

## Introduction

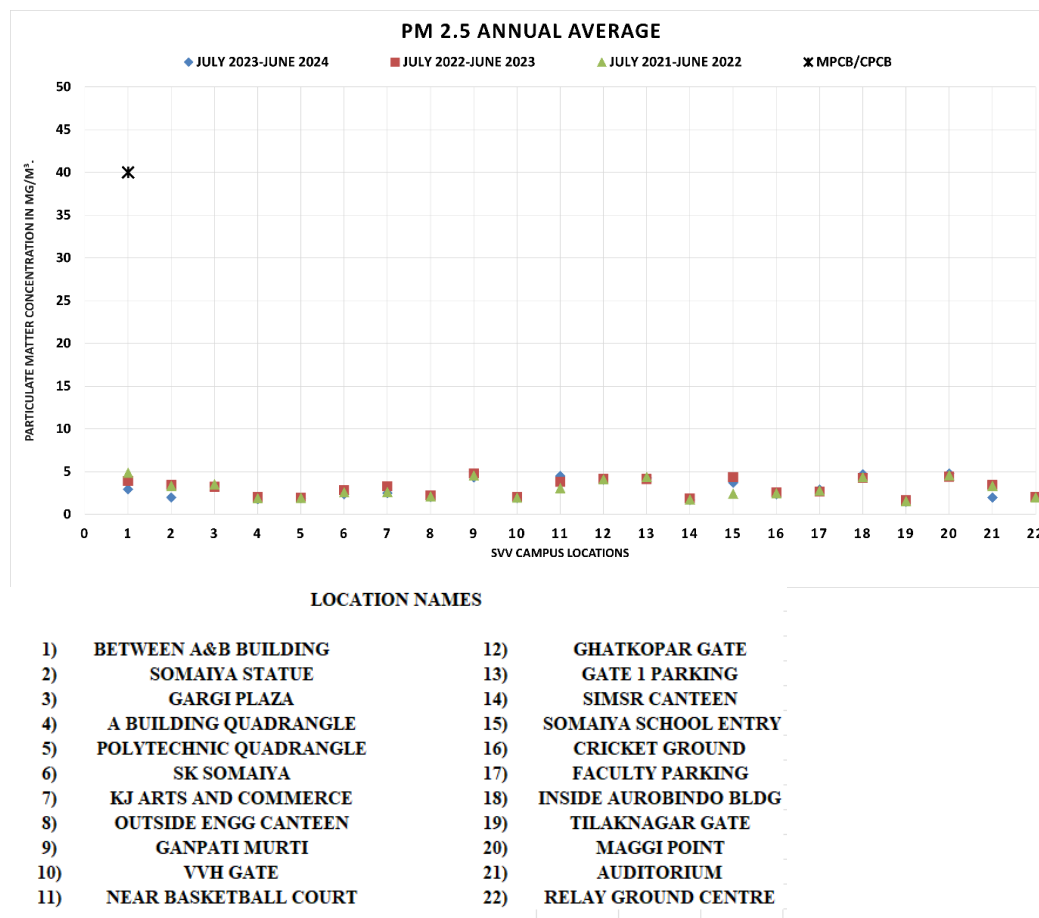
A study conducted by Dr. Siddappa S Bhusnoor from Mechanical Engineering Department as a part of Student internship work to analyze the ambient air quality of Somaiya Vidyavihar Campus and its comparison with MPCB, CPCB and WHO standards. This report consists of measurement and analysis of particulate matter (PM) 2.5 levels for 24-hour and annual basis and comparison of measured PM 2.5 levels with that of standards provided by the Central Pollution Control Board (CPCB) and Maharashtra pollution control board (MPCB) limits.

## Methodology

Using the HAL-HPC601, an instrument capable of measuring and recording particulate matter in five stages (required five stages can be set manually), air sampling were taken from 22 different locations within the SVV campus (for three consecutive years starting from July 2021 to June 2024). The study involved measurement of 10 readings for every first week of the month at each sampling location for five sizes of particulate matter (PM 0.5 TO PM 2.5, in a step of 0.5 micrometer). The focus was on PM 2.5 micron because of their adverse effects on health and environment (particles less than 2.5 microns can enter the lungs and bloodstream, posing significant health risks).

## Key Findings from the present study

### 1) Analysis of PM 2.5 (Annual Average Levels) in SVV Campus and comparison with MPCB/CPCB standard



## Findings

Out of the 22 points covered on the entire campus, it was found that:

PM 2.5 levels within the campus consistently showed lower values compared to the CPCB annual average limit of  $40 \mu\text{g}/\text{m}^3$ . This indicates that the campus environment maintains better air quality than the surrounding urban areas of Mumbai city.

Yearly Distribution: The data shows variability in PM 2.5 levels across different years:

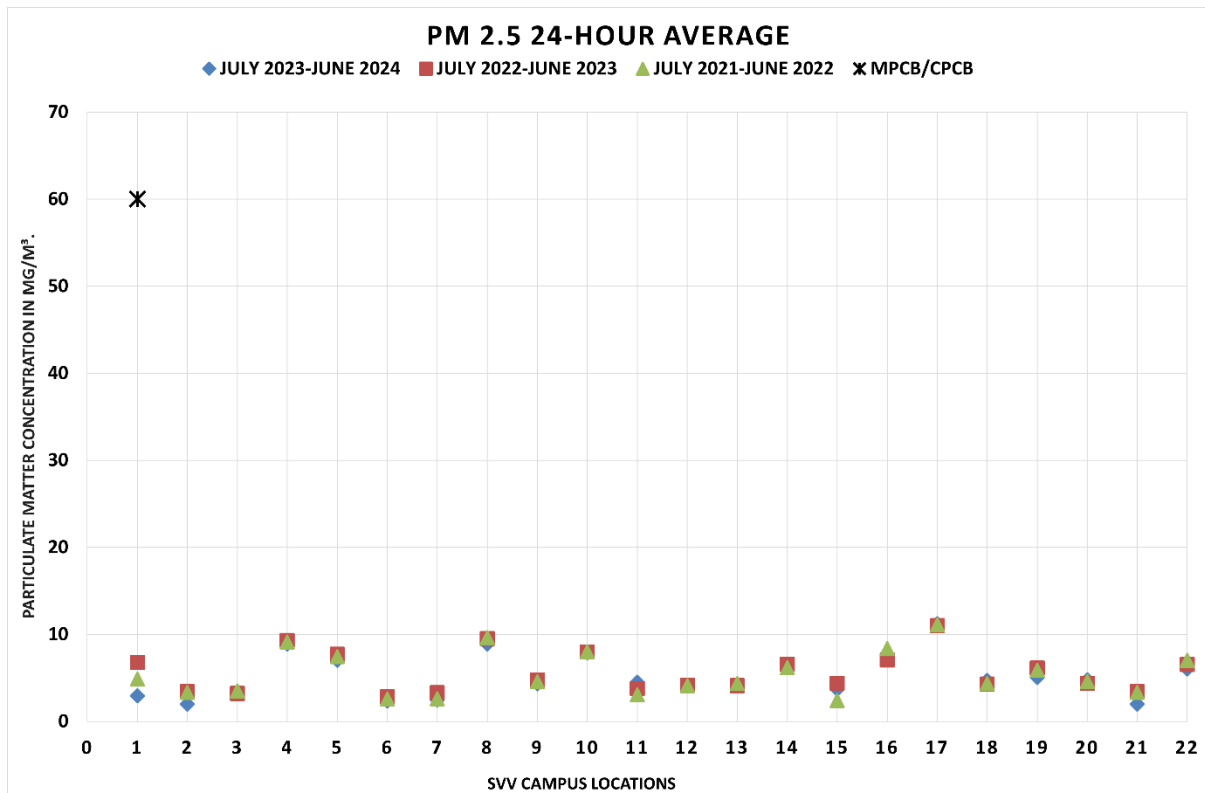
- JULY 2023-JUNE 2024: Most of the readings are below  $40 \mu\text{g}/\text{m}^3$ , suggesting a significant improvement in air quality in recent times.
- JULY 2022-JUNE 2023: Many readings are clustered around  $2 \mu\text{g}/\text{m}^3$  to  $5 \mu\text{g}/\text{m}^3$ , indicating slightly higher levels compared to 2023 but still within safe limits.
- JULY 2021-JUNE 2022: The readings show more variability, with some points reaching close to  $5.2 \mu\text{g}/\text{m}^3$ . However, these values are still below the CPCB threshold.

Overall, Campus Average: Most of the campus readings fell below  $40 \mu\text{g}/\text{m}^3$ , which is the regulatory limit set by CPCB. This suggests that the air quality on campus is well-maintained and poses less health risk to students and staff.

Distribution Across Locations: The distribution of the data points across the 22 locations indicates some variability, but overall, the PM 2.5 levels remained within safer limits. This variability might be due to differences in proximity to pollution sources or varying environmental conditions at different locations on campus such as construction sites, road dust, open playing grounds, gardening and open composting lands.

Health Implications: The lower PM 2.5 levels on campus shows that the risk of health issues associated with particulate matter, such as respiratory problems and cardiovascular diseases, are reduced.

**2) Analysis of PM 2.5 (24-hour Average Levels) in SVV Campus and comparison with MPCB/CPCB standards.**



**LOCATION NAMES**

- |                           |                           |
|---------------------------|---------------------------|
| 1) BETWEEN A&B BUILDING   | 12) GHATKOPAR GATE        |
| 2) SOMAIYA STATUE         | 13) GATE 1 PARKING        |
| 3) GARGI PLAZA            | 14) SIMSR CANTEEN         |
| 4) A BUILDING QUADRANGLE  | 15) SOMAIYA SCHOOL ENTRY  |
| 5) POLYTECHNIC QUADRANGLE | 16) CRICKET GROUND        |
| 6) SK SOMAIYA             | 17) FACULTY PARKING       |
| 7) KJ ARTS AND COMMERCE   | 18) INSIDE AUROBINDO BLDG |
| 8) OUTSIDE ENGG CANTEEN   | 19) TILAKNAGAR GATE       |
| 9) GANPATI MURTI          | 20) MAGGI POINT           |
| 10) VVH GATE              | 21) AUDITORIUM            |
| 11) NEAR BASKETBALL COURT | 22) RELAY GROUND CENTRE   |

**Findings**

Out of the 22 points covered on the entire campus, it was found that:

Comparison with CPCB Standards: PM 2.5 levels within the campus consistently showed lower values compared to the CPCB 24-hour average of 60  $\mu\text{g}/\text{m}^3$ . This indicates that the campus environment has better air quality than the surrounding urban areas.

Yearly Distribution: The data shows variability in PM 2.5 levels across different years:

- JULY 2023-JUNE 2024: Most of the readings are below 60  $\mu\text{g}/\text{m}^3$ , suggesting a significant improvement in air quality in recent times.

- JULY 2022-JUNE 2023: Many readings are clustered around 10  $\mu\text{g}/\text{m}^3$ , indicating slightly higher levels compared to 2023 but still within safe limits.
- JULY 2021-JUNE 2022: The readings show more variability, with some points reaching close to 12  $\mu\text{g}/\text{m}^3$ . However, these values are still below the CPCB threshold.

Overall, Campus Average: Most of the campus readings fell below 15  $\mu\text{g}/\text{m}^3$ , which is significantly lower than the regulatory limit of 60  $\mu\text{g}/\text{m}^3$ , set by CPCB. This suggests that the air quality on campus is well-maintained and reduced health risk to students and staff.

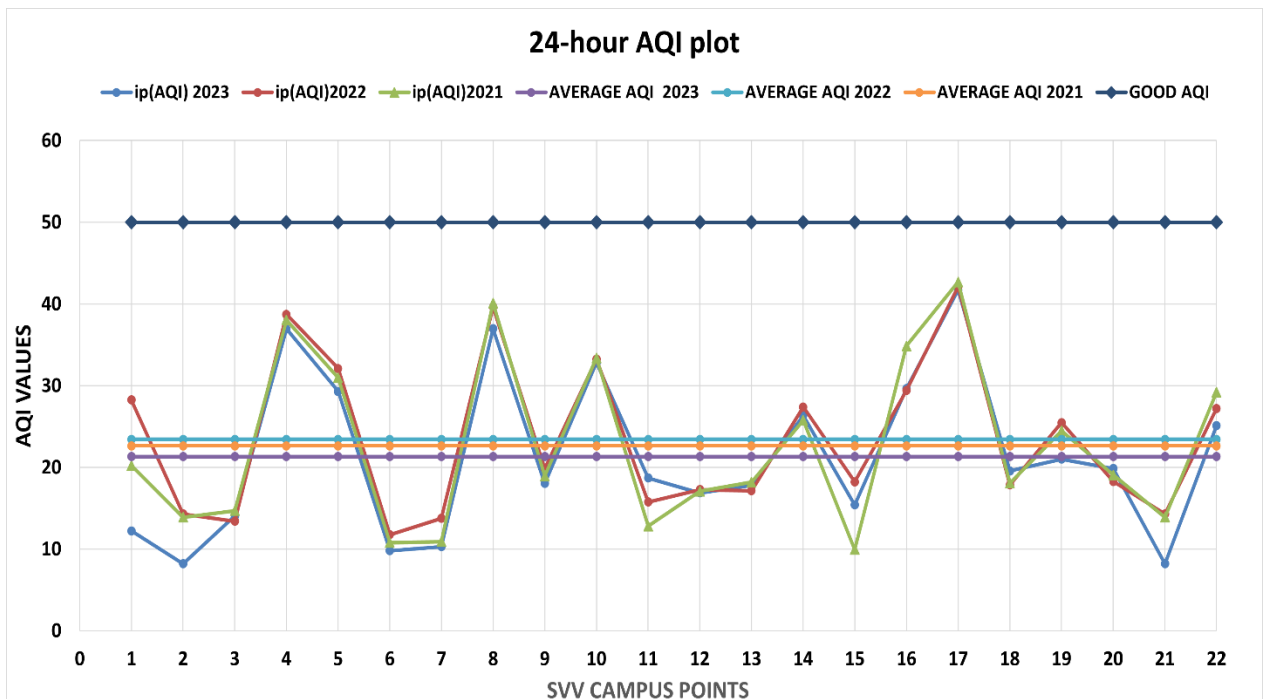
Distribution across Locations: The distribution of the data points across the 22 locations indicates some variability, but overall, the PM 2.5 levels remained within safer limits. This variability might be due to differences in proximity to pollution sources or varying environmental conditions at different locations on campus such as construction sites, road dust, open playing grounds, gardening and open composting lands.

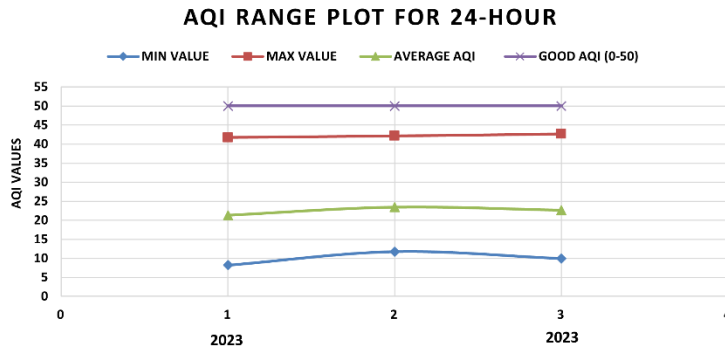
Health Implications: The lower PM 2.5 levels on campus shows that the risk of health issues associated with particulate matter, such as respiratory problems and cardiovascular diseases, are reduced.

## AQI Analysis

The Air Quality Index (AQI) values for the SVV campus over the past three years reflect a consistently high standard of air quality, demonstrating the effectiveness of the campus's environmental management strategies. AQI of PM2.5 pollutant obtained from the measured concentration from July 2021 to June 2024 indicates that the campus has maintained a 'Good' AQI rating every year, with average values as follows:

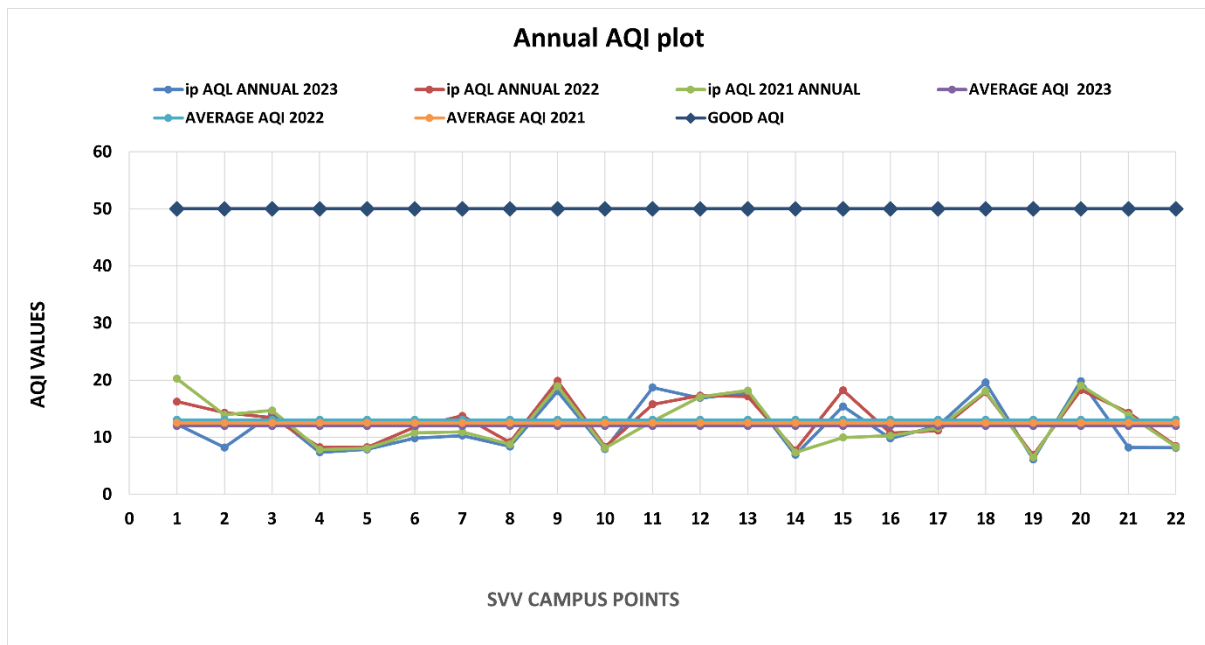
### 1) AQI analysis for 24-hour average

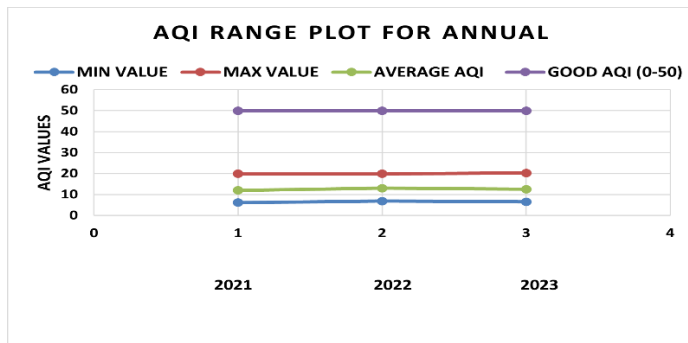




- JULY 2023 - JUNE 2024: The AQI ranged from a minimum value of 8.20 to a maximum value of 41.71666667, with an average AQI of 21.31, all within the 'Good' category (0-50). This suggests that the initiatives to improve air quality have been highly successful, resulting in particulate matter levels that are well within safe limits
- JULY 2022 - JUNE 2023: The AQI varied between a minimum value of 11.75 and a maximum value of 42.13, maintaining an average AQI of 23.43, within the 'Good' range (0-50). This consistency indicates a stable and effective approach to managing air quality, despite slight annual variations.
- JULY 2021 - JUNE 2022: The AQI values fluctuated from a minimum of 9.95 to a maximum of 42.67, with an average AQI of 22.64, all within the 'Good' category (0-50), demonstrating that the campus has maintained a high standard of air quality over multiple years.

## 2\_) AQI analysis for annual average





- JULY 2023 - JUNE 2024: The annual AQI ranged from a minimum of 6.12 to a maximum of 19.85, with an average AQI of 11.97, all within the 'Good' category (0-50). This suggests that the initiatives to improve air quality have been highly successful, resulting in particulate matter levels that are well within safe limits.
- JULY 2022 - JUNE 2023: The annual AQI varied between a minimum of 6.85 and a maximum of 19.854, maintaining an average AQI of 13.04, within the 'Good' range (0-50). This consistency indicates a stable and effective approach to managing air quality, despite slight annual variations.
- JULY 2021 - JUNE 2022: The annual AQI values fluctuated from a minimum of 6.48 to a maximum of 20.24, with an average AQI of 12.51, all within the 'Good' category (0-50), demonstrating that the campus has maintained a high standard of air quality over multiple years.

These AQI values, well below the hazardous thresholds set by regulatory bodies, underscore the campus's commitment to providing a healthy environment. The consistently low AQI values reflect the successful implementation of green initiatives and proactive measures to reduce pollution sources. This achievement not only enhances the well-being of the campus community but also sets a benchmark for other institutions aiming to improve their environmental footprint.

### **Conclusion:**

These findings showcase the remarkable success of SVV's efforts to maintain outstanding air quality with lush greenery on the campus. The consistent improvement over the years, with current levels well below hazardous limits, underscores the campus's dedication to health and environmental excellence. Continued green initiatives will further elevate this exceptional air quality, making SVV a shining example of a healthy and vibrant academic environment. The average AQI values for the past three years categorize the air quality as 'Good,' reflecting the positive impact of the campus's proactive measures in ensuring a safe and healthy atmosphere for students and staff.