Loyola High School and Junior College, Pashan, Pune

(For any queries, clarifications kindly email: jaaiwzc25@gmail.com)
(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 (CHIRPS - Last Three Years)**

Year	Rainfall (mm)	Rainfall (m)
2024	1130.86	1.1309
2023	820.10	0.8201
2022	1175.95	1.1760

- **Mean Annual Rainfall (P)** = (1.1309 + 0.8201 + 1.1760) / 3 = **1.0423 m/year**

- ## Surface Area Data:

Surface Type	Area (m^2)	Runoff Coefficient
Roof	5,805.49	0.875
Paved	18,975.27	0.7
Unpaved	27,890.76	0.6
Green	19,757.23	Excluded

RWH Calculations

- **RWH (Roof)** = 1.0423 × 5,805.49 × 0.875 = **5,2G5.80 m^3**
- **RWH (Paved)** = 1.0423 × 18,975.27 × 0.7 = **13,825.G8 m^3**
- **RWH (Unpaved)** = 1.0423 × 27,890.76 × 0.6 = **17,446.84 m^3**

Total Annual Harvestable Rainwater = 5,295.80 + 13,825.98 + 17,446.84 = 36,568.62 m^3/year = **36,568,620 liters/year**

TERRAIN PROFILE ANALYSIS

Profile 1: North–South

- **Elevation Range:** 593.38 m to 650.62 m → **Relief:** ~57.24 m
- **Slope Pattern:** Steep southward elevation gain

- ## Drainage Implication:

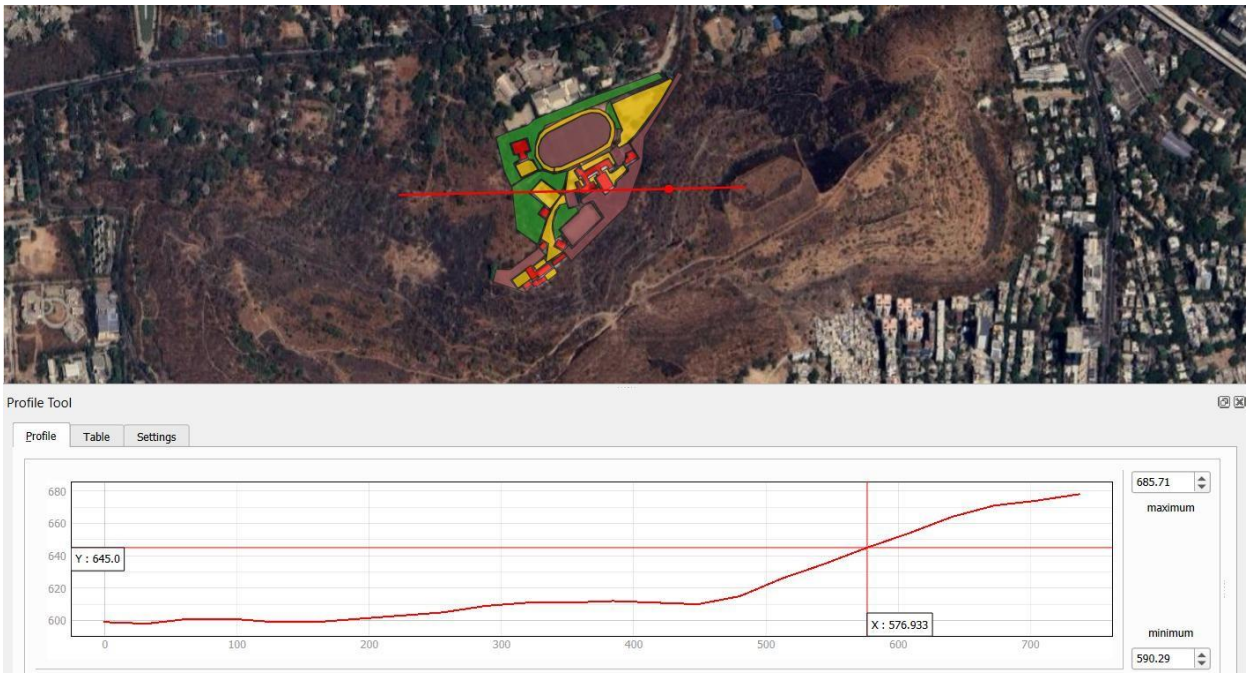
  Potential for water to accumulate in northern portions; recommend drainage channels or infiltration pits along southern and central zones

Profile 2: East–West

- **Elevation Range:** 590.29 m to 685.71 m → **Relief:** ~95.42 m
- **Slope Pattern:** Sharp gradient increasing toward the east

- ## Drainage Implication:

  Runoff likely channeled eastward; suitable site for check dams, swales, or tank structures on the east boundary



Recommendations: Storage & Recharge Zones

- Install recharge trenches and tanks along eastern and southern edges
- Convert select paved areas to permeable pavement to enhance infiltration
- Include tree plantation drives to enhance sequestration
- Use elevation-aware planning to divert rooftop water into recharge pits on lower elevations

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

- Rain Water Harvesting Potential: 36,568.62 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: 13,851
- If RWH water is used *for Gardening* then the garden area that can be supported annually is : 20,037 m^2
- If RWH water is used for watering of trees, then the number of trees that can be irrigated annually is: 6094

3 Carbon Sequestration Potential

- **Total Green Area** = 19,757.23 m²
- **IPCC sequestration rate** = 0.9 kg CO_2/m²/year
- Estimated Annual CO_2 Sequestration =

  19,757.23 × 0.9 = **17,781.51 kg/year** = **17.78 metric tons CO_2/year**

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*

4 SOLAR INSTALLATION

- Refer to : https://ecosjwestzone.org/solar-dashboard/ for Province/School information.
- Installed On Grid kW Capacity : 72 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.