Campion School, Colaba, Bombay

(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

Area-Based RWH Formula

RWH = P × A × C

Where:

- **P** = Mean annual rainfall (in meters)
- **A** = Catchment area (m²)
- **C** = Runoff coefficient
    - Rooftop: 0.875 (average of 0.8–0.95)
    - Paved: 0.7 (concrete/compacted surface)

Data Considered:

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

Year	Rainfall (mm)	Rainfall (m)
2024	3501.243	3.501
2023	2651.150	2.651

2022	3134.591	3.135

- **Mean Rainfall (P)** = (3.501 + 2.651 + 3.135) / 3 = **3.0G6 m/year**
- **Rooftop Area (A_1)** = 1,306.47 m^2
- **Paved Area (A_2)** = 1,710.73 m^2

- Runoff Coefficients:
  - Rooftop (C_1) = 0.875
  - Paved (C_2) = 0.7

Calculations:

- **RWH from Rooftop** = 3.096 × 1,306.47 × 0.875 = **3,537.99 m^3**
- **RWH from Paved Area** = 3.096 × 1,710.73 × 0.7 = **3,713.89 m^3**
- **Total Annual Harvestable Rainwater** =
  3,537.99 + 3,713.89 = 7,251.88 m^3 = 7,251,880 liters

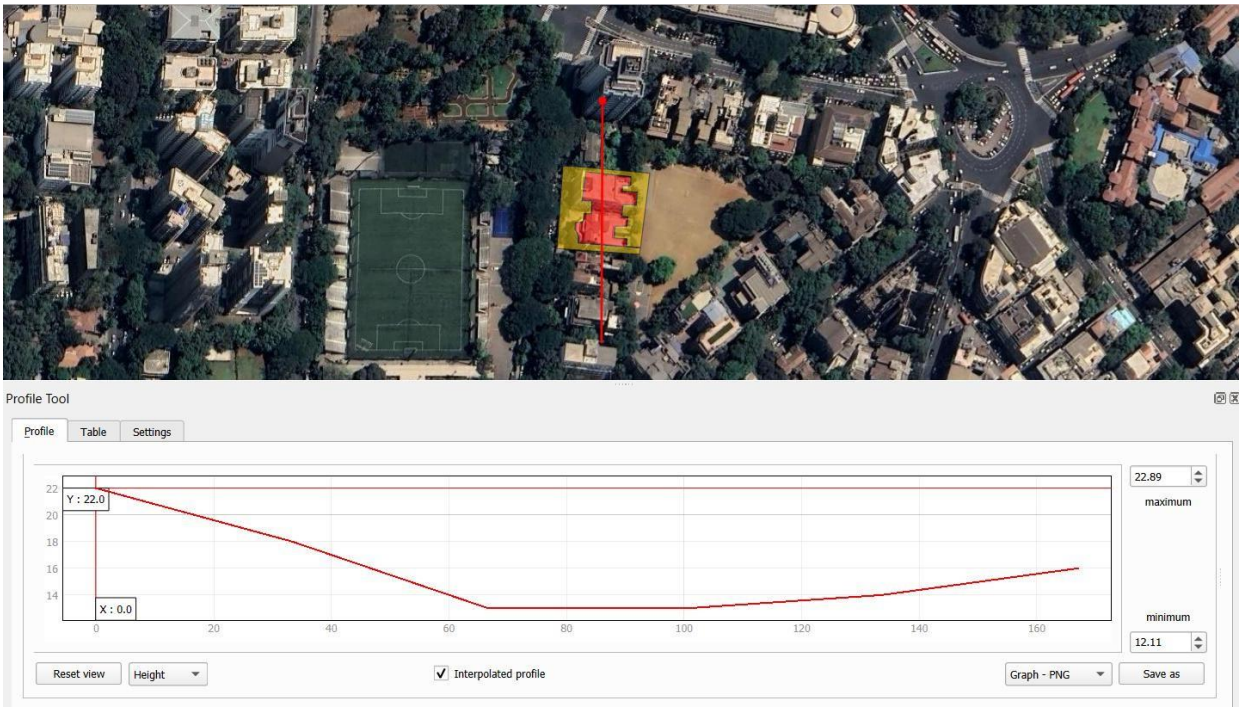
TERRAIN PROFILE ANALYSIS

Profile 1: North–South Direction

- **Elevation Range:** 22.89 m (max) to 12.11 m (min) → **Relief: ~10.78 m**

- Slope Pattern:
  - Decline from the northern edge (22.89 m) to a low (~12.11 m) at the southern boundary.
  - Gentle upward gradient after the trough.

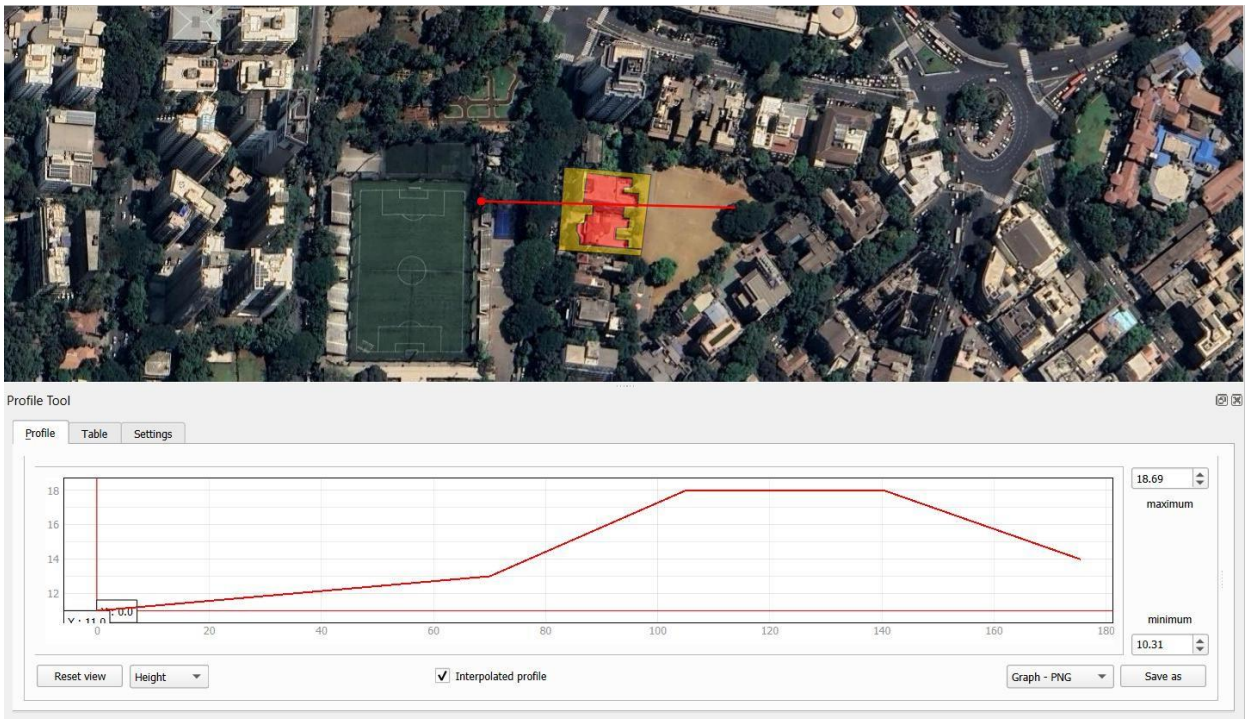
- Drainage Implication:
  - Northern roof and paved areas naturally drain southward.
  - Southern trough is an ideal location for **ground recharge pits** or **detention storage tanks**.



Profile 2: East–West Direction

- **Elevation Range:** 18.69 m (max) to 10.31 m (min) → **Relief: ~8.38 m**

- Slope Pattern:
    - Gradual rise from west to a central peak (~18.69 m), then drop eastward.
- Drainage Implication:
    - Suggests **central mound** with runoff toward both east and west.
    - East and west edges are **viable locations for RWH structures** if no utility conflicts exist.



Potential Storage & Recharge Zones Mapping (Recommendation)

- **Central low-lying points in both profiles** should be marked as **primary recharge zones.**
- Storage tanks can be placed along the **southern edge** (per NS profile) and **eastern edge** (per EW profile) for gravity-based collection.
- **Overlay with green/open area** to explore **bio-retention swales** and **percolation trenches.**

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

- Rain Water Harvesting Potential: 7,251.88 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: 2,747
- If RWH water is used *for Gardening* then the garden area that can be supported annually is : 3,974 m^2
- If RWH water is used for watering of trees, then the number of trees that can be irrigated annually is: 1,209

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: Campion School is within a building. The greenery area could not be located on the Google Earth.

4 SOLAR INSTALLATION

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