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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 (m^2)
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	1191.84	1.1918
2023	811.82	0.8118
2022	1054.72	1.0547

- Mean Annual Rainfall (P) = (1.1918 + 0.8118 + 1.0547) / 3 = 1.0194 m/year

- ## Surface Area Data

Surface Type	Area (m^2)	Runoff Coefficient
Roof	11,415.58	0.875
Paved	12,326.06	0.7
Unpaved	33,708.31	0.6
Green	11,182.30	— (excluded)

RWH Calculations

- RWH (Roof) = 1.0194 × 11,415.58 × 0.875 = 10,182.75 m^3
- RWH (Paved) = 1.0194 × 12,326.06 × 0.7 = 8,786.17 m^3
- RWH (Unpaved) = 1.0194 × 33,708.31 × 0.6 = 20,615.80 m^3

Total Annual Harvestable Rainwater

Total RWH = 10,182.75 + 8,786.17 + 20,615.80 = 39,584.71 m^3/year = 39,584,710 liters/year

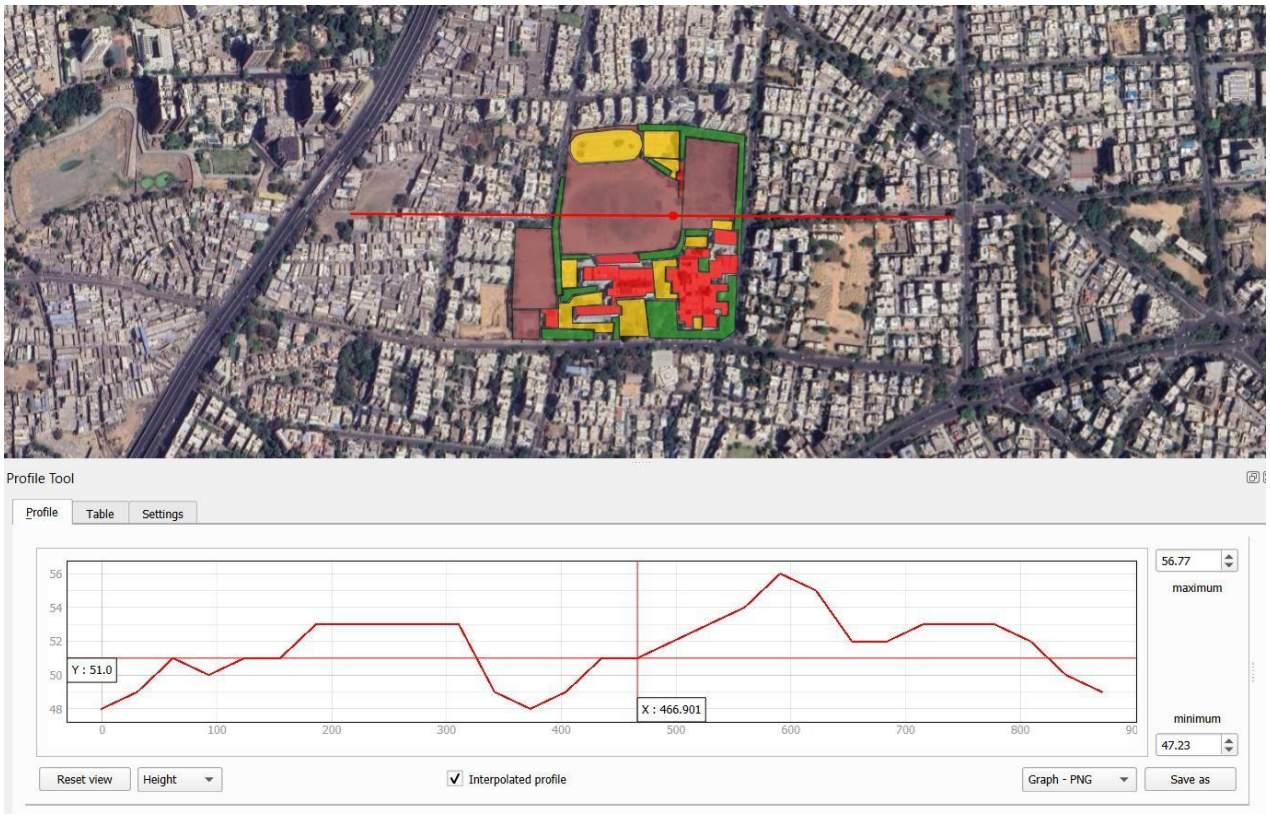
TERRAIN PROFILE ANALYSIS

Profile 1: North–South

- Elevation Range: 47.84 m to 62.16 m → Relief: ~14.32 m
- Slope Pattern: Central low point with surrounding rise suggests inward collection
- Drainage Implication: Ideal for a central recharge system and sideward infiltration

Profile 2: East–West

- Elevation Range: 47.23 m to 56.77 m → Relief: ~9.54 m
- Slope Pattern: Gentle slope toward east and west flanks
- Drainage Implication: Suitable for placing lateral recharge swales and staggered storage along east and west



Recommendations: Storages Recharge Zones

- Central depression area offers potential for a large underground recharge tank
- East–west flanks may benefit from lateral recharge swales
- Western green zone can be designated for bio-swale integration
- Permeable paving upgrades may improve paved zone infiltration

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

- Rain Water Harvesting Potential: 26,184.39 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: 14,994
- If RWH water is used *for Gardening* then the garden area that can be supported annually is : 21,690 m^2
- If RWH water is used for watering of trees, then the number of trees that can be irrigated annually is: 6,597

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 = 11,182.30 m²
- IPCC Standard Rate: 0.9 kg CO_2/m²/year
- Estimated CO_2 Sequestration = 11,182.30 × 0.9 = 10,064.07 kg/year = 10.06 metric tons CO_2/year

4 SOLAR INSTALLATION

- Refer to : https://ecosjwestzone.org/solar-dashboard/ for Province/School information.
- Installed On Grid kW Capacity : 18 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.