



# Dnyanamata Vidyalaya, Sangamner, Pune

(For any queries, clarifications kindly email: [jaaiwzc25@gmail.com](mailto: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:

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

Where:

P = Mean annual rainfall (in meters)

A = Surface area (m<sup>2</sup>)

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	895.52	0.8955
2023	703.86	0.7039
2022	913.38	0.9134

- Mean Annual Rainfall (P) =  $(0.8955 + 0.7039 + 0.9134) / 3 = 0.8376$  m/year

- Surface Area Data

Surface Type	Area (m <sup>2</sup> )	Runoff Coefficient
Roof	1,751.78	0.875
Paved	1,834.87	0.7
Unpaved	15,308.34	0.6
Green	1,756.21	<i>(excluded)</i>

## RWH Calculations

- RWH (Roof) =  $0.8376 \times 1,751.78 \times 0.875 = 1,283.30$  m<sup>3</sup>
- RWH (Paved) =  $0.8376 \times 1,834.87 \times 0.7 = 1,075.42$  m<sup>3</sup>
- RWH (Unpaved) =  $0.8376 \times 15,308.34 \times 0.6 = 7,688.94$  m<sup>3</sup>

## Total Annual Harvestable Rainwater

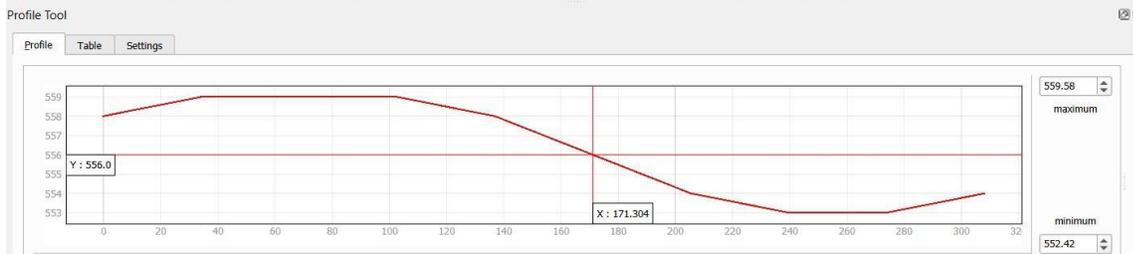
Total RWH =  $1,283.30 + 1,075.42 + 7,688.94 = 10,047.66$  m<sup>3</sup> = 10,047,660 liters/year



## TERRAIN PROFILE ANALYSIS

### Profile 1: North–South

- **Elevation Range:** 552.42 m to 559.58 m → **Relief:** ~7.16 m
- **Slope Pattern:** Gentle northward incline; slope moderate at southern edge
- **Drainage Implication:**
  - South to north drainage flow
  - Best recharge zone: **northern boundary**

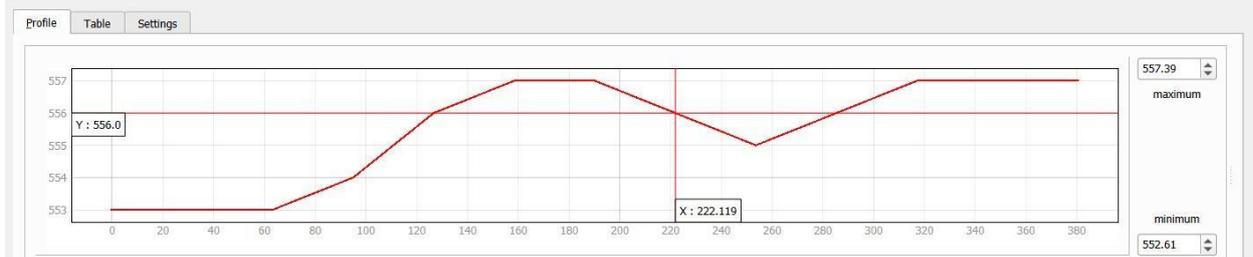


### Profile 2: East–West

- **Elevation Range:** 552.61 m to 557.39 m → **Relief:** ~4.78 m
- **Slope Pattern:** Mostly flat center; slight eastward rise
- **Drainage Implication:**
  - Drainage likely toward **west and south edges**
  - Storage/harvesting potential in **southwestern quadrant**



Profile Tool



## Recommendations: Storage & Recharge Zones

- Prioritize northern and southwestern edges for recharge trenching
- **Green zone** can be enhanced with native trees for maximum sequestration
- Consider **perforated tank-based recharge structures** for flat paved areas
- Display **educational signage** around water harvesting systems and green belts

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

- Rain Water Harvesting Potential: 10,047.66 m<sup>3</sup>/year
- If RWH water is used *for toilet flushing* then the number of students whose flushing needs can be met in a year is: 3,805
- If RWH water is used *for Gardening* then the garden area that can be supported annually is : 5,505 m<sup>2</sup>
- If RWH water is used for watering of trees, then the number of trees that can be irrigated annually is: 1,674



**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/m<sup>2</sup>/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:  $1 m^3 = 1 kL = 1,000 liters$ .

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<sup>2</sup>/day):** Based on FAO irrigation planning practice using crop evapotranspiration (ET<sub>c</sub>). FAO Irrigation & Drainage Paper 56 (Allen et al.) gives the ET<sub>c</sub> 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 = 1,756.21 m<sup>2</sup>
- IPCC sequestration rate = 0.9 kg CO<sub>2</sub>/m<sup>2</sup>/year
- Estimated Annual CO<sub>2</sub> Sequestration =  $1,756.21 \times 0.9 = 1,580.59 \text{ kg/year}$   
= 1.58 metric tons CO<sub>2</sub>/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: -



## 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<sub>2</sub>) 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.