration trenches or tanks can be strategically placed on western side



RECOMMENDATIONS: STORAGE s RECHARGE ZONES

- Establish recharge trenches along **southern and western boundaries**
- Add **permeable paving** in paved areas to improve groundwater infiltration
- Encourage **tree planting in green areas** to enhance sequestration
- Use **eco-awareness signage** to promote water conservation among students

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

- Rain Water Harvesting Potential: 6,237.53 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: 2,362
- If RWH water is used *for Gardening* then the garden area that can be supported annually is : 3,417 m^2
- If RWH water is used for watering of trees, then the number of trees that can be irrigated annually is: 1,039

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 $L/m^2/day$ year-round (365 days)
Garden Area = RWH (L) / (5 $L/m^2/day$ × 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 m^3 = 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 $L/m^2/day$): *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** = 4,274.28 m^2
- **IPCC Standard Rate** = 0.9 kg CO_2/m^2/year
- **Estimated Annual CO_2 Sequestration** = 4,274.28 × 0.9 = **3,846.85 kg/year**
  = 3.85 metric tons CO_2/year

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 (CO_2) 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.