Environmental Audit Report

2022-23

Shri Nagpur Gujarati Mandal's
VMV COMMERCE JMT ARTS & JJP SCIENCE COLLEGE, NAGPUR
NAAC Reaccredited with **B⁺** Grade

Vrajlal Manilal Vasant Commerce, Jaideoshankar Manishankar Thakar Arts and Jashbhai Jijibhai Patel Science College, Nagpur

Report By

Dr. Anagha P Patil

Principal Investigator
&
Certified Lead Auditor
ISO 14001:2015 EMS

Certificate

This is to certify that an **Environmental Audit** for

Vrajlal Manilal Vasant Commerce, Jaideoshankar Manishankar Thakar Arts and Jashbhai Jijibhai Patel Science College, Wardhaman Nagar, Nagpur

has been conducted for **session 2022-23** to assess the

Environmental Components: Water, Air, Soil, Weather and Climate, Vegetation and Fauna, Sound Level, Energy, Waste-Institutional Municipal Solid Waste and **Wastewater, Fire and Safety, Land use Land Cover** and the Eco-friendly initiatives implemented within the college campus.

Place: Nagpur
Date: 23/08/23

Dr. Anagha P Patil
Principal Investigator
&
Certified Lead Auditor-TUV Nord
ISO 14001:2015 EMS

CQI and IRCA-Unique Learner Number: 534381

Acknowledgement

I express my gratitude to **Mother Nature** and her supreme power rainbowed with flourishing services to mankind and for inspiring me always to explore and work with purity.

I am immensely thankful to **Dr. Abhay Mudgal, Officiating Principal, VMV College, Nagpur** for proposing the need of this project and their kind consent to conduct the study. His motivation has been crucial for the entire report.

I acknowledge my thanks to **Dr. Shuchismita Mishra, Co-Ordinator IQAC, VMV College** for her kind co-operation and **Mrs. Meenal Rajdev Assistant Professor, Department of Commerce & Co-Ordinator, BBA Department, VMV College** for always being supportive and willingly sharing their college information essential for audit report.

I am also grateful to **Shri. Jitubhai Patel** Accounts Section, **Shri. Ram Thakre** Estate Manager**, Mr. Rakesh Katare** and the **staff** at **VMV College** for their whole hearted help during data collection in the field and financial proceeding for project.

A special thanks and appreciation to the whole **audit team** who worked hard for data collection and also during compilation. This project has been possible with the team efforts.

Dr. Anagha P Patil

Principal Investigator
&
Certified Lead Auditor,
ISO 14001:2015 EMS

Audit Team

1) **Dr. Anagha Patil (Principal Investigator)**

2) **Ms. Sukhada Nagpure (GIS Computation & Compilation)**

3) **Ms. Seema Kallewar (Species Indentification)**

4) **Ms. Nisha Rohankar (Species Exploration Field Data Collection)**

5) **Ms. Niharika Tople (Species Exploration Field Data Collection)**

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Preamble

Being one of the oldest Institute dedicated towards the promotion and spread of education in this part of India, **Shri Nagpur Gujarati Mandal** has been rendering unflinching services for this cause. Since its inception in 1905 by handful of enthusiastic philanthropist Gujaratis, namely, **Shri. Rajaram Dixit, Shri. Soubhagyachand Kothari, Shri Deojibhai Thawa**r and others, the Mandal is proud today to have established educational institutions catering to the needs of nursery, primary, secondary, higher secondary, higher education and technical education students through Hindi, Marathi and English. Infact, Shri Nagpur Gujarati Mandal is the only century old institution beyond the boundaries of the then Greater Gujarat State.

The visionary forefathers of the Mandal started **'Itwari Gujarati Shikshan Sanstha'** with a meagre number of 28 students, which proved to be the sheet-anchor of the Mandal subsequently establishing many educational institutions. The Mandal has seen many ups and downs in its life but because of the total and single-minded dedication of the members, it has completed 100 years of its eventful and purposeful journey. The Mandal runs the following institutions enrolling more than 5000 students today.

1) **Shri. Malak Itwari Gujarati Primary School, Itwari, Nagpur.**

2) **Shri. Mahavir Chhabalbhai Gujarati Primary Kanya Shala, Itwari, Nagpur.**

3) **Shri. Pakwasa Gujarati Girls' High School & Junior College, Lakadganj, Nagpur.**

4) **Shri. Umiyashankar Narayanji High School & Junior College, Lakadganj, Nagpur.**

5) **Shri. Vrajlal Manilal Vasant Commerce, Jaydeoshankar Manishankar Thakar Arts and Jashbhai Jijibhai Patel Science College, Wardhaman Nagar, Nagpur.**

6) **Smt. Chanchalben Narayanbhai Patel Shishu Vihar, Lakadganj, Nagpur.**

7) **Shri. M.I.G. English Medium Primary School, Nagpur.**

8) **Shri. Raojibhai Jhaverbhai English Medium Primary School, Lakadganj, Nagpur.**

9) **Sudha Sureshbhai Maniyar College of Computer & Management, Chikhali, Kalamna Market Road, Nagpur.**

10) **Smt. Ushaben Chandrakant Thakar Womens' College, Lakadganj, Nagpur.**

The students of the institutions run by the Mandal have proved their worth by claiming top merit positions in HSSC & University examinations for the past many years. The students of these institutions have also represented in district, University and state level sports- meets and brought laurels. The Department of Education has granted the status of central school to Shri. Umiyashankar Narayanji High School, one of the Mandal's educational institutions. The National Assessment and Accreditation Council has granted the status of B-Grade to Shri. Vrajlal Manilal Vasant Commerce, Jaydeoshankar Manishankar Thakar Arts and Jashbhai Jijibhai Patel Science College, Wardhaman Nagar.

The humble beginning of the Mandal with the establishment of its first primary School has metamorphosed into a mighty **'Educational Vatvriksha'**. The credit squarely goes to those great leaders of the management of that time who set up a tradition of transparency, honesty and responsibility in running the Mandal. The predecessors have been following the footprints of this legacy and are able to establish a fine rapport with the society, so much so that generous donations and other financial supports are coming willingly to the Mandal for the cause of education. The time has come to acknowledge gratefully the cherishable deeds of those great founding fathers of the Mandal without whose efforts it would not have been what it is today.

It is imperative that this great Mandal has benefitted thousands of students, teachers, parents and common citizens. Pupils passing out of the institutions are working successfully in all walks of life strengthening the society and country at large. This itself is a concrete proof that the Mandal has achieved its social obligation emphasizing upon mass education, eradication of illiteracy and promotion of well-being of all.

To acknowledge its constructive services, the honorable members of the Mandal have taken this opportunity to augment a year-long centenary celebration involving people from cross-sections of the society. It is time to express heartfelt gratitude to all who helped bringing the Mandal to this height.

The College is well flourished in academics as well as in co-curricular activities under the able leadership of **Shri. Yogeshbhai Patel,** President, **Shri Narendrabhai Jha,** Vice-President and **Shri. Sanjaybhai Thakar,** General Secretary of VMV College. Their continued efforts and guidance have led the institution to achieve success in every aspect as one of the best higher learning institution highly preferred by students for holistic personality development.
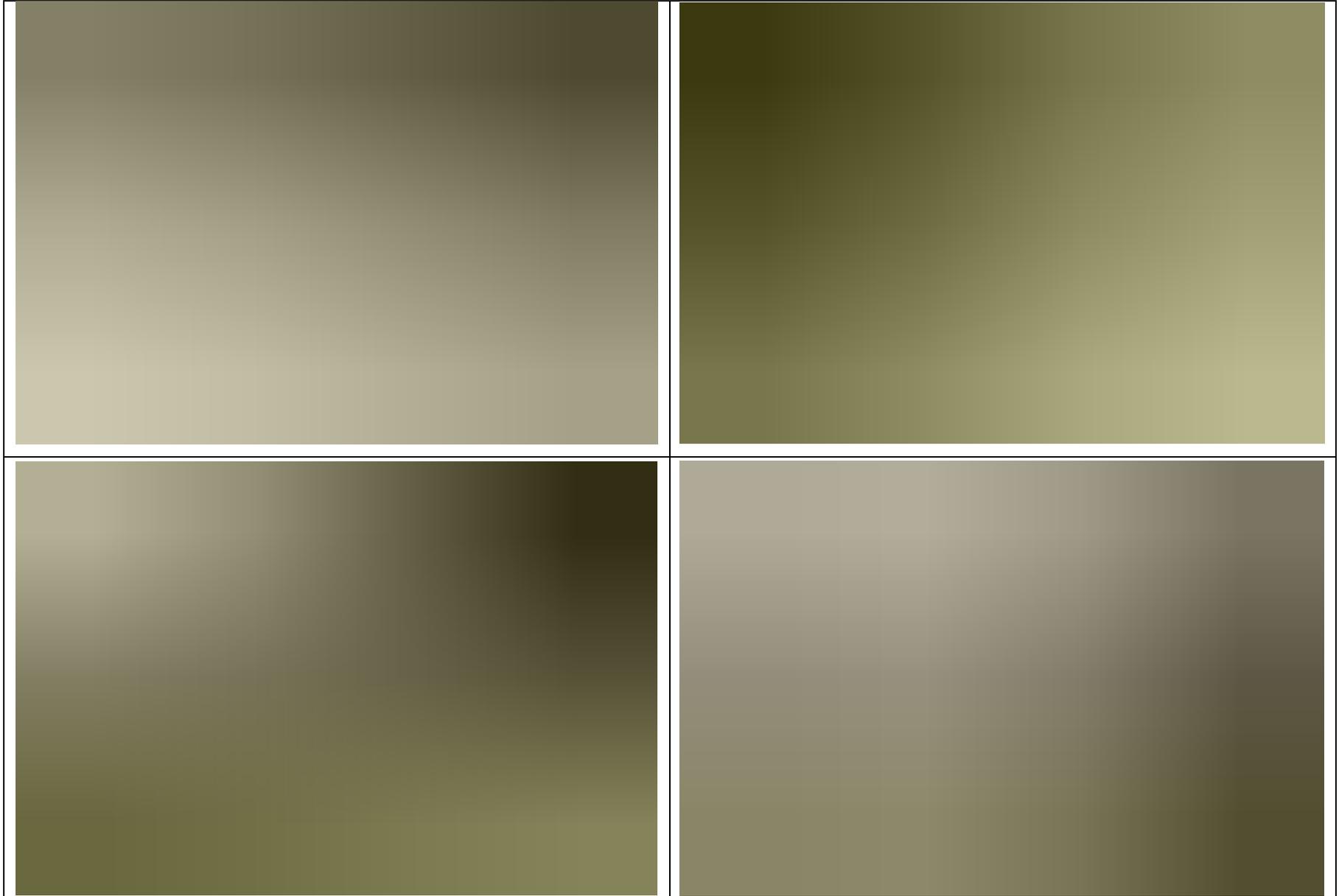
Image No. 1: Green Campus of VMV

Executive Body

Trustee Mandal

College Development
Committee
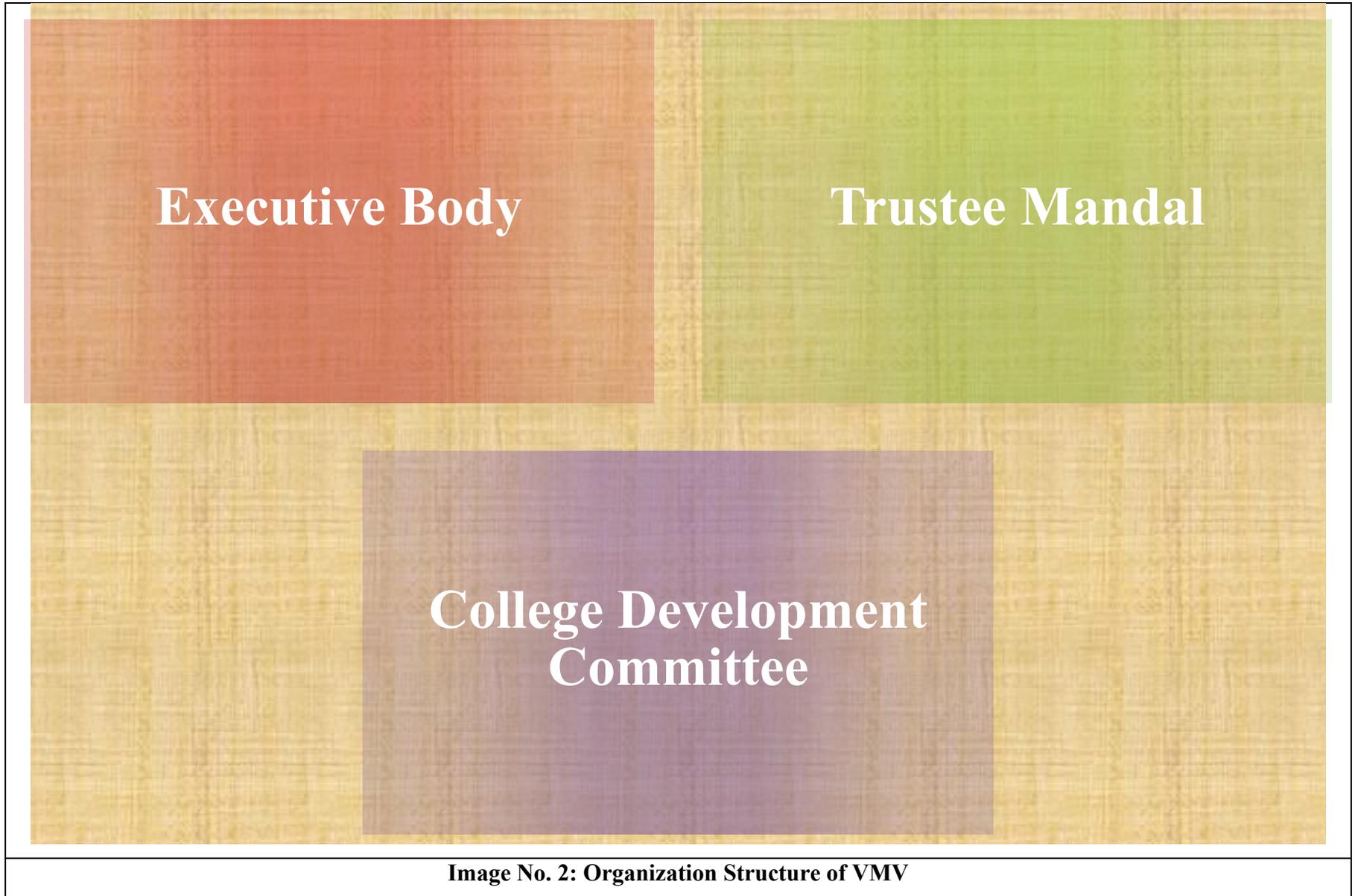
Image No. 2: Organization Structure of VMV
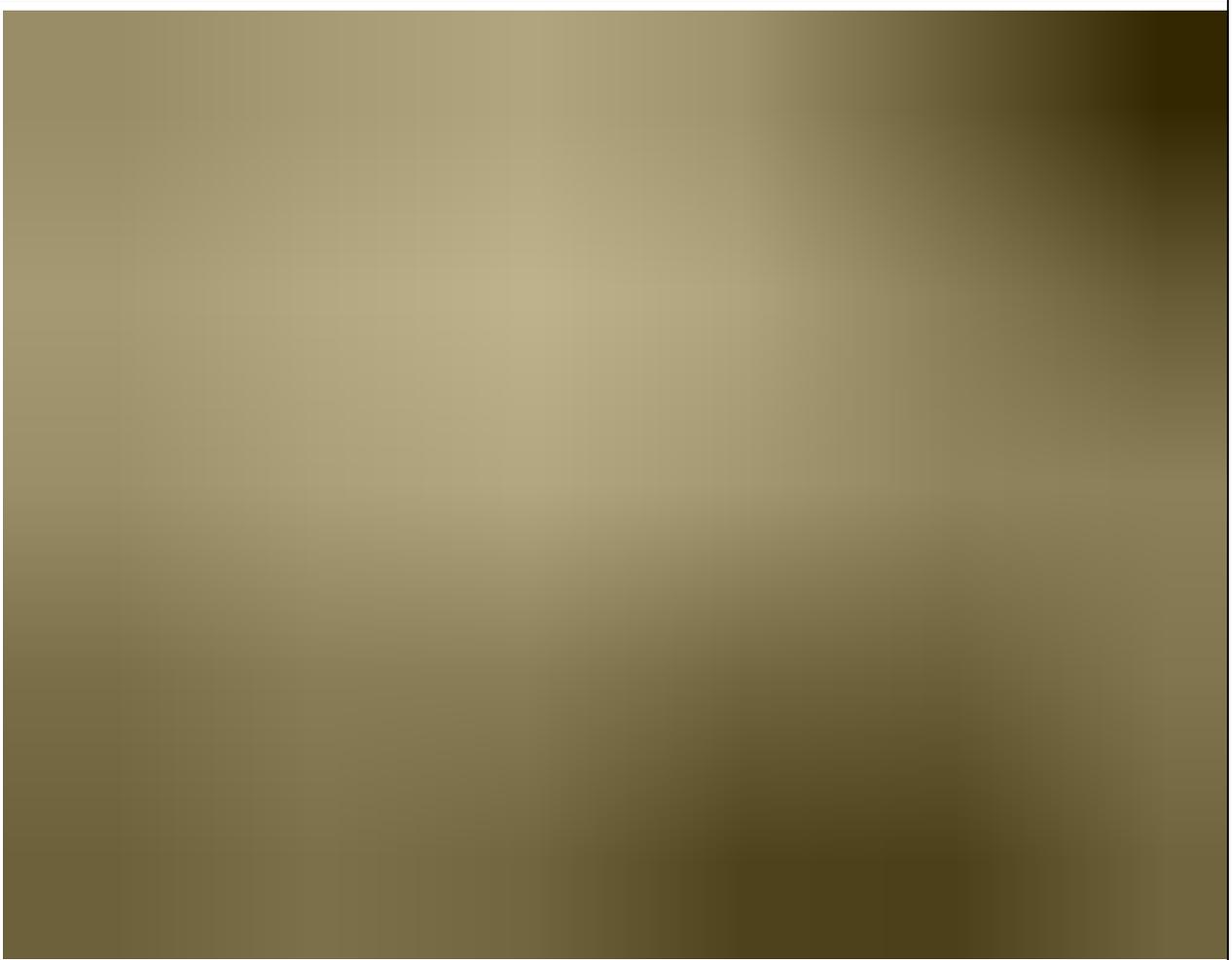
Image No. 3: Admin Building at VMV
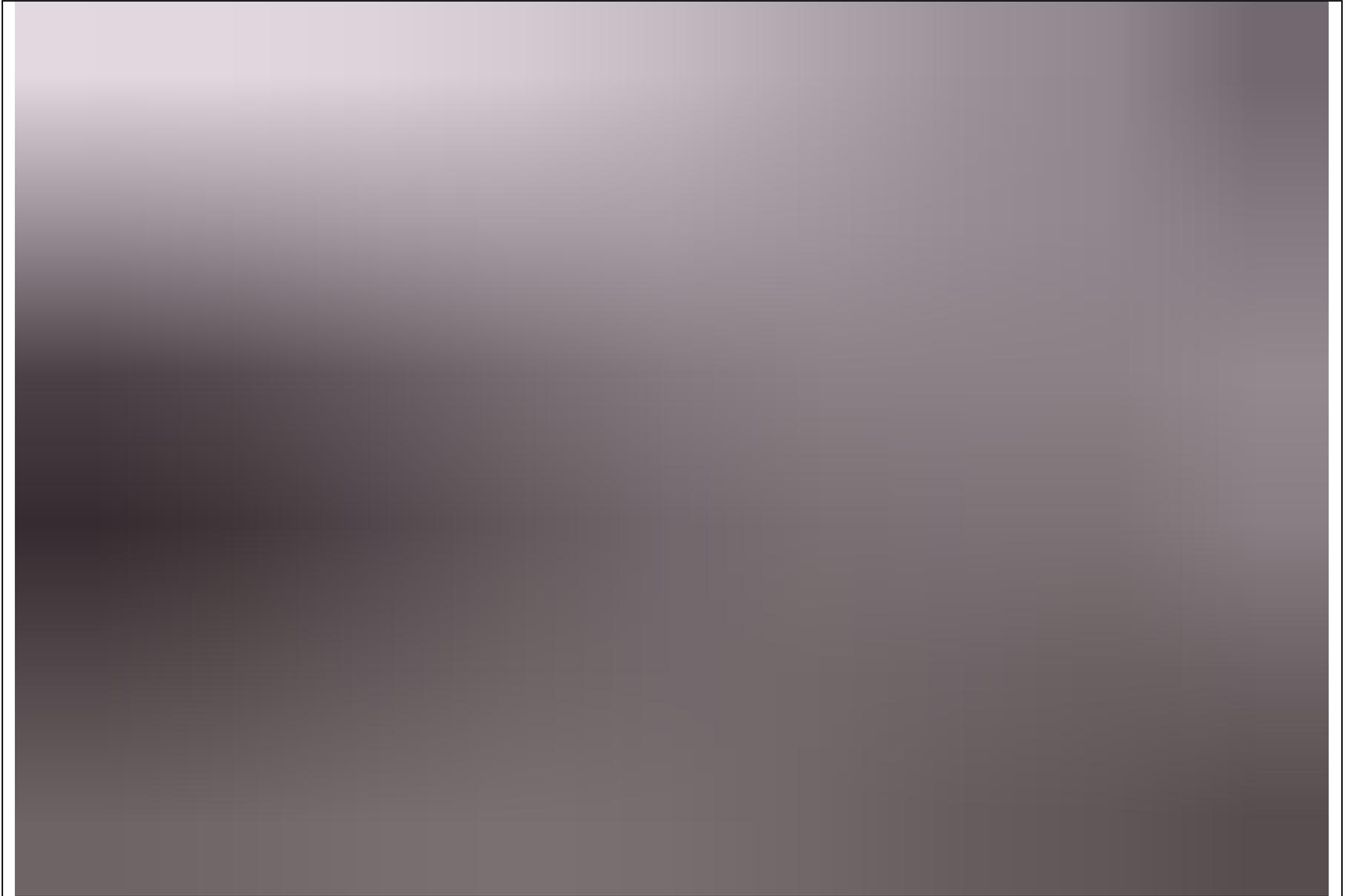
Image No. 4: Façade of College Building

Goals and Objectives of VMV

- Total personality development with integrity and ingenuity.
- Faculty development through continuing education.
- To develop among students the academic and technical excellence, social and cultural sensitivity, ethical responsibility and concern for environment.
- Acting as support center to other institutions.

Executive Body

Trustee Mandal
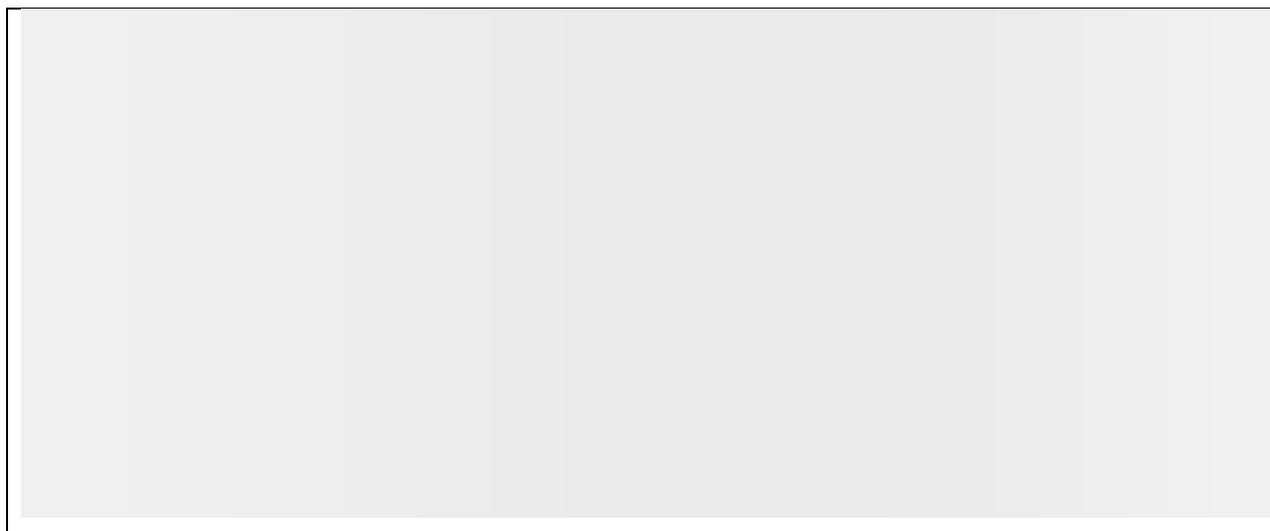
Vision

The growth of any institution rests upon the dreams that the founding fathers have established which the posterity realizes through their perseverance. As an institution, our vision is to achieve EXCELLENCE in the first place, and, secondly, apply it for the total and simultaneous growth of all sections of society. Finally, our institution shall serve as a catalyst for ENLIGHTENMENT of the humanity.

Mission

The college is committed to serve the society, especially disadvantaged, and enhance the quality of life through excellence in academically and professionally relevant education and training. The emphasis is on developing right attitudes and values of discipline, dedication and commitment among its members.

Objectives of Environmental Audit:

The main aim objective of this Environmental Audit is to assess the environmental quality and the management strategies being implemented and the conformation to the standards prescribed for management of environmental segments by **Vrajlal Manilal Vasant Commerce, Jaideoshankar Manishankar Thakar Arts and Jashbhai Jijibhai Patel Science College, Nagpur**.

To assess the quality of Water component in VMV College Campus

To assess the quality of Soil component in VMV College Campus

To track the Weather and Climate parameters around the campus and monitor ambient air quality parameters of VMV

To monitor the Energy consumption pattern (Electricity & Solar) of the VMV College

To explore the flora and fauna species within the surrounding of VMV College

To quantify the Solid Waste generation and and suggest management plans in VMV Campus

To assess the Carbon Footprint drawn from Electricity and Solar Energy Consumption

To evaluate the Fire and Safety Equipments and facility existing at VMV College

To suggest recommendations for improving the green campus at VMV College

Image No. 5: Specific Objectives of Study

Environmental Audit VMV College, Nagpur

Image No. 6: Segments of Environmental Audit

Image No.7: VMV Campus Map

Main Entrance

Administration Building

Temple Place

Parking
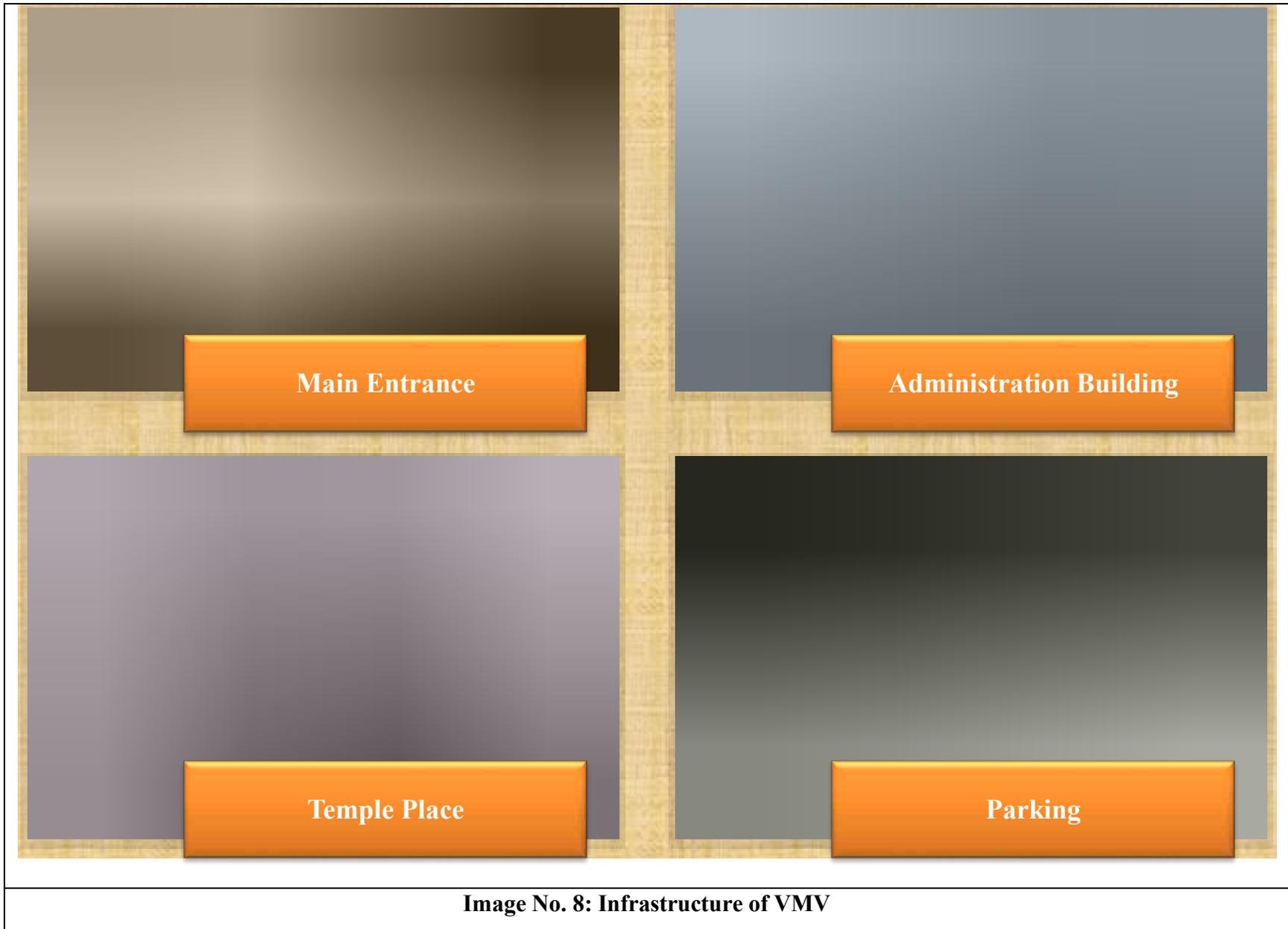
Image No. 8: Infrastructure of VMV
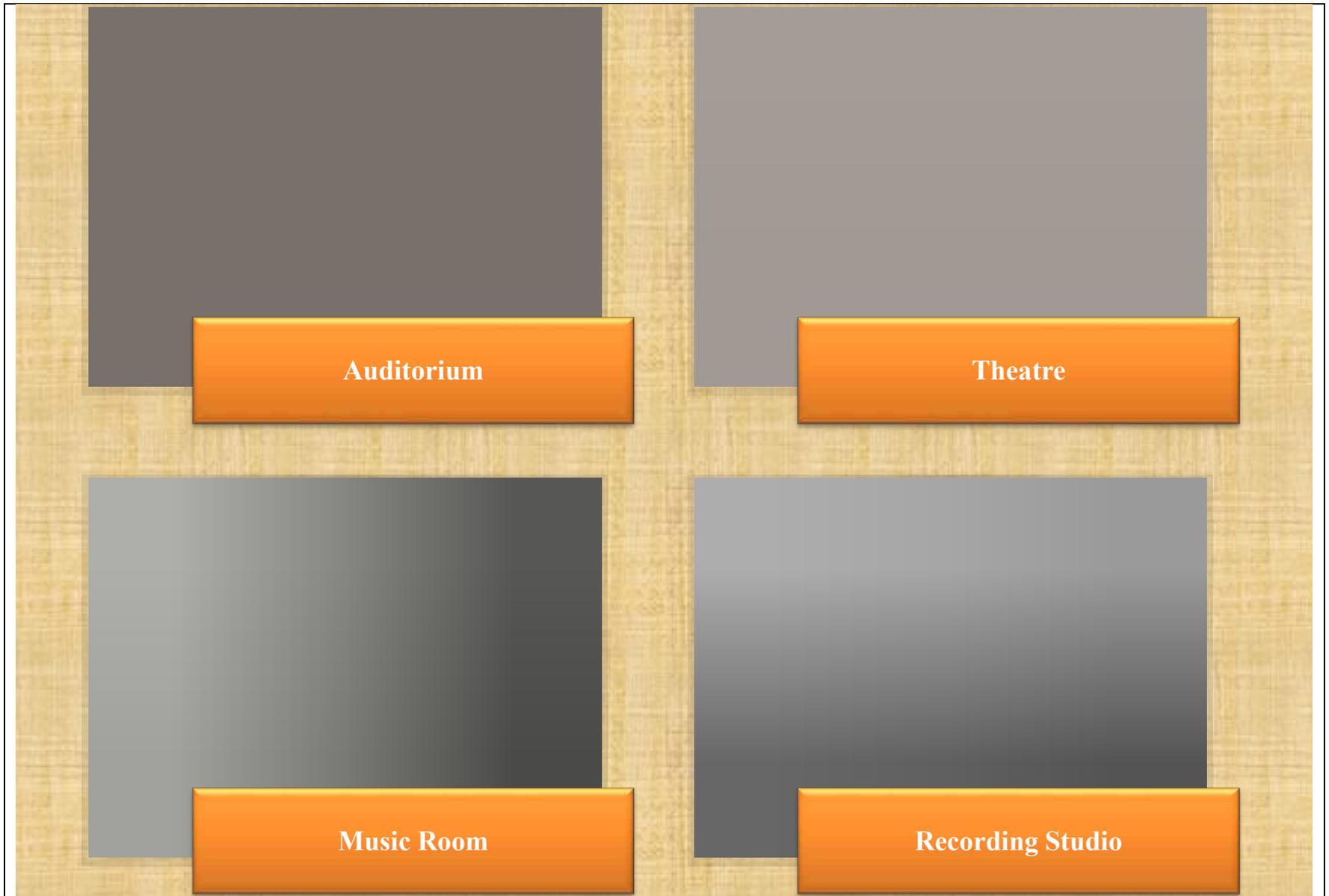
Image No. 9: Infrastructure of VMV
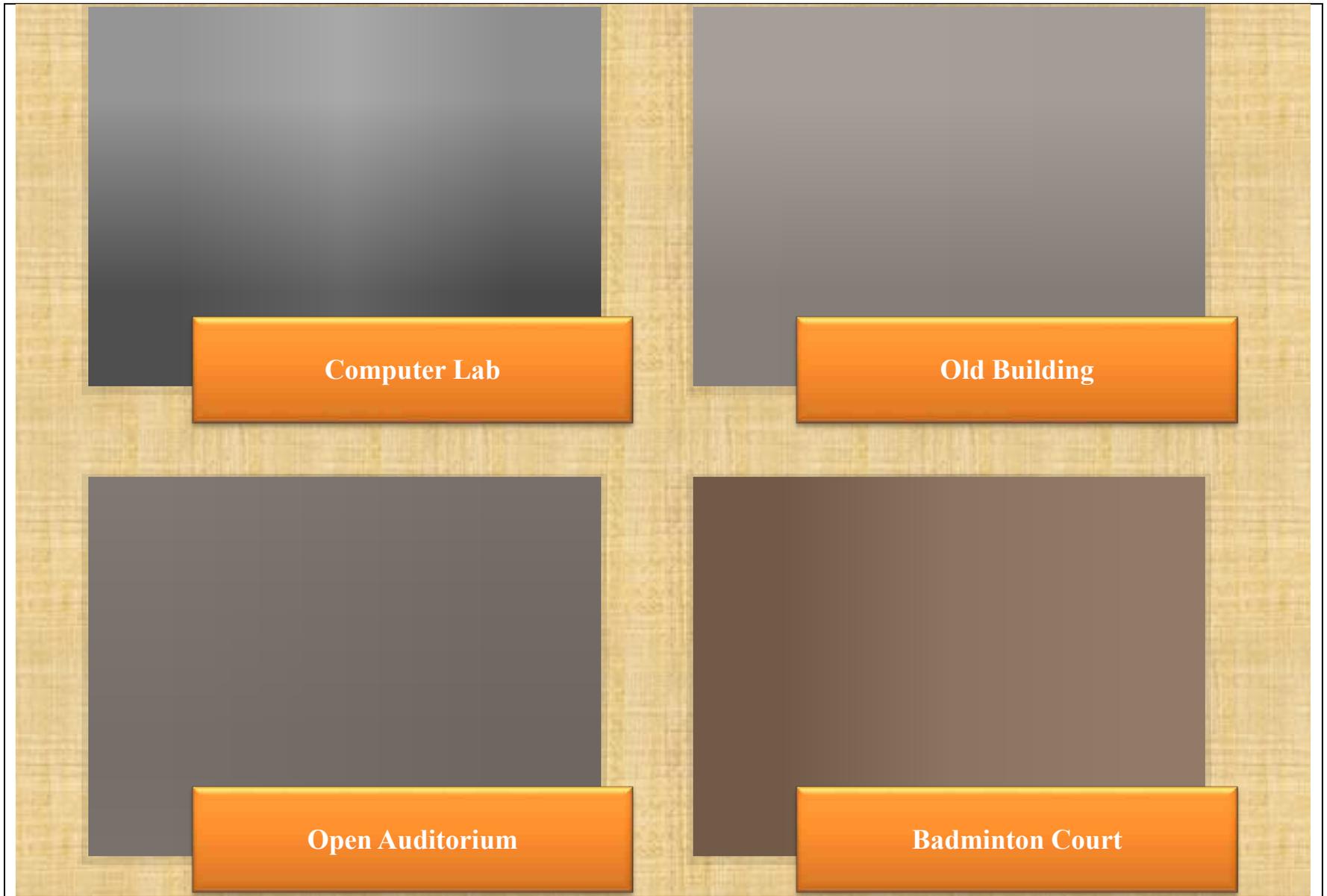
Image No. 10: Infrastructure of VMV
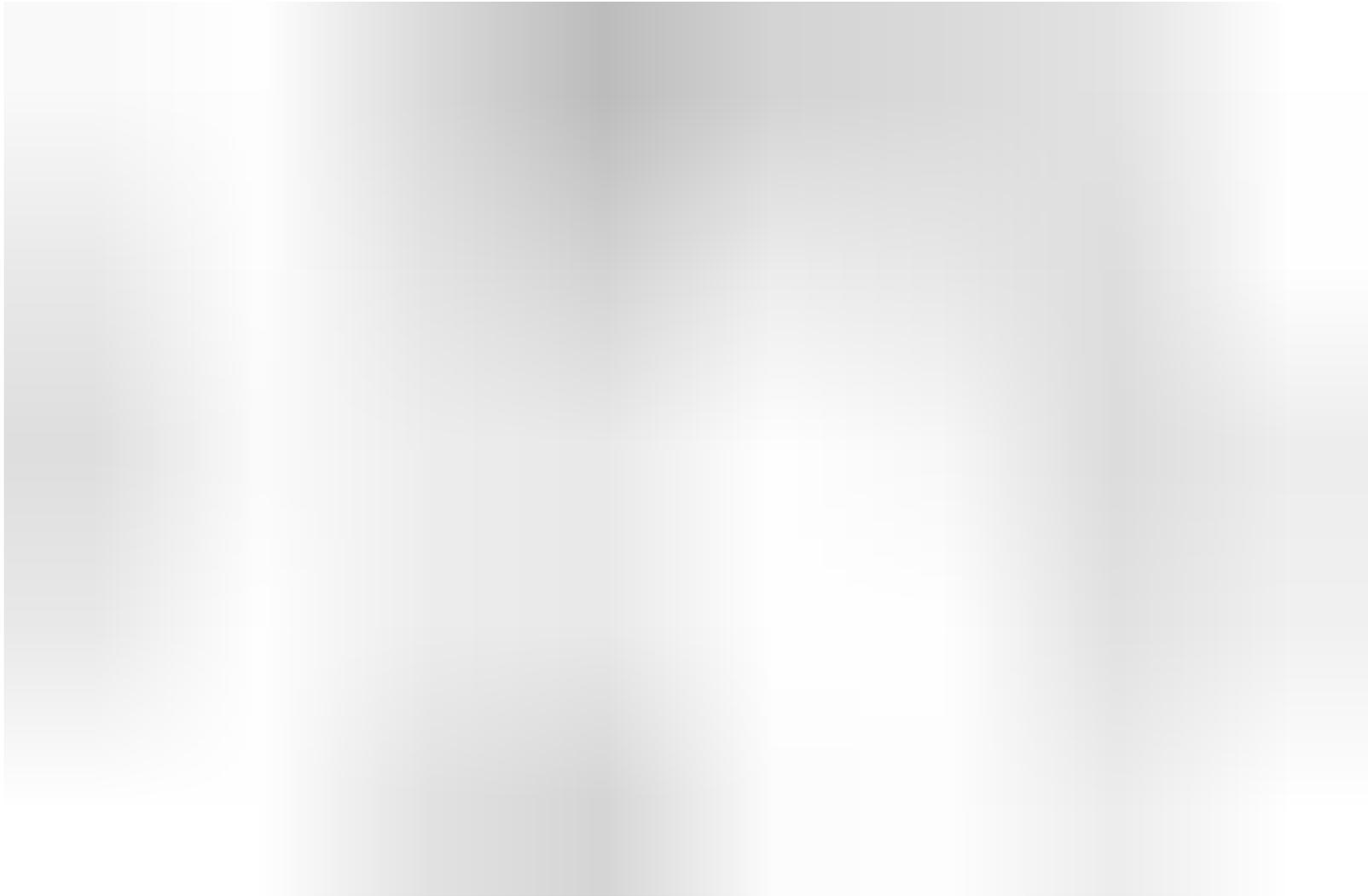
Image No. 11: Study Methodology adopted to conduct the Environmental Audit of VMV Institution

Table No. 1: Area description of Study Region

Sr. No.	Description	Details
1)	Campus Area	2.86 Acres
2)	Location	Green Residential Area in Wardhaman Nagar, Nagpur
3)	Accessibility	5.8 Kms from Nagpur Railway Station and 13.8 Kms from City Airport

Table No. 2: Area segments -Total Built-up and Green Area at VMV

Sr. No.	Description	Area
1)	Campus Area	11599.52 sq. m
2)	Built-up Area (Permitted)	11563.63 sq. m
3)	Vegetation Cover	3127 sq. m
4)	Playground	2485.56 sq. m
5)	Parking + Roads	2162.01 sq. m

GRAPH NO. 1 : BUILT-UP AND GREEN AREA AT VMV

Parking + Roads 7%
Playground 8%
Vegetation Cover 11%
Campus Area 37%
Built-up Area (Permitted) 37%

Legend:
- Campus Area
- Built-up Area (Permitted)
- Vegetation Cover
- Playground
- Parking + Roads

Graph No. 1: Area under Vegetation Cover
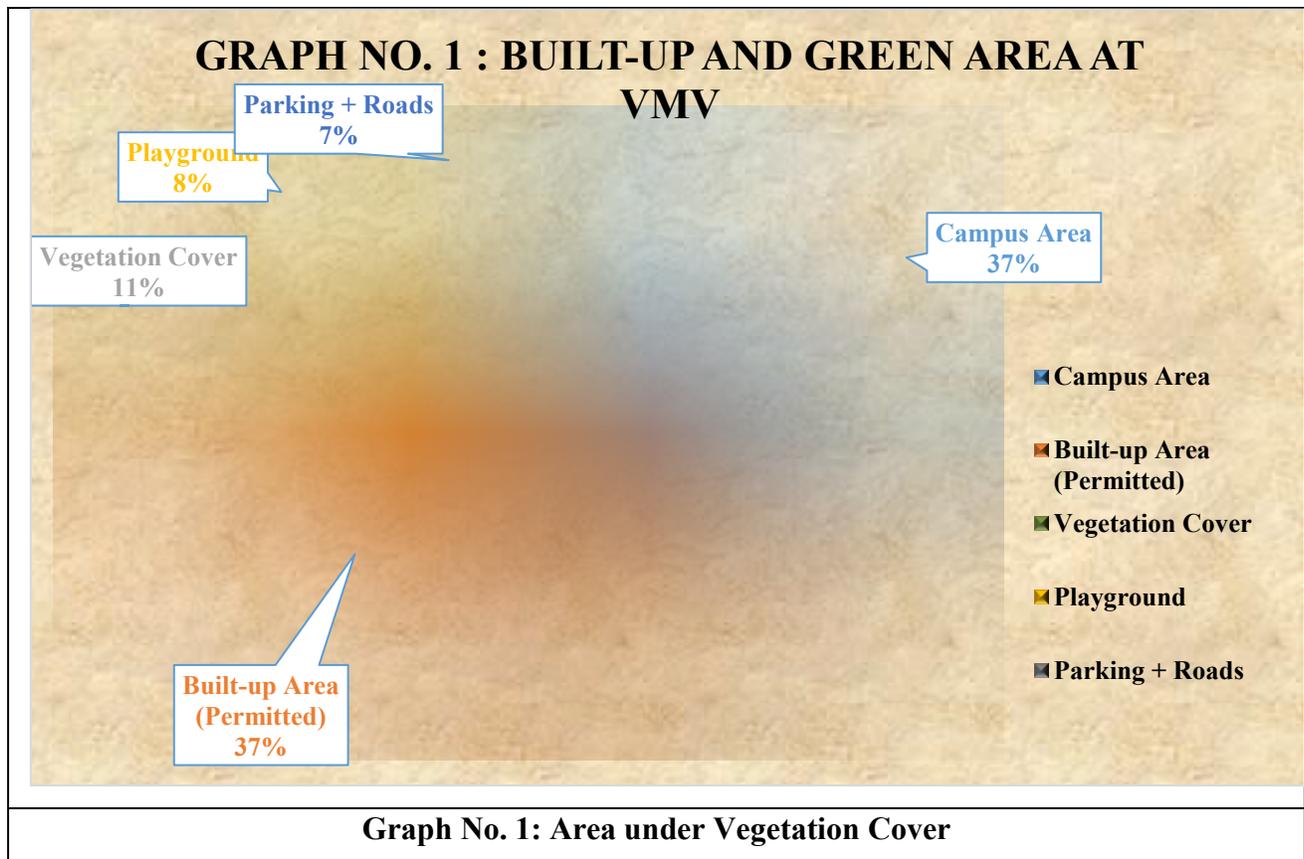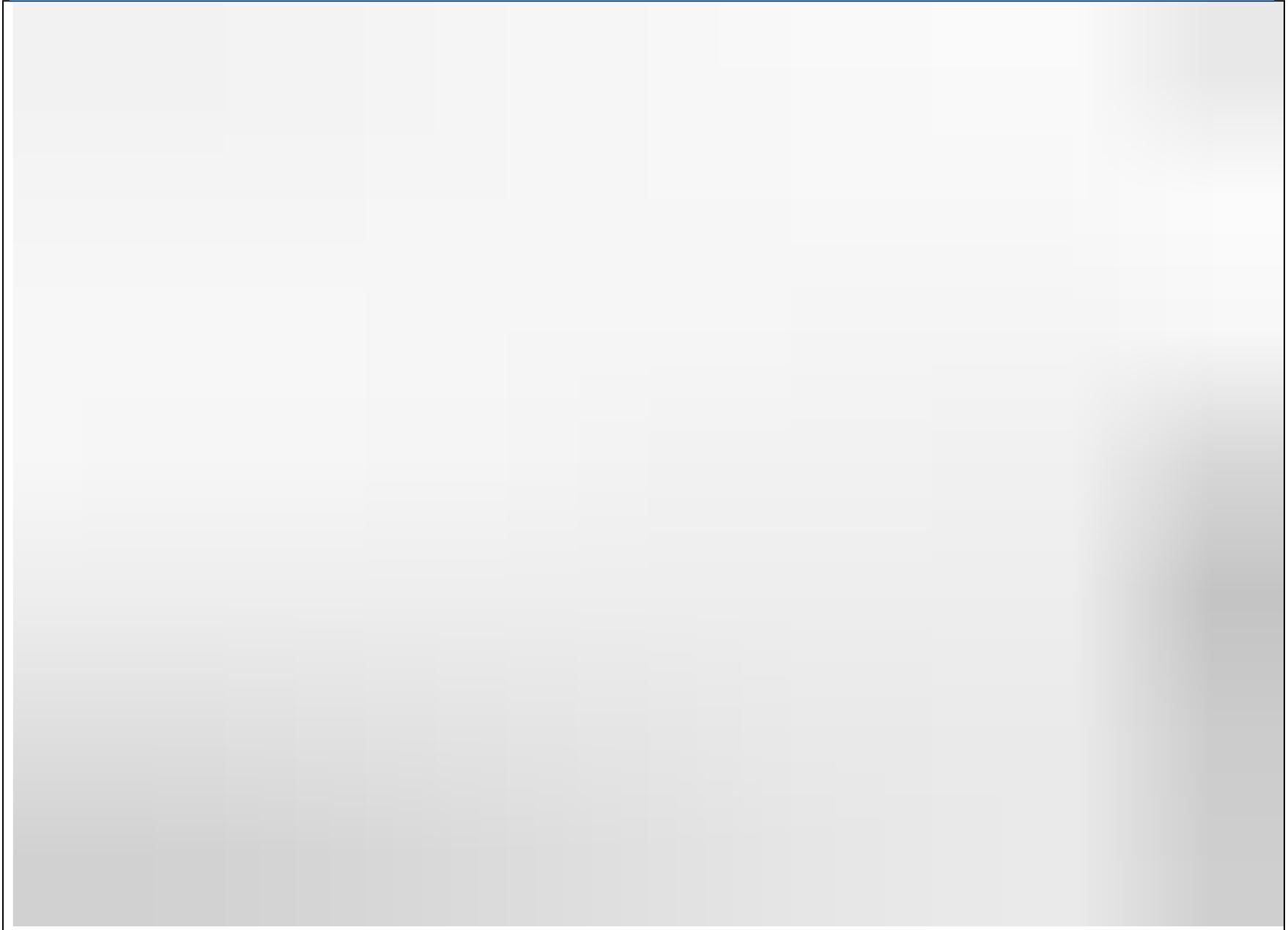
Map No. 1: Basement Floor Plan

Map No. 2: Ground Floor Plan

Map No. 3: First Floor Plan

Map No. 4: Second Floor Plan

Map No. 5: Third Floor Plan

Map No. 6: Fourth Floor Plan

Map No. 7: Front Elevation

Table No. 3: Infrastructure of VMV

Sr. No.	Description	Nos.
1)	**Total Classroom**	34
2)	**Total Labs**	14
3)	**Auditorium (Enclosed)**	1
4)	**Auditorium (Open)**	1
5)	**Computer Lab**	6
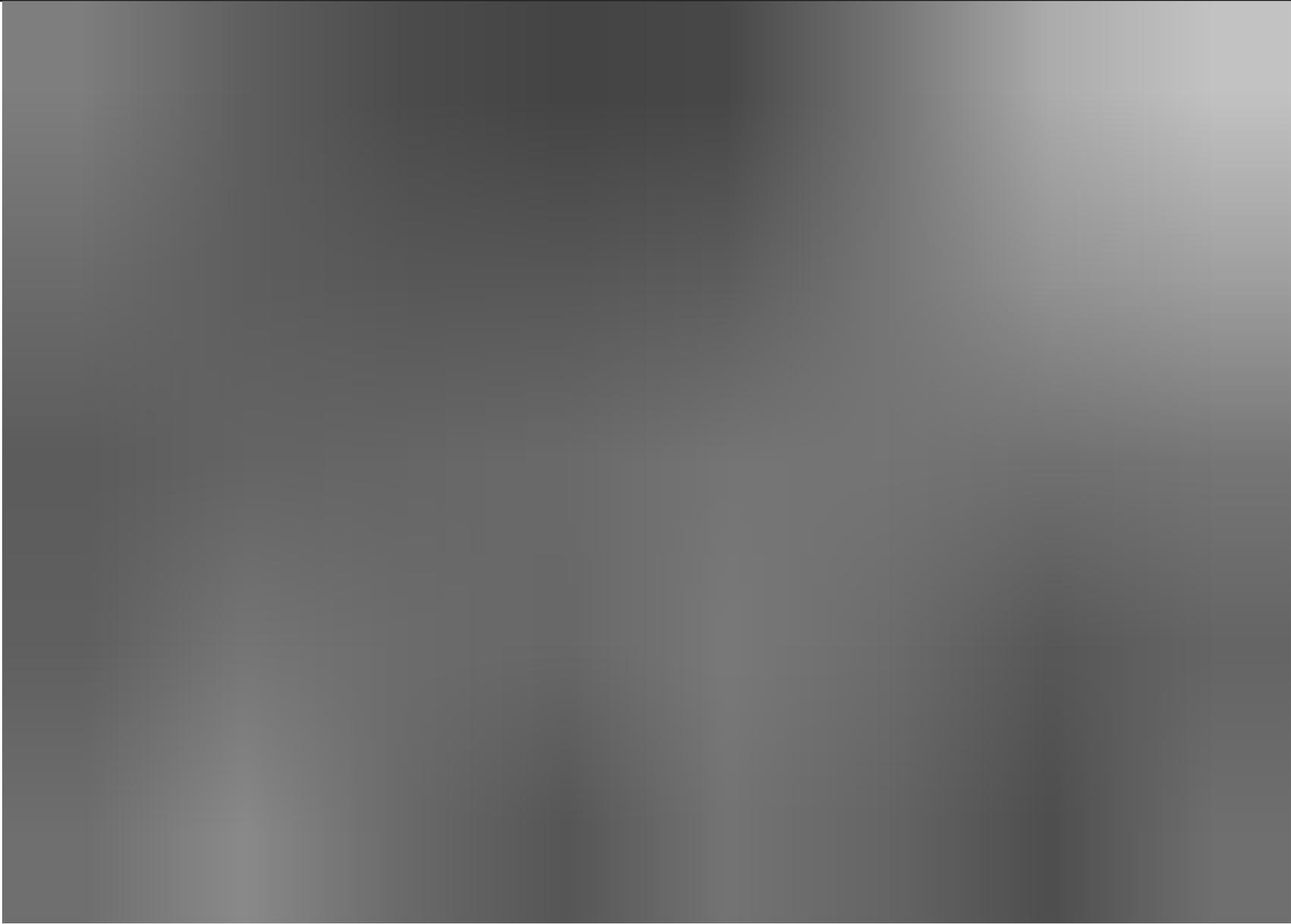
Satellite Imagery No. 1: Marked Boundary Area of VMV
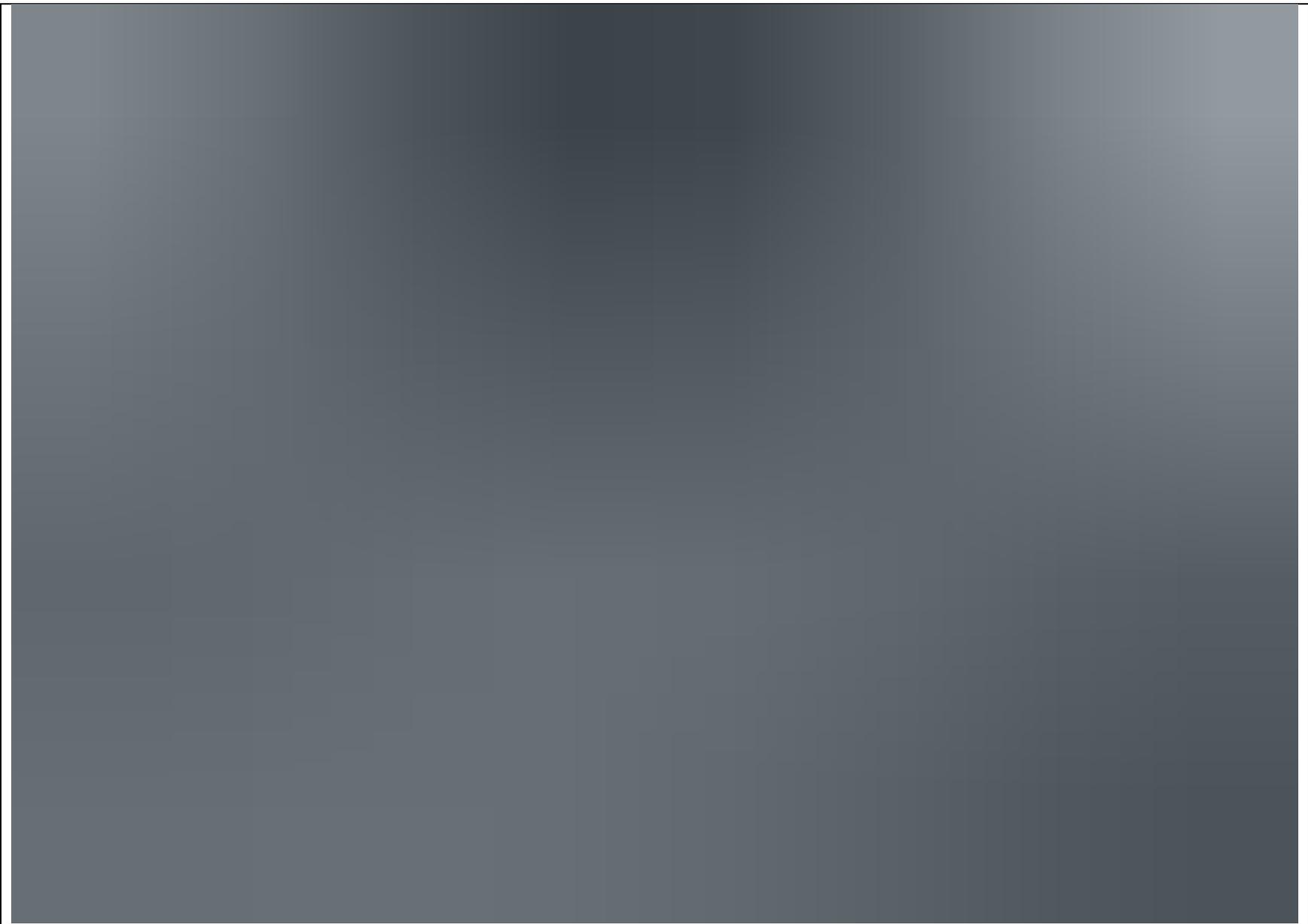
Satellite Imagery No. 2: Built-up Area VMV

I) WATER AUDIT

Water plays a significant role in maintaining the human health and welfare. Clean drinking water is now recognized as a fundamental right of human beings. Around 780 million people do not have access to clean and safe water and around 2.5 billion people do not have proper sanitation. As a result, around 6–8 million people die each year due to water related diseases and disasters. In the today world, the water use in household supplies, public supplies is commonly defined as domestic water. This water is processed to be safely consumed as drinking water and other purposes. Water quality and suitability for use are determined by its taste, odor, colour and concentration of organic and inorganic matters. Contaminants in the water can affect the water quality and consequently the human health. Therefore, the investigation of the drinking water quality by researchers and governmental departments/ private organization has been performed regularly throughout the world.

The major Drinking water sources at VMV are:

1) Nagpur Municipal Corporation-**2 Connections (20 & 15)**
2) Borewell-**2 Nos.**

The water sample was collected by purposive sampling method from common sump and subjected for the physico-chemical and biological characterization for qualitative and quantitative estimation of water within the campus.
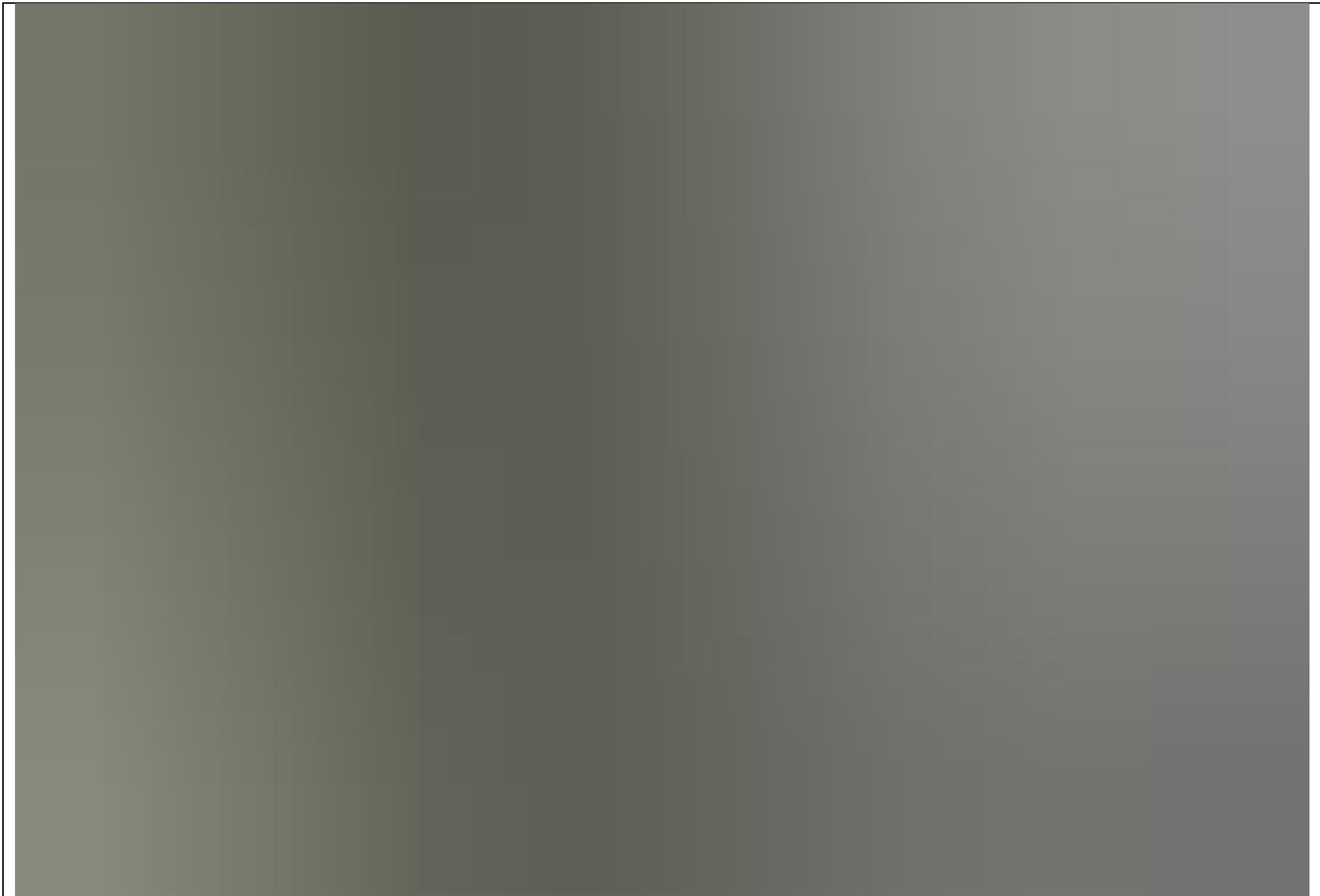
Satellite Imagery No. 3: Water Storage Tanks within VMV
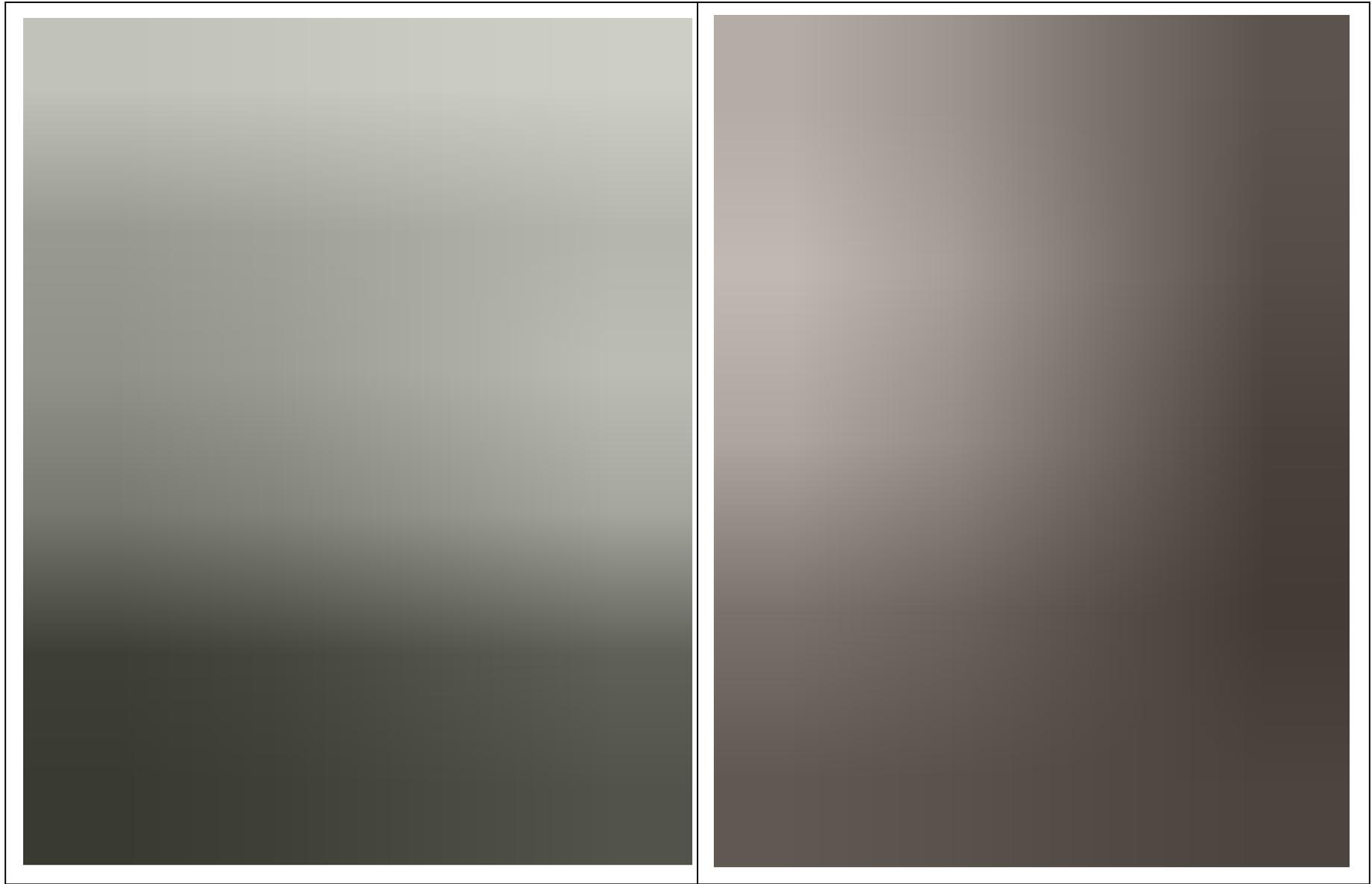
Image No. 12: Drinking Water Cooler with purifier
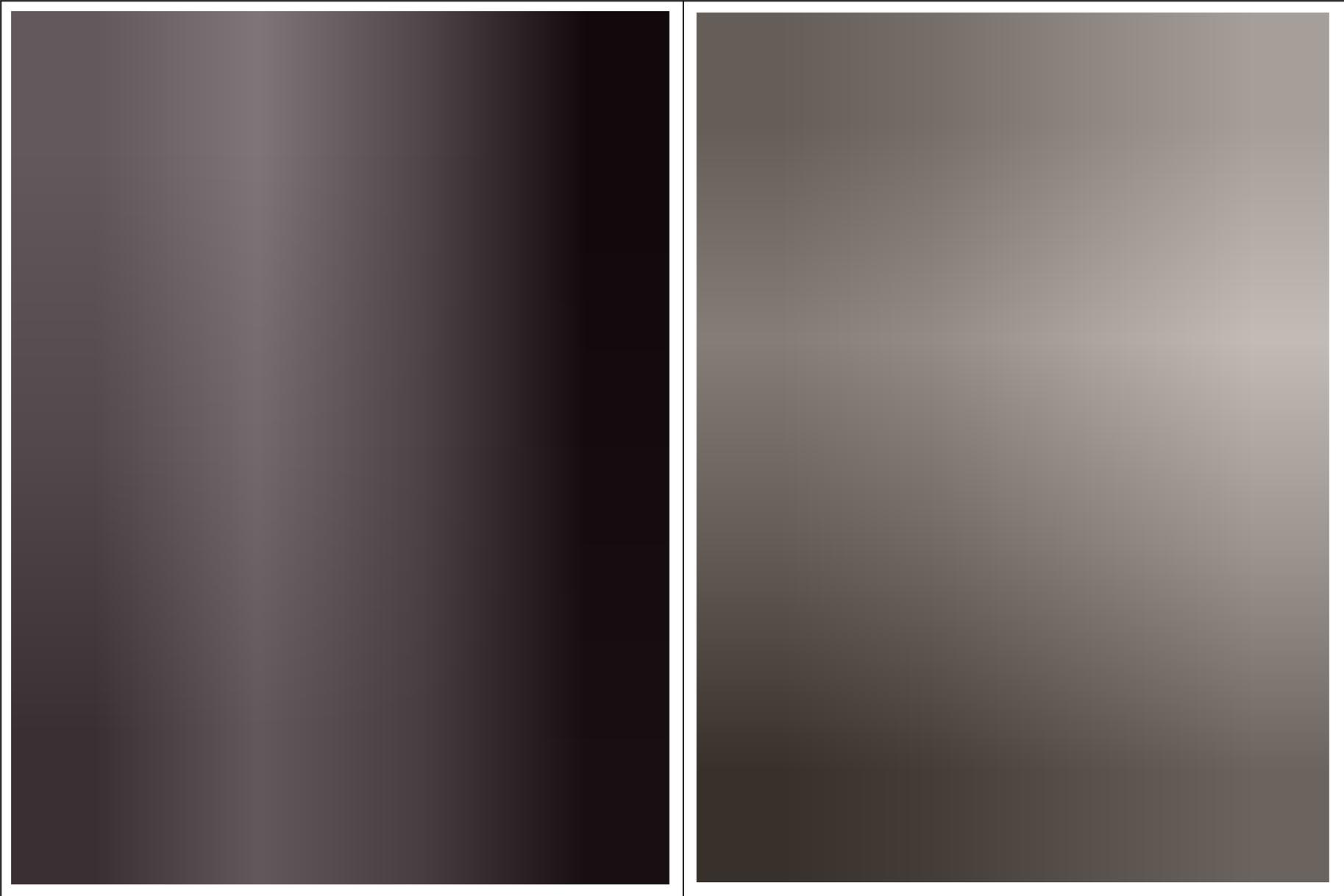
Image No. 13: Overhead Water Storage Tank (Old Building)

Image No. 14: Overhead Water Storage Tank (New Building)
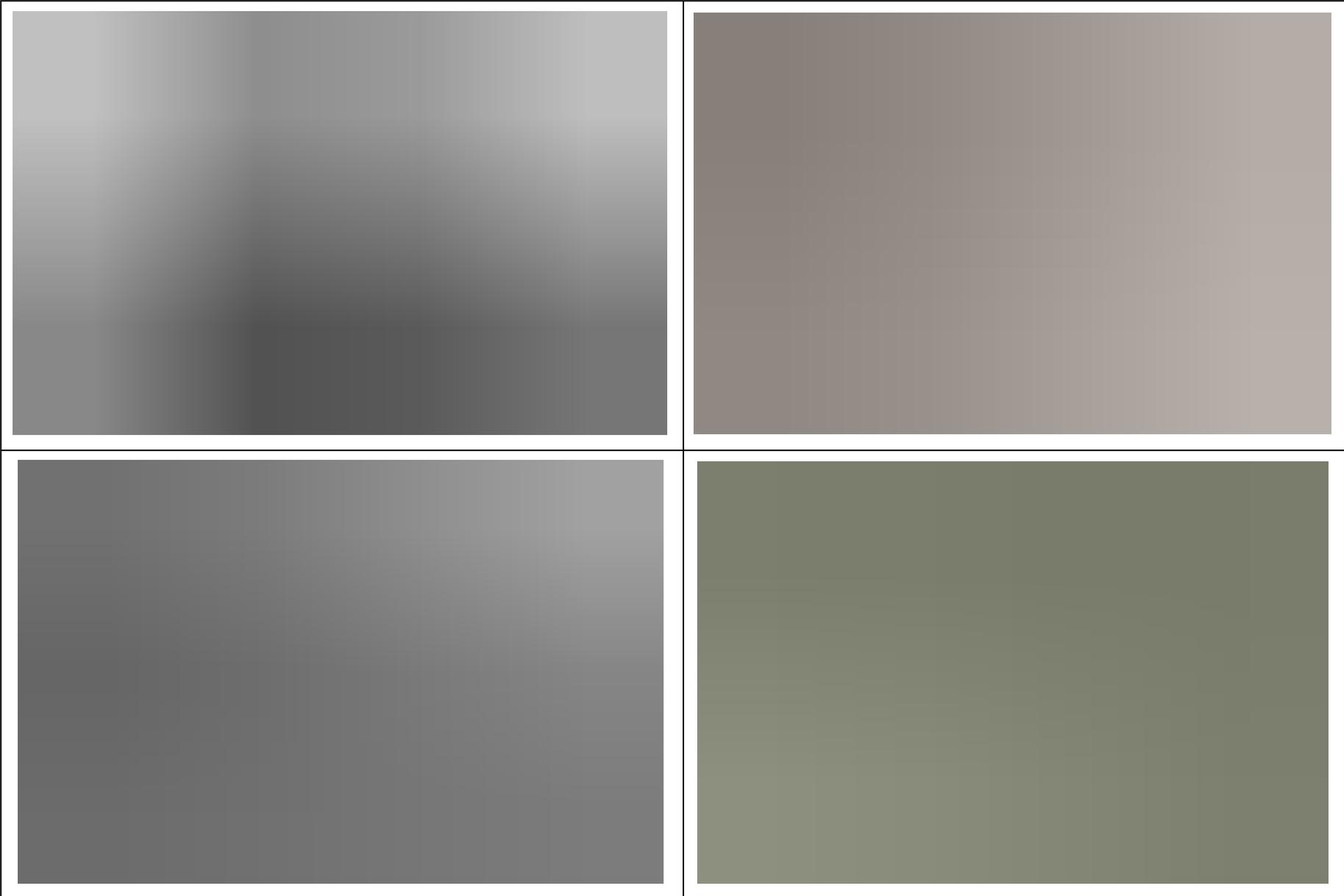
Image No. 15: Underground Sump

Indian Standard DRINKING WATER — SPECIFICATION

	Table No. 4: Organoleptic and Physical Parameters			
	(*Foreword* and *Clause* 4)			
Sr. No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Remarks
i)	**Colour, Hazen units, *Max***	5	15	Extended to 15 only, if toxic substances are not suspected in absence of alternate sources a) Test cold and when heated
ii)	**Odour**	Agreeable	Agreeable	—
iii)	*p*H value	6.5-8.5	No relaxation	b) Test at several dilutions
iv)	**Taste**	Agreeable	Agreeable	Test to be conducted only after safety has been established
v)	**Turbidity, NTU, *Max***	1	5	—
vi)	**Total dissolved solids, mg/l,**	500	2,000	—
NOTE - **It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.**				

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	Table No. 5: General Parameters Concerning Substances Undesirable in Excessive Amounts (Foreword and Clause 4)			
Sr. No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in theAbsence of Alternate Source	Remarks
1)	Aluminium (as Al), mg/l, *Max*	0.03	0.2	—
2)	Ammonia (as total ammonia-N), mg/l, *Max*	0.5	No relaxation	—
3)	Anionic detergents (as MBAS) mg/l, *Max*	0.2	1.0	—
4)	Barium (as Ba), mg/l, *Max*	0.7	No relaxation	—
5)	Boron (as B), mg/l, *Max*	0.5	1.0	—
6)	Calcium (as Ca), mg/l, *Max*	75	200	—
7)	Chloramines (as Cl_2), mg/l, *Max*	4.0	No relaxation	—
8)	Chloride (as Cl), mg/l, *Max*	250	1,000	—
9)	Copper (as Cu), mg/l, *Max*	0.05	1.5	—
10)	Fluoride (as F) mg/l, *Max*	1.0	1.5	—

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11)	**Free residual chlorine, mg/l,** *Min*	0.2	1	To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be minimum 0.5 mg/l
12)	**Iron (as Fe), mg/l,** *Max*	0.3	No relaxation	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
13)	**Magnesium (as Mg), mg/l,** *Max*	30	100	—
14)	**Manganese (as Mn), mg/l,** *Max*	0.1	0.3	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
15)	**Mineral oil, mg/l,** *Max*	0.5	No relaxation	—
16)	**Nitrate (as NO₃), mg/l,** *Max*	45	No relaxation	—
17)	**Phenolic compounds (as C₆H₅OH), mg/l,** *Max*	0.001	0.002	—
18)	**Selenium (as Se), mg/l,** *Max*	0.01	No relaxation	—
19)	**Silver (as Ag), mg/l,** *Max*	0.1	No relaxation	—

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20)	Sulphate (as SO$_4$) mg/l, *Max*	200	400	May be extended to 400 provided that Magnesium does not exceed 30
21)	Sulphide (as H$_2$S), mg/l, *Max*	0.05	No relaxation	—
22)	Total alkalinity as calcium carbonate, mg/l, *Max*	200	600	—
23)	Total hardness (as CaCO$_3$), mg/l, *Max*	200	600	—
24)	Zinc (as Zn), mg/l, *Max*	5	15	—

NOTES:

1) In case of dispute, the method indicated by '*' shall be the referee method.

2) It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.

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	Table No. 6: Parameters Concerning Toxic Substances			
	(*Foreword* and *Clause* 4)			
Sr. No.	**Characteristic**	**Requirement (Acceptable Limit)**	**Permissible Limit in the Absence of Alternate Source**	**Remarks**
i)	**Cadmium (as Cd), mg/l, *Max***	0.003	No relaxation	—
ii)	**Cyanide (as CN), mg/l, *Max***	0.05	No relaxation	—
iii)	**Lead (as Pb), mg/l, *Max***	0.01	No relaxation	—
iv)	**Mercury (as Hg), mg/l, *Max***	0.001	No relaxation	—
v)	**Molybdenum (as Mo), mg/l, *Max***	0.07	No relaxation	—
vi)	**Nickel (as Ni), mg/l, *Max***	0.02	No relaxation	—
vii)	**Pesticides, µg/l, *Max***	—	No relaxation	—
viii)	**Polychlorinated biphenyls, mg/l, *Max***	0.000 5	No relaxation	or APHA 6630
ix)	**Polynuclear aromatic hydro-carbons (as PAH), mg/l, *Max***	0.000 1	No relaxation	—
x)	**Total arsenic (as As), mg/l, *Max***	0.01	0.05	—
xi)	**Total chromium (as Cr), mg/l, *Max***	0.05	No relaxation	—

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Table No. 7: Bacteriological Quality of Drinking Water[1] (*Clause* 4.1.1)		
Sr. No.	**Organisms**	**Requirements**
1)	**All water intended for drinking:** a) E. coli or thermo-tolerant coliform bacteria	Shall not be detectable in any 100 ml sample
2)	**Treated water entering the distribution system:** a) E. coli or thermo-tolerant coliform bacteria b) Total coliform bacteria	Shall not be detectable in any 100 ml sample
3)	**Treated water in the distribution system:** a) E. coli or thermo-tolerant coliform bacteria b) Total coliform bacteria	Shall not be detectable in any 100 ml sample
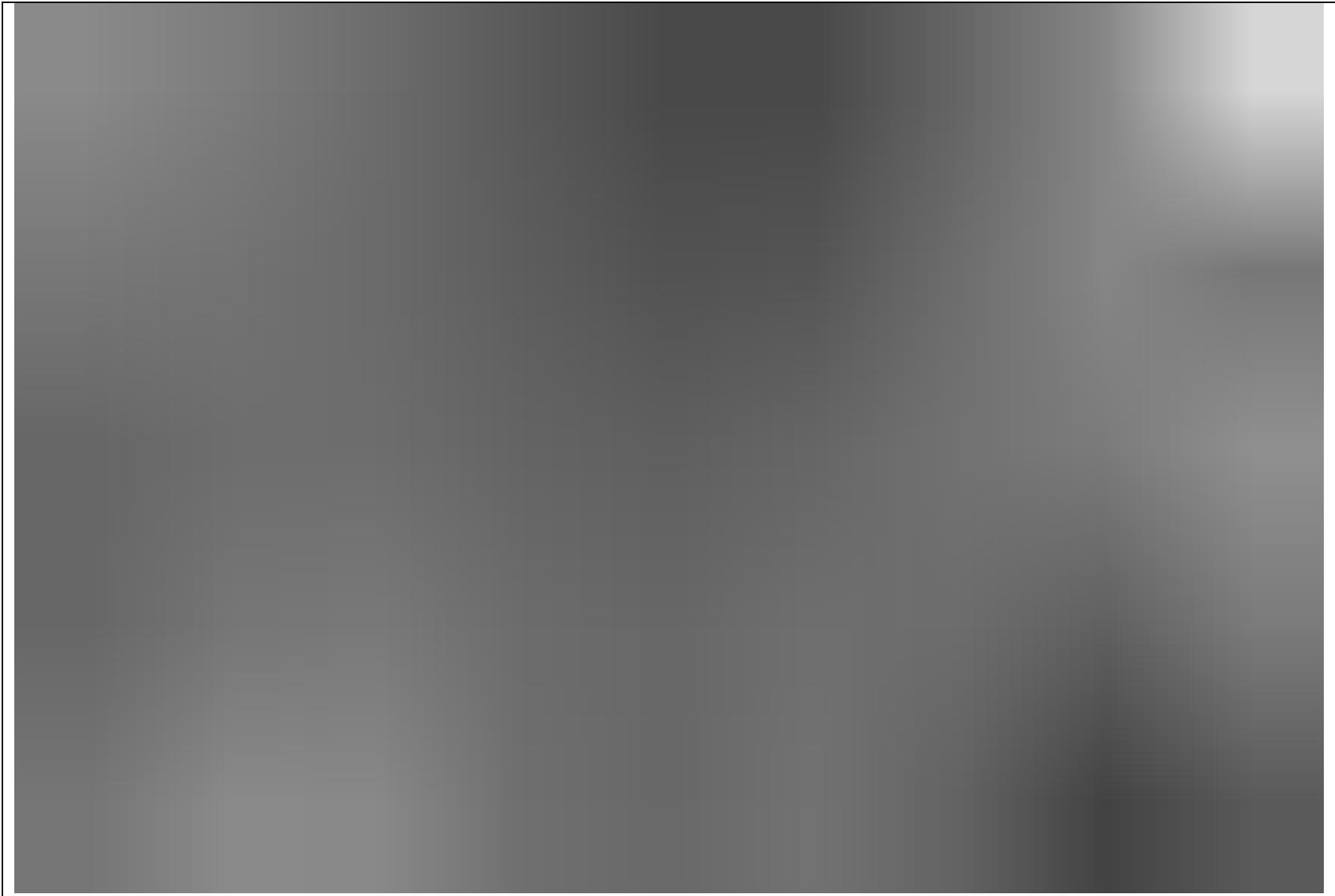
Satellite Imagery No. 4: Sampling Locations of Air Component

Table No. 8: Qualitative & Quantitative Parameters of Drinking Water Source at VMV

Sr. No	Characteristics Parameters	Values
1)	Odour	Agreeable
2)	Colour	<1 Hazen
3)	Taste	Agreeable
4)	pH	6.90
5)	Electrical Conductivity mS/cm	0.64
6)	Water Temperature	18
7)	Turbidity (NTU)	0.1
8)	Total Solids (mg/L)	232
9)	Dissolve Solids (mg/L)	216
10)	Suspended solids (mg/L)	<4
11)	Relative Density	1
12)	Dissolve Oxygen (mg/L)	6.6
15)	Carbonate	Absent
16)	Bicarbonate (HCO_3)	4.00

Sr. No	Characteristics Parameters	Values
17)	**Sodium (meq/L)**	**1.00**
18)	**Calcium (meq/L)**	**21.00**
19)	**Magnesium (meq/L)**	**23.80**
20)	**Potassium (meq/L)**	**0.23**
21)	**Chloride (meq/L)**	**6**
22)	**Sulphate (mg/L)**	**36.03**
23)	**Ortho Phosphate (mg/L)**	**<0.03**
24)	**Fluorides (mg/L)**	**0.14**
26)	**Nitrates (mg/L)**	**0.24**
30)	**Sodium Absorption Ratio (SAR)**	**0.21**
31)	**Residual Sodium Carbonate (RSC)**	**Absent**
32)	**Fecal coliform (CFU)**	**Absent**
33)	**E. Coli (CFU)**	**Absent**

Table No. 9: Water Source at VMV: I] Nagpur Municipal Corporation (20)

Sr. No.	Month	Year	Meter Readings	Total Units Used	Total Amount
1)	January	2022	-	375	-
2)	February	2022	-	333	-
3)	March	2022	-	352	-
4)	April	2022	-	386	-
5)	May	2022	-	449	-
3)	June	2022	8945	464	14606.24
4)	July	2022	9316	371	11675.56
5)	August	2022	9667	351	11020.36
6)	September	2022	9995	328	10266.88
7)	October	2022	10121	126	4092
8)	November	2022	10353	232	7939
9)	December	2022	10573	220	7504
10)	January	2023	10764	191	6564
11)	February	2023	10909	145	4867
12)	March	2023	11041	132	4388
13)	April	2023	11229	188	6739
14)	May	2023	11425	196	7047
15)	June	2023	11590	165	5853.25
16)	Total			5004	102562.29

* Amount- 22.23 Rs./unit for first 20 units; 25.66 Rs./unit for 21-80 units; and above 80 units 30.78 Rs./unit

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Graph No. 2: Monthly Water Consumption and the Expense (20)
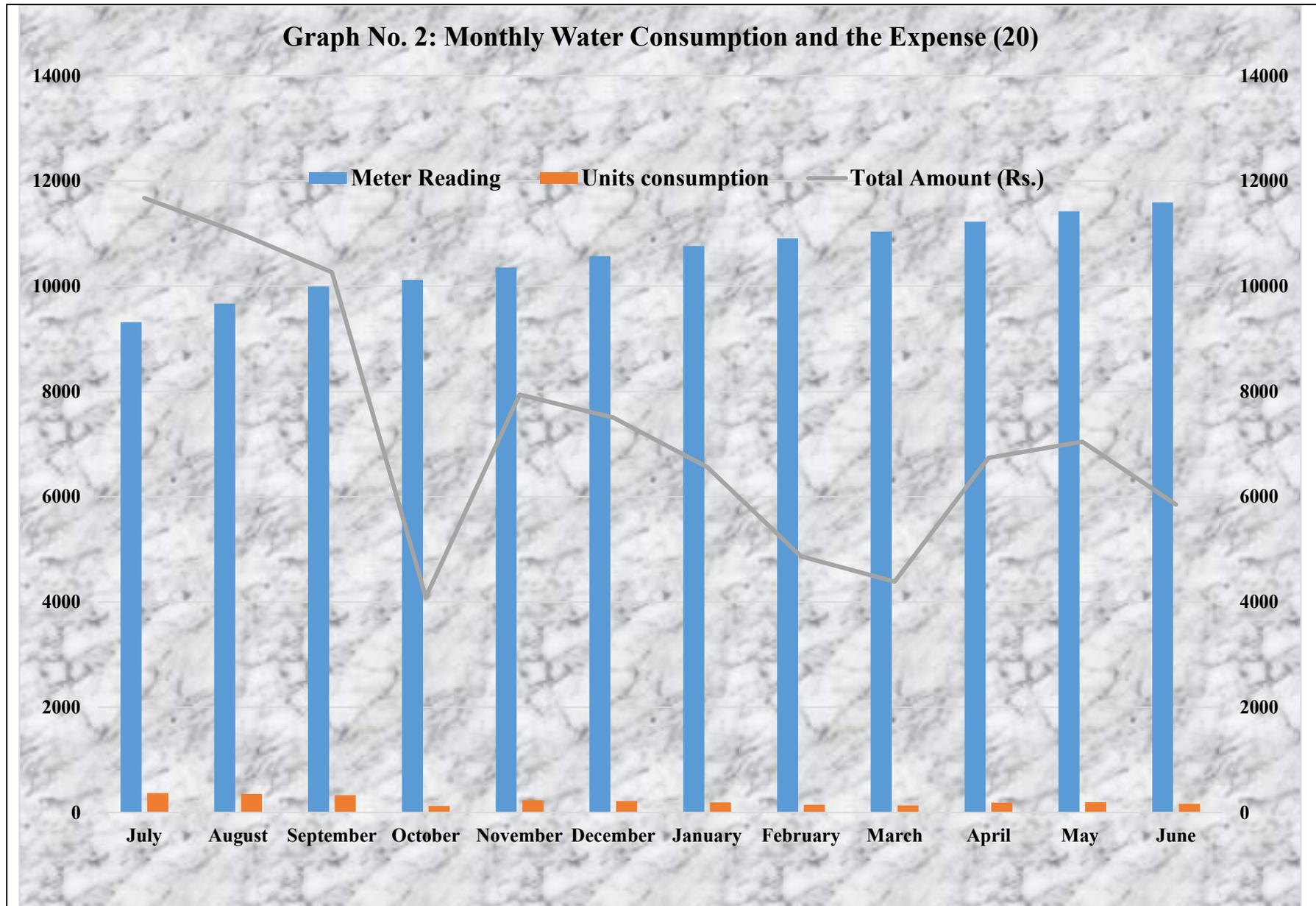
Table No. 10: Water Source at VMV: I] Nagpur Municipal Corporation (15)

Sr. No.	Month	Year	Meter Readings	Total Units Used	Total Amount
1)	January	2022	89	6	-
2)	February	2022	95	5	-
3)	March	2022	100	4	-
4)	April	2022	104	4	-
5)	May	2022	108	3	-
3)	June	2022	111	4	-
4)	July	2022	115	2	-
5)	August	2022	117	4	226
6)	September	2022	121	136	230
7)	October	2022	257	167	-
8)	November	2022	424	323	-
9)	December	2022	747	358	10137
10)	January	2023	1105	310	11287
11)	February	2023	1415	236	9892
12)	March	2023	1651	217	7417
13)	April	2023	1868	157	6781
14)	May	2023	2025	19	-
15)	June	2023	2044	63	-
16)	July	2023	2107	267	9839
17)	Total			2285	45970

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Graph No. 3: Monthly Water Consumption and the Expense
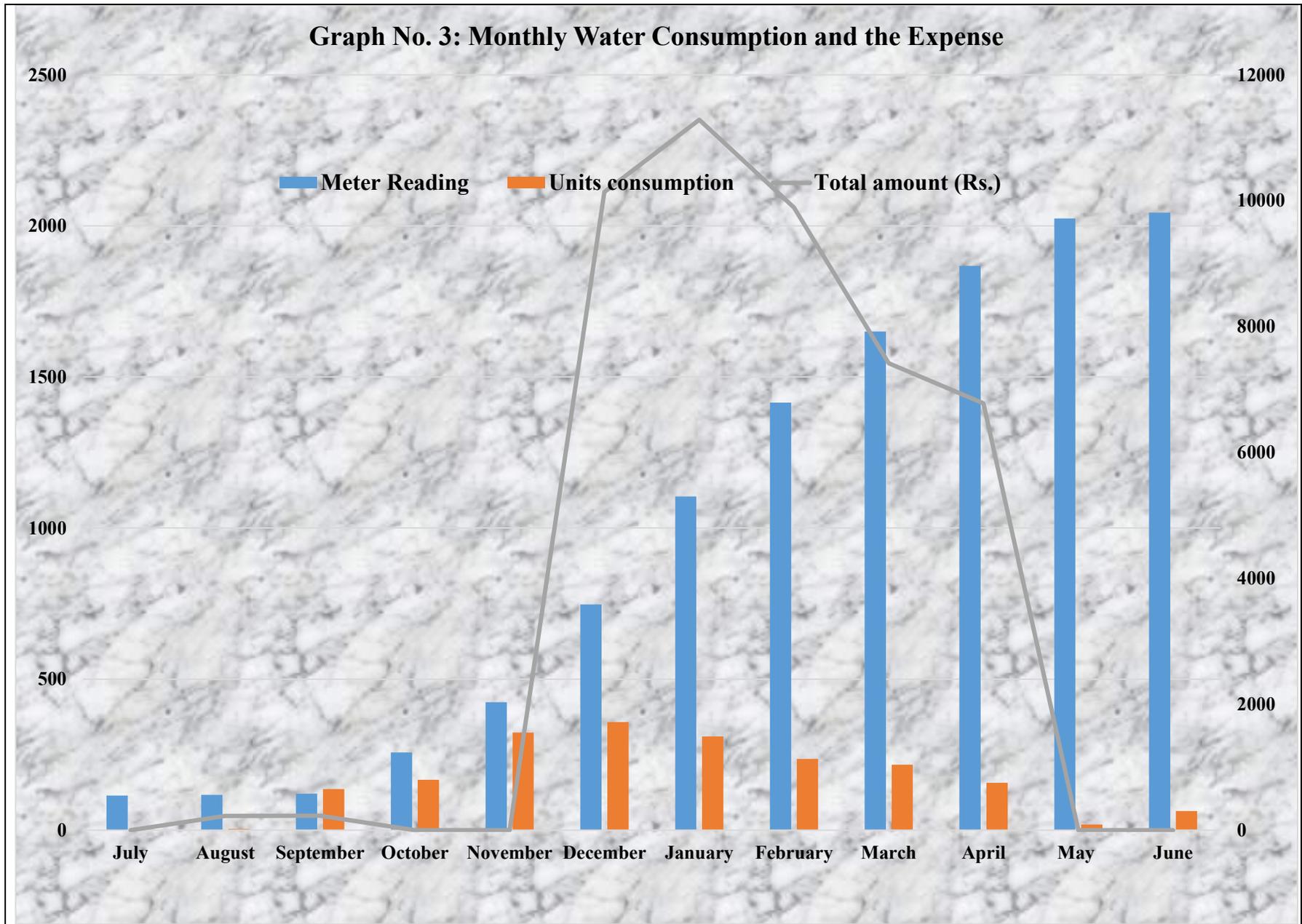
Table No. 11: Water Source at VMV: I] Quantification of Water Consumption NMC (20)

Sr. No.	Month	Year	Total water quantity (litres)	Total Units Used
1)	January	2022	375000	375
2)	February	2022	333000	333
3)	March	20222	352000	352
4)	April	2022	386000	386
5)	May	2022	449000	449
6)	June	2022	464000	464
7)	July	2022	371000	371
8)	August	2022	351000	351
9)	September	2022	328000	328
10)	October	2022	126000	126
11)	November	2022	232000	232
12)	December	2022	220000	220
13)	January	2023	191000	191
14)	February	2023	145000	145
15)	March	2023	132000	132
16)	April	2023	1880001	188
17)	May	2023	196000	196
18)	June	2023	165000	165

* 1 Unit-1000 Lit. of water

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Graph No. 4: Quantification of Water Consumption NMC (20)
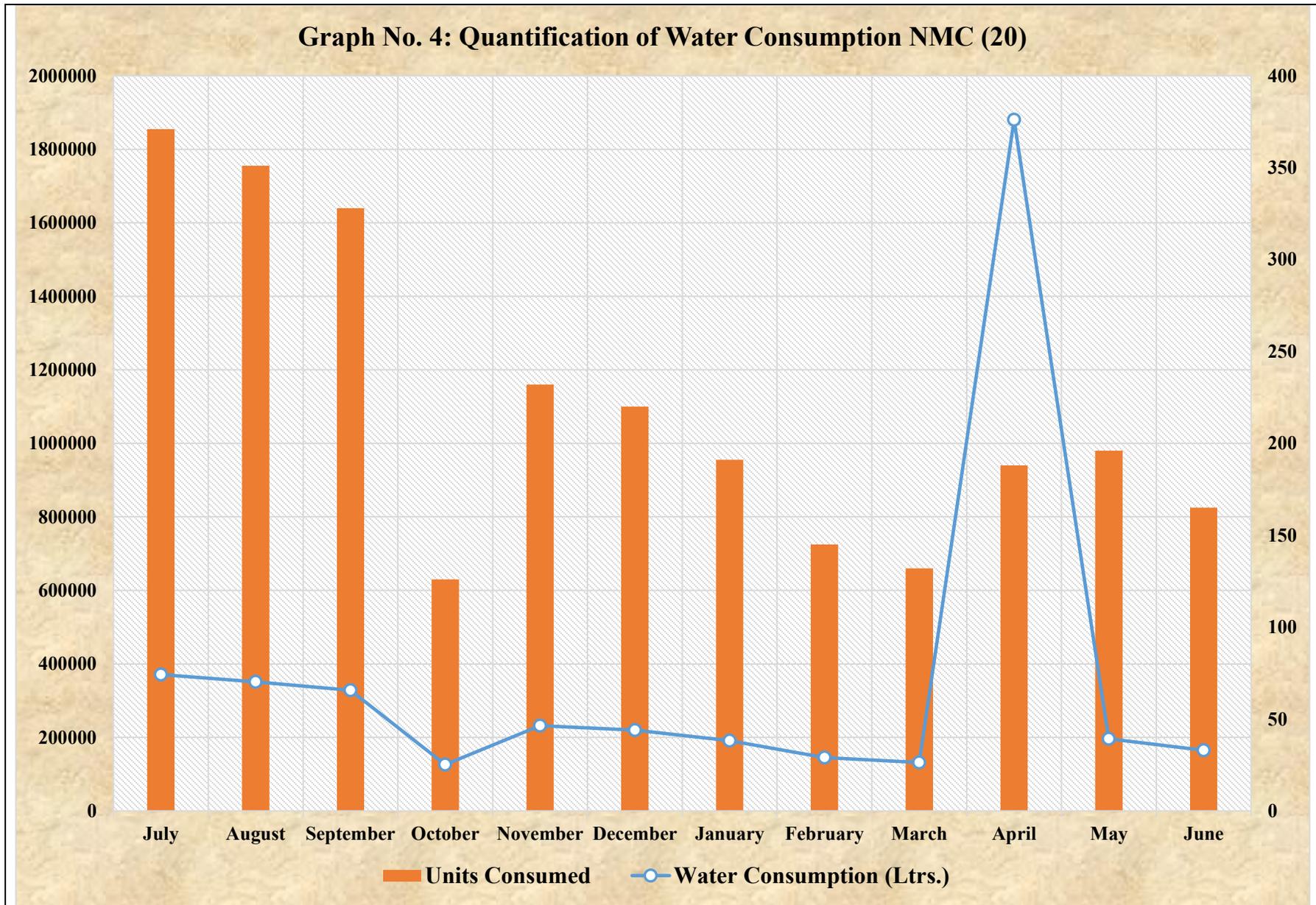
Table No. 12: Water Source at VMV: II] Quantification of Water Consumption NMC (15)

Sr. No.	Month	Year	Total water quantity (litres)	Total Units Used
1)	January	2022	6000	6
2)	February	2022	5000	5
3)	March	20222	4000	4
4)	April	2022	4000	4
5)	May	20222	3000	3
6)	June	2022	4000	4
7)	July	2022	2000	2
8)	August	2022	4000	4
9)	September	2022	136000	136
10)	October	2022	167000	167
11)	November	2022	323000	323
12)	December	2022	358000	358
13)	January	2023	310000	310
14)	February	2023	236000	236
15)	March	2023	217000	217
16)	April	2023	157000	157
17)	May	2023	19000	19
18)	June	2023	63000	63
19)	July	2023	267000	267

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Graph No. 5: Quantification of Water Consumption NMC (15)

Legend: Units Consumed — Water Consumption (Ltrs.)
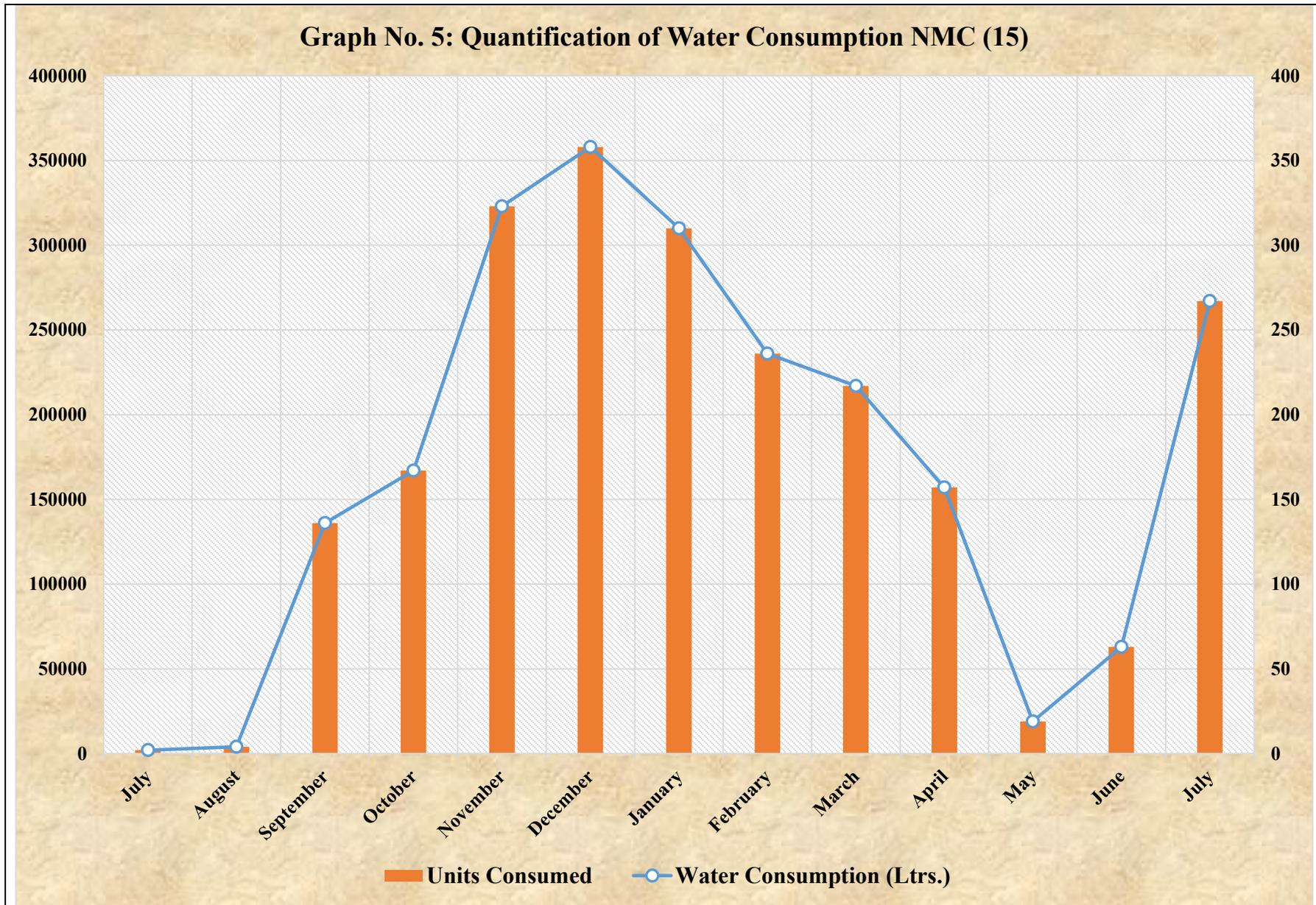
Table No. 13: Water Tank Provision

Sr. No.	Location	Type of tank	Capacity in Ltr.	Quantity
1)	**Near Old Building**	Underground Sump	45000	1=1+1 (divided)
2)	**Old Building**	Overhead RCC Tank	5000	1
3)	**Old Building**	Small water Tank	1000	1
4)	**Behind New Building**	Underground Tank (Rainwater Harvesting Tank)	40000	1
5)	**New Building**	Overhead RCC Tank	25000	1
6)	**New Building**	Overhead RCC Tank	25000	1
7)	**Total**		**1,41,000**	**6**

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Table No. 14: Water Dispensing Connectivity

Sr. No.	Department and Floor		Water Coolers/ RO Filter	No. of Taps	Capacity
1)	**Old Building (L-Shaped)**	Ground Floor	2	25	100 Ltrs. each
		1st Floor	-		-
		2nd Floor	1		60 Ltrs.
		3rd Floor	-		-
		Fourth Floor	1		120 Ltrs.
2)	**New Building**	Ground Floor	-		-
		1st Floor	1		60 Ltrs.
		2nd Floor	1		60 Ltrs.
		3rd Floor			
		Fourth Floor			
	Total		6	25	500 Ltrs.

Table No. 15: Annual Rooftop Rainwater Harvesting Potential for VMV

Sr. No	Name of the Building	Terrace (Area)	RWH Potential (Litres)
1)	**Old Building**	2012.08 sq. m	**6202632.11**
2)	**New Building**	837.72 sq. m	**2582436.75**
3)	**Total**	**2849.8**	**8785068.86**

Graph No. 6: Rainwater Harvesting Potential

Graph No. 6: Rainwater Harvesting Potential
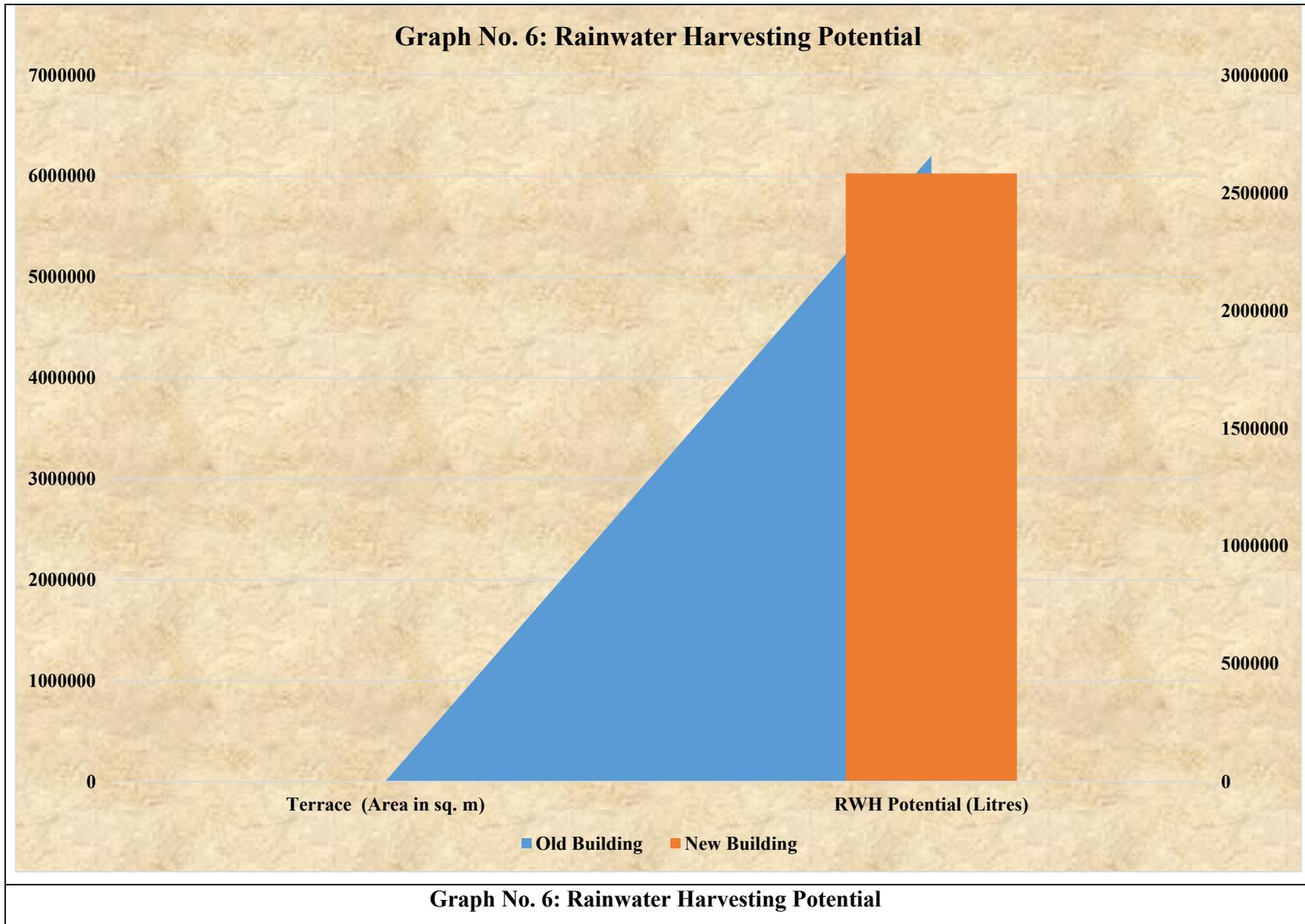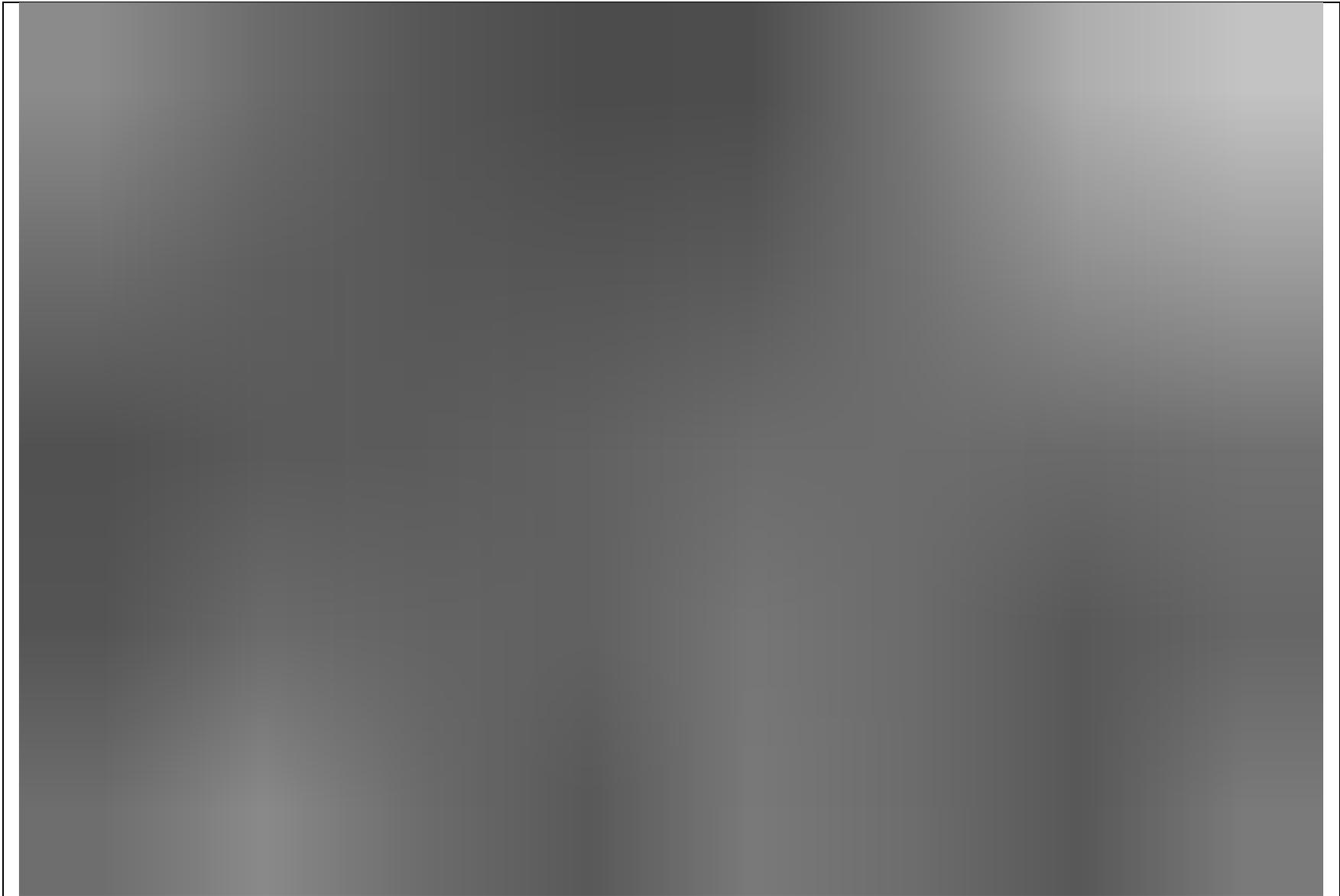
Satellite Imagery No. 5: Rainwater Harvesting Potential

Image No. 16: Components of Rainwater Harvesting System

Table No. 16: Annual Water Budget of VMV

| Sr. No. | VMV Water Source | Total Volume of Water (in Units) | Purpose of Water Use | | | Waste water Generated (Lit.) | Subjected to STP for treatment and disposal |
			Domestic	Laboratory	Sanitation		
1)	**NMC (20 & 15)**	**4637** (1 Unit = 1000 Litres)	Drinking, Irrigating Lawns	Distillation, Washing Glassware, Others	Flushing, Washing, Cleaning Toilets, etc	**2,14,85,400**	**2,11,12,400**
2)	**Borewell**	Utilized as per requirement	Drinking, Irrigating Lawns	Distillation, Washing Glassware, Others	Flushing, Washing, Cleaning Toilets, etc		

II) AIR AUDIT

In addition to land and water, air is the prime resource for sustenance of life. In recent years, medium and small towns and cities have also witnessed an increase in pollution, thus getting fast reflected in the non-attainment cities of India. Air pollution has increasingly become a serious concern, predominantly because of its health impacts. Thus, regular track of Air Quality is important for human health.

One way to describe air quality is to report the concentrations of all pollutants with acceptable levels. An air quality index is defined as an overall scheme that transforms the weighed values of individual air pollution related parameters (for example, pollutant concentrations) into a single number or set of numbers.

The air sampling was done by purposive random sampling method at different locations within the campus to compute the qualitative and quantitative air pollutant data. The Air pollution index is generated with this data for the college campus.
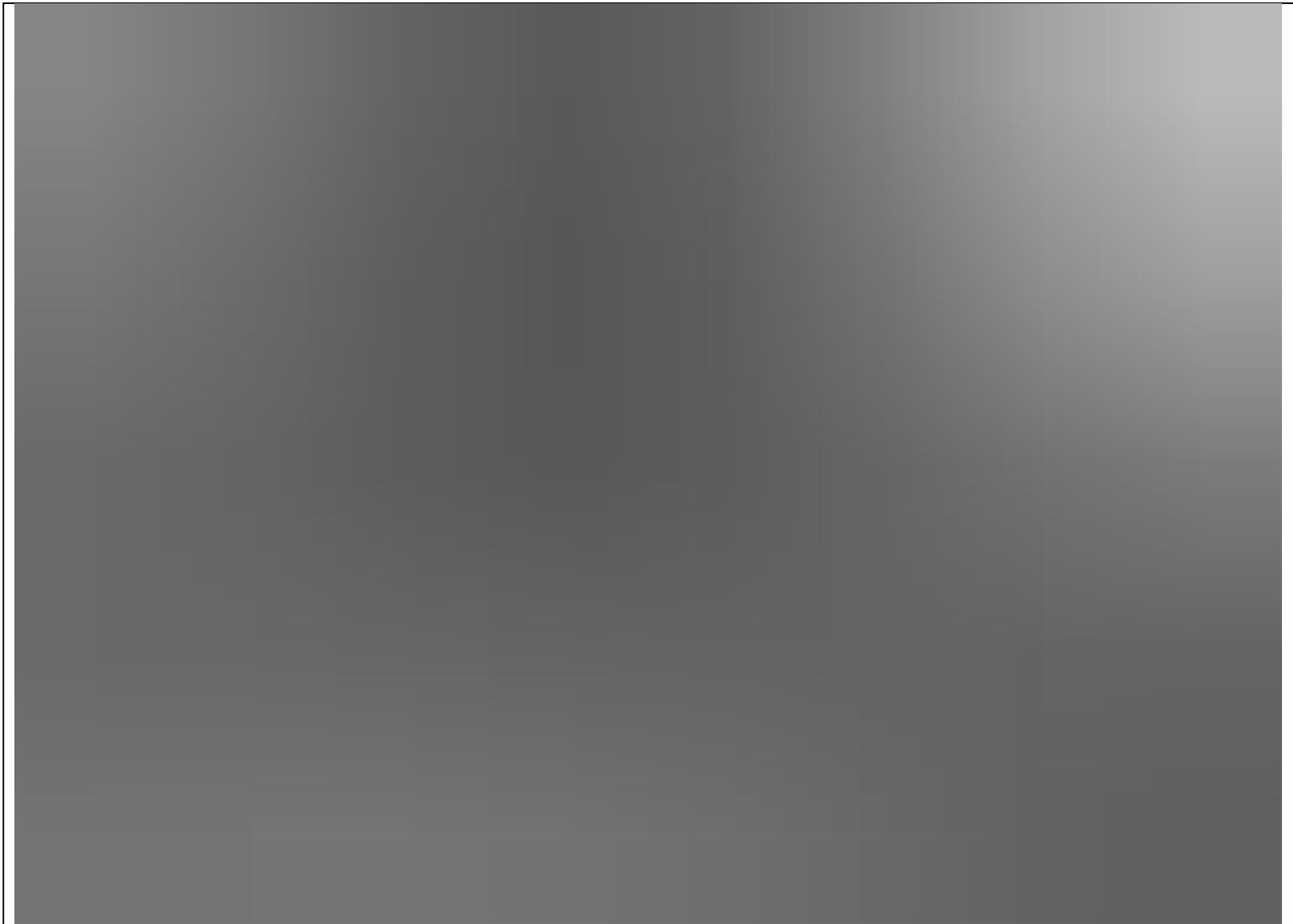
Satellite Imagery No. 6: Sampling Locations of Air Component Component

Table No. 17: National Ambient Air Quality Standards

Sr. No.	Pollutants	Time weighted Average	Concentration of Ambient Air	
			Industrial, Residential, Rural Areas	Ecologically Sensitive Area
1)	Sulphur Dioxide (SO_2), µg/m³	Annual	50	20
		24 hrs	80	80
2)	Nitrogen Dioxide (NO_2), µg/m³	Annual	40	30
		24 hrs	80	80
3)	Particulate matter (PM_{10}), µg/m³	Annual	60	60
		24 hrs	100	100
4)	Particulate matter ($PM_{2.5}$), µg/m³	Annual	40	40
		24 hrs	60	60
5)	Ozone (O_3), µg/m³	8 hours	100	100
		1 hours	180	180
6)	Carbon monoxide (CO) mg/m³	8 hours	02	02
		1 hours	04	04

Source: National Ambient Air Quality StandarDs, CPCB, New Delhi, 18th November, 2009

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Table No. 18: Qualitative and Quantitative Characteristics of Air at different locations at VMV

Sr. No.	Months	Locations	CO	NO_2	SO_2	RSPM	SPM	O_3	NH_3
1)	July	L1	498	24.57	11.14	83.28	303.14	49	21
2)	August	L2	538	18	8.7	101	344.33	89	22
3)	September	L3	502	28.88	11.88	124.33	365.66	132	22
4)	October	L4	510	28.9	9.72	105	234.09	110	23
5)	November	L5	508	34.26	9	165.26	308.73	129	21
6)	December	L6	502	25.44	6.4	114.55	255	112	21

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7)	**January**	L7	432	20	35	198	124	50	21
8)	**February**	L8	498	18.66	32	93	158	47	21
9)	**March**	L9	487	16	36	87	97	46	22
10)	**April**	L10	459	19.4	38	89	94	43	24
11)	**May**	L11	476	18	38	91	83	49	22
12)	**June**	L12	482	17	32	50	86	52	21

* **CO - Carbon monoxide**
* **NO$_2$ - Nitrogen dioxide**
* **SO$_2$ - Sulphur dioxide**
* **RSPM - Respirable Suspended Particulate matter**
* **SPM - Suspended Particulate matter**
* **O$_3$ - Ozone**
* **NH$_3$ - Ammonia**

GRAPH NO. 7 : MONTHLY VARIATION IN AIR POLLUTANTS

RSPM ■ SPM ■ SO2 ■ O3 ■ NH3 ■ NO2 ● CO
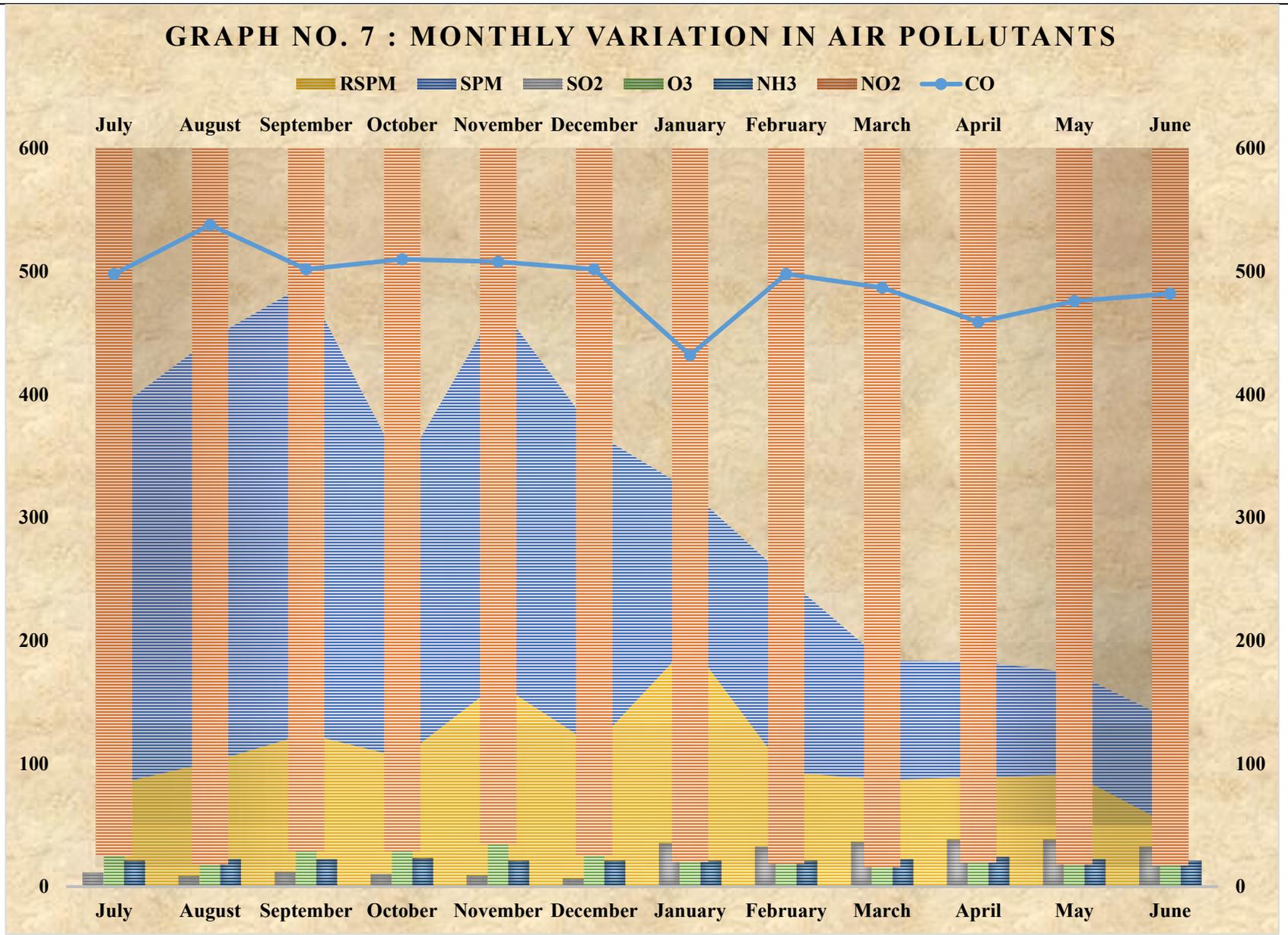
Graph No. 7: Monthly Variation in Air Pollutants at VMV Campus

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Table No. 19: Assessment of Air Quality Index (AQI) of VMV

Sr. No.	Months	Locations	AQI
1)	July	L1	50
2)	August	L2	65
3)	September	L3	58
4)	October	L4	132
5)	November	L5	147
6)	December	L6	223
7)	December	L6	223
8)	January	L7	201
9)	February	L8	178
10)	March	L9	204
11)	April	L10	98
12)	May	L11	80
13)	June	L12	92

Graph No. 8: Monthly Variation in AQI at VMV Campus

250	
200	
150	
100	
50	
0	

July August September October November December December January February March April May June
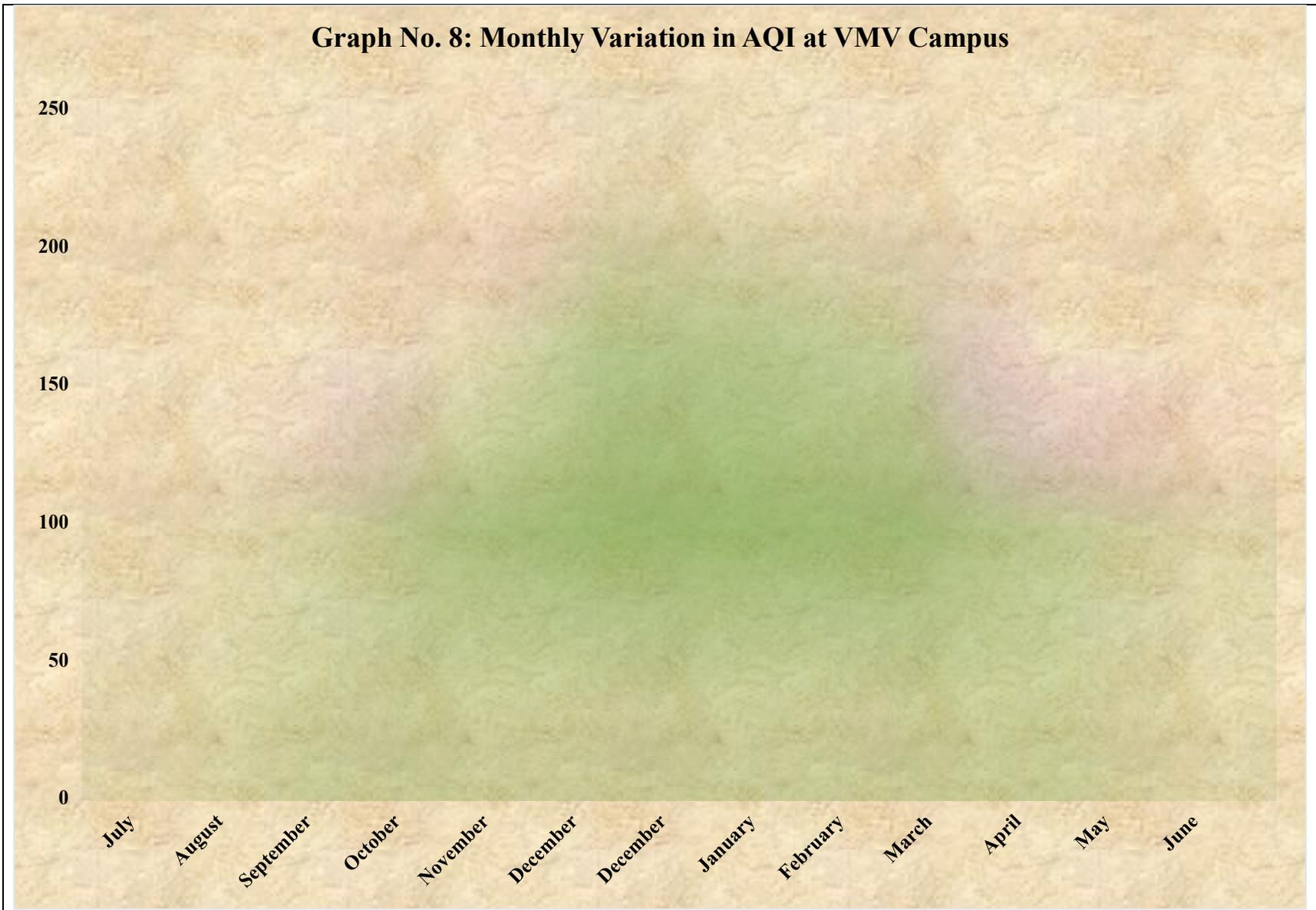
Graph No. 8: Monthly Variation in AQI at VMV Campus

III) WEATHER & CLIMATE AUDIT

Weather is the mix of events that happen each day in our atmosphere. Even though there's only one atmosphere on Earth, the weather isn't the same all around the world. Weather is different in different parts of the world and changes over minutes, hours, days, and weeks. Most weather happens in the part of Earth's atmosphere that is closest to the ground called the troposphere. Whereas weather refers to short-term changes in the atmosphere, climate describes what the weather is like over a long period of time in a specific area. Different regions can have different climates.

Weather is made up of multiple parameters, including air temperature, atmospheric (barometric) pressure, humidity, precipitation, solar radiation and wind. Each of these factors can be measured to define typical weather patterns and to determine the quality of local atmospheric conditions. The environmental conditions produced by different weather parameters have an impact on the quality of the surrounding ecosystem. Weather elements form a chain reaction, as the impacts do not remain solely in the atmosphere. Temperature, pressure and humidity (moisture) can interact to form clouds. These clouds, in turn can reduce solar radiation for plants, or increase precipitation, which can runoff into a body of water. Consistently high temperatures can increase the heat transfer to local bodies of water in addition to heating the air. Likewise, a lack of precipitation affects not only weather conditions, but soil moisture and water levels due to evaporation. Wind speed and direction can be indicative of a front moving into the area, or it can create waves and encourage a stratified water column to mix.

Weather monitoring can establish a database of typical conditions. When one or more weather elements deviate from this standard, the information can be used to explain or predict weather events. Monitoring weather conditions is important not only as an environmental baseline, but to maintain quality working conditions, marine studies and recreational safety.
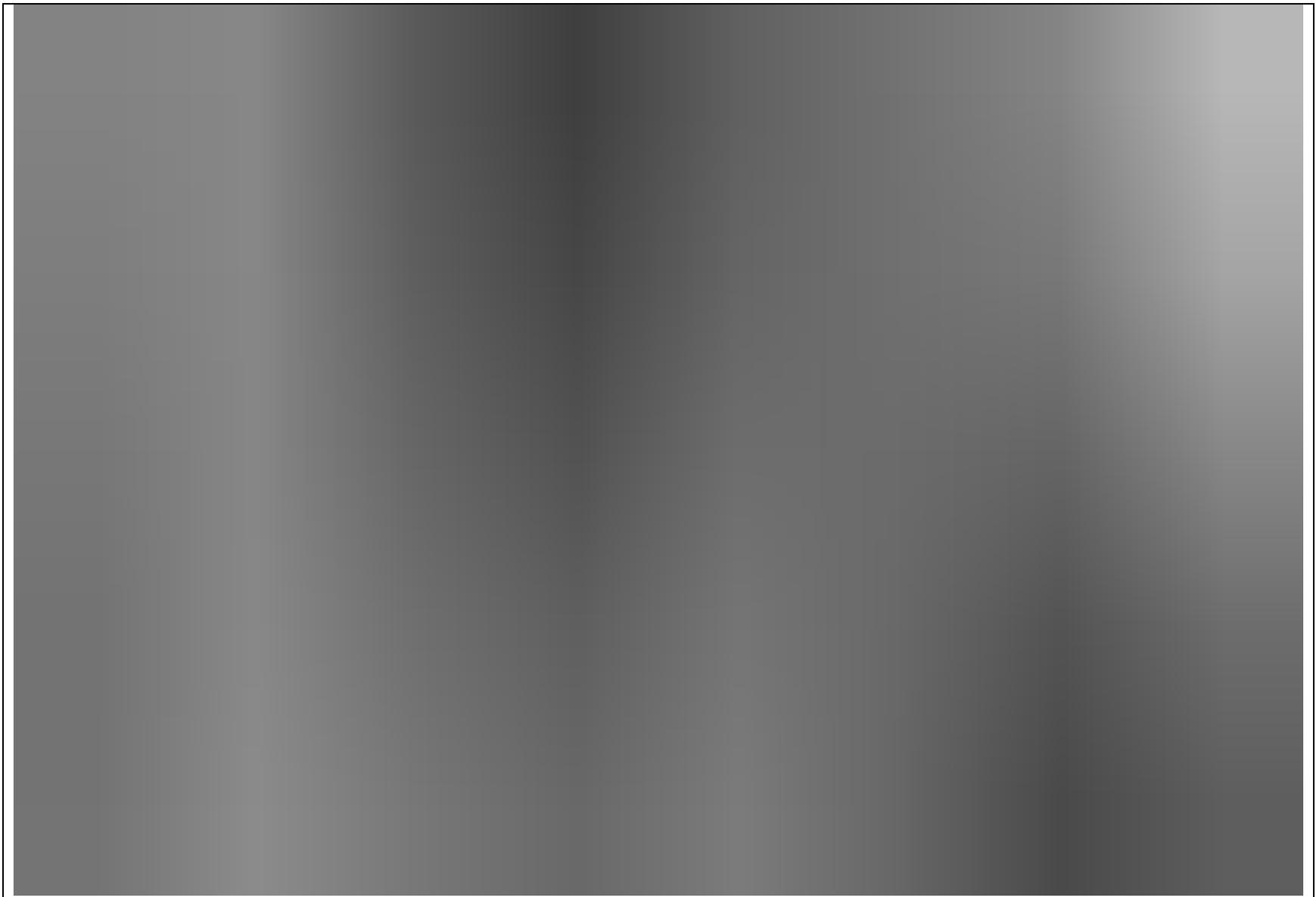
Satellite Imagery No. 7: Sampling Locations of Weather & Climate Component

Table No. 20: Qualitative and Quantitative Characteristics of Weather and Climate at VMV

Sr. No.	Location	Air Temp (ºC) Min.-Max.	Relative Humidity (%)	UV Index	Pressure KPa	Wind Speed mph	Wind Chill (%)	Dew Point (ºC)	Cloud Cover (%)
1)	**L1**	22-26	68	6.7	99.5	40	28	17	40
2)	**L2**	24-28	70	6.3	101.5	36	27	18	34
3)	**L3**	21-26	66	6.4	101.3	34	26	17	32
4)	**L4**	22-26	71	6.9	101.3	35	24	16	34
5)	**L5**	22-28	68	6.6	99.6	34	25	19	36

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Graph No. 9: Characteristics of Weather and Climate at VMV
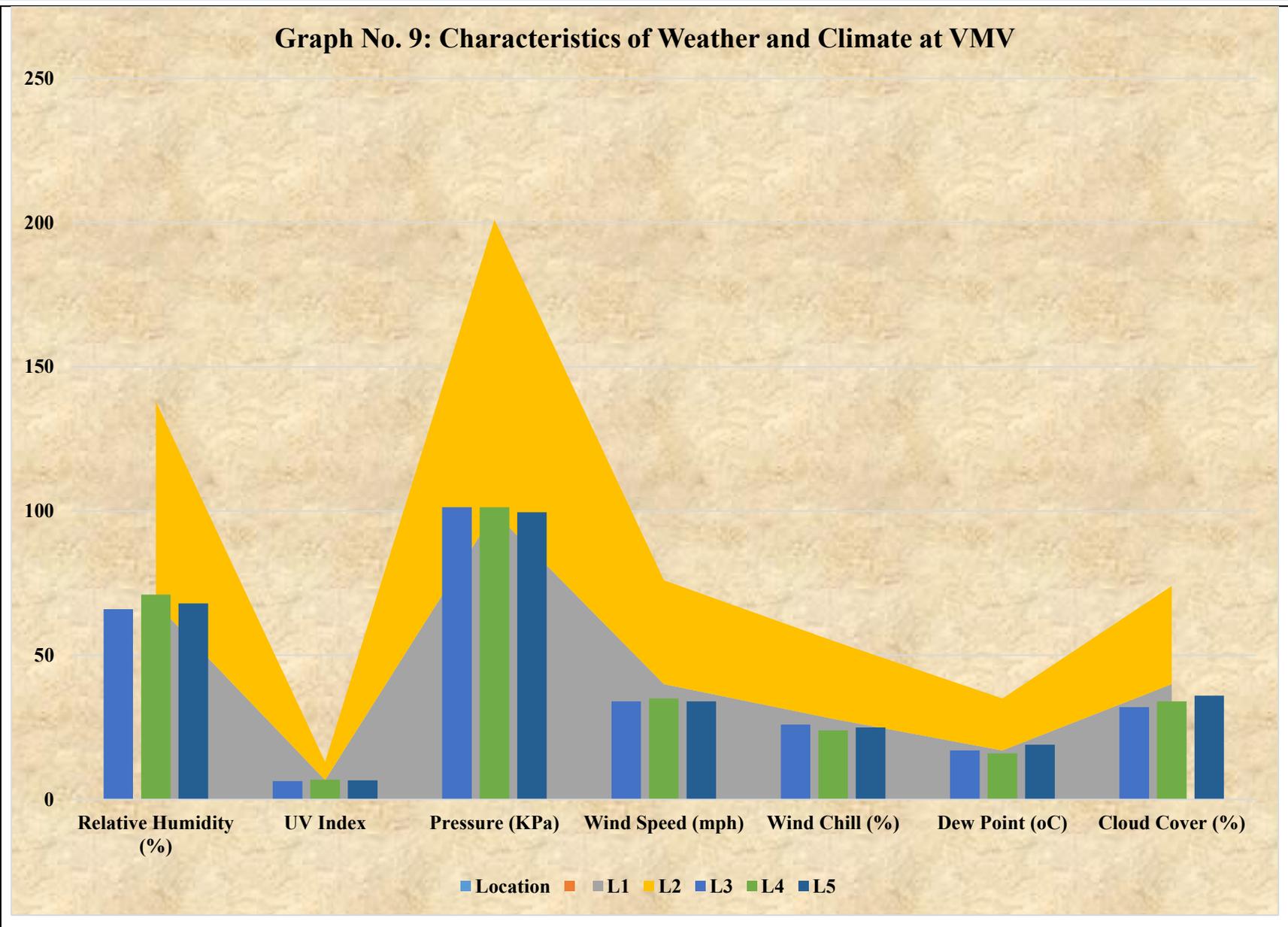
Graph No. 9: Characteristics of Weather and Climate at VMV

IV) SOIL AUDIT

Soil is important as a medium for plant growth and for the support of much animal and human activity. The Soil acts as the reservoir for the nutrients and water providing the plant's needs for these requirements throughout their growth. Indeed soil (and the soil constituents), together with the plant life it supports, the rock on which it lies, and the climate it experiences, forms a finely balanced system.

The soil performs many functions. These include functions related to natural ecosystems, agricultural productivity, and environmental quality, soil as source of raw materials and as base for buildings. Of these the agricultural productivity function is probably the most widely recognized and understood. This function of soil is to support plant and animal productivity whilst maintaining or enhancing water and air quality and also supporting human health and habitation. To perform this production function, the soil must be able to provide the following: a physical, chemical and biological context suitable for the survival and development of living organisms; the conditions for the regulation and partitioning of water flow, storage and recycling of nutrients and other elements; conditions to support biological activity and diversity for plant growth and animal productivity; an environment to filter, buffer, degrade, immobilize, and detoxify organic and inorganic substances; and provide mechanical support for living organisms and their structures.

The soil samples were collected from different locations within the VMV campus by random sampling method and then further these samples were equilibrated by quartering and coning method. Further the big stones and mudballs were removed and the soil was sieved through the fine sieve and then was subjected for further qualitative and quantitative physico-chemicalanalysis.
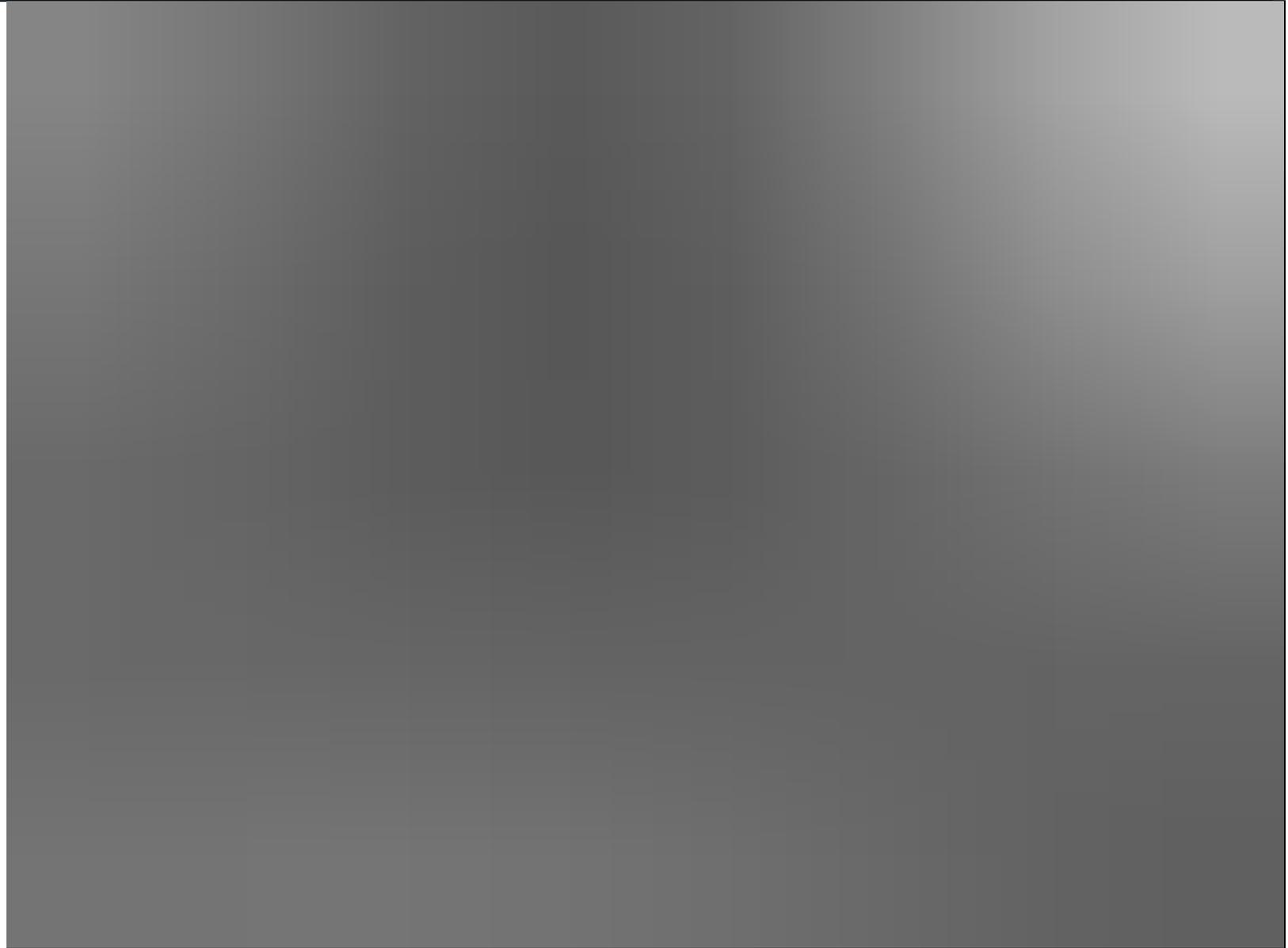
Satellite Imagery No. 8: Sampling Locations of Soil Component

Table No. 21: Standard Soil Classification

Sr. No.	Soil Tests	Range	Classification
1)	**pH**	<4.5	Extremely acidic
		4.51-5.50	Very strongly acidic
		5.51-6.00	Moderately acidic
		6.01-6.50	Slightly acidic
		6.51-7.30	Neutral
		7.31-7.80	Slightly alkaline
		7.81-8.50	Moderately alkaline
		8.51-9.00	Strongly alkaline
		9.01	Very strongly alkaline
2)	**Salinity (mmhos/cm), (1ppm=640 mmhos/cm)**	Upto 1.00	Average
		1.01-2.00	Harmful to germination
		2.01-3.00	Harmful to crops
3)	**Organic carbon (%)**	Upto 0.2	Very Less (for crops)
		0.21-0.4	Less
		0.41-0.6	Medium
		0.61-0.8	On an average sufficient
		0.81-1.0	Sufficient
		>1.0	More than sufficient

4)	**Nitrogen (Kg/ha)**	Upto 50	Very Less (for crops)
		51-100	Less
		101-105	Good
		151-300	Better
		>300	Sufficient
5)	**Phosphorus (Kg/ha)**	Upto 15	Very Less (for crops)
		16-30	Less
		31-50	Medium
		51-65	On an average sufficient
		66-85	Sufficient
		>80	More than sufficient
6)	**Potash (Kg/ha)**	0-120	Very Less (for crops)
		121-180	Less
		181-240	Medium
		241-300	Average
		301-360	Better
		>360	More than sufficient

Source: Hand Book of Agriculture, ICAR, New Delhi

Table No. 22: Qualitative and Quantitative Characteristics of Soil at VMV

Sr. No.	Parameters	Units	Results	Method Reference
1)	pH		7.70	Manual of Soil Testing, Department of Agriculture & Co- operation, Ministry of Agriculture, Govt. India, Sec.4-17, Page No 89.
2)	Electrical Conductivity	mS/cm	0.27	
3)	Organic Carbon	(%)	0.81	
4)	Nitrogen	Kg/ha	351.23	
5)	Phosphorus	Kg/ha (P)	35.09	FAO Sec. III, 12-1; PageNo. 157
6)	Potassium	Kg/ha (K)	179.55	
7)	Copper	ppm	2.31	Manual of Soil Testing, Department of Agriculture & Co- operation, Ministry of Agriculture, Govt. India, Sec.4-17, Page No 89.
8)	Iron	ppm	3.89	
9)	Zinc	ppm	2.33	
10)	Manganese	ppm	2.31	
15)	Moisture	(%)	6.72	
16)	Water holding Capacity	(%)	42.6	
17)	Pore Space	(%)	43.2	Manual of Soil Testing, Department of Agriculture & Co- operation, Ministry of Agriculture, Govt. India, Sec.4-17, Page No 89.
18)	Texture		Soft - Coarse	

V) VEGETATION AUDIT: Flora Diversity

Trees play a critical role for people and the planet. Numerous studies have demonstrated that the presence of trees and urban nature can improve people's mental and physical health, children's attention and test scores, the property values in a neighborhood, and beyond. Trees cool our urban centers. Trees are essential for healthy communities and people. The benefits that tree's provide can help cities and countries meet 15 of the 17 internationally supported United Nations Sustainable Development Goals.

Trees provide many ecosystem services that can benefit a city environment, ranging from reducing energy use and removing pollution (Nowak & Greenfield, 2018) to increasing property values, developing the local economy, and supporting tourism (Nesbitt, Hotte, Barron, Cowan, & Sheppard, 2017).

One of the most important benefits for human health that urban forests can provide is the interception and reduction of air pollution. Tree cover is strongly linked to student academic performance (Kuo, Browning, Sachdeva, et al., 2018; Kweon, Ellis, Lee, & Jacobs, 2017; Matsuoka, 2010). In a study, views of trees and shrubs at schools, as opposed to grass, were strongly related to future education plans and graduation rates (Matsuoka, 2010). Li and Sullivan (2016) found that students who had views of trees and green environment from their classrooms, as compared to being in a room without windows or a room with a view of a brick wall, scored substantially higher on tests measuring attention, and they had a faster recovery from a stressful event. Students who learn in the presence of trees and nature have improved classroom engagement (Kuo, Browning, & Penner, 2018). Trees can promote a quality education, which has innumerable advantages for society.

The Flora component was studied by observation and identification method. The vegetation was further categorized as: Shrubs, Ornamental Species, Medicinal Species and Tree Species. The tree species are marked with their geospatial data in map to generate the no. of individual per species present in the VMV campus. This shall help to generate the highly dominant species.

Satellite Imagery No. 9: Vegetation Map of VMV Campus

Table No. 23: Vegetation at VMV: I] Ornamental Species

Sr. No.	Scientific Name	Common Name
1)	*Urtica cannabina*	Hemp nettle
2)	*Cordyline fruticosa*	ti Plant
3)	*Ixora chinensis*	Chinese Ixora
4)	*Acalypha wilkesiana*	Copperleaf green
5)	*Rosa indica*	Desi Gulab
6)	*Ixora*	Jungle geranium
7)	*Ficus elastica Roxb.*	Rubber Fig
8)	*Hamelia patens.*	Firebush
9)	*Solenostemon scutellarioides*	Coleus/ Roy Pedley
10)	*Caladium bicolor*	Heart of Jesus
11)	*Euphorbia tithymaloides*	Devils Backbone
12)	*Dieffenbachia Bowmannii*	Dumb Canes
13)	*Polyscias scutellaria*	Shield aralia
14)	*Dypsis lutescens*	Areca Palm
15)	*Thuja occidentalis*	Eastern white cedar
16)	*Techoma stans*	Yellow elder
17)	*Aglaonema Christina*	Chinese Evergreen

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Sr. No.	Scientific Name	Common Name
18)	*Hibiscus rosa sinensis*	Hibiscus
19)	*Manihot esculenta Crantz*	Cassava
20)	*Tradescantia spathacea*	Moses in the cradle
21)	*Catharanthus roseus*	White periwinkle
22)	*Tithonia diversifolia*	Shrub sunflower
23)	*Opuntia*	Nopal
24)	*Agrostistachys indica*	Leaf Litter Plant
25)	*Polyscias*	Ming Aralia
26)	*Codiaeum variegatum*	Croton
27)	***Catharanthus roseus***	Purple periwinkle

Scientific Classification:

[1] Name of Species: _Urtica cannabina_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperm
Clade	Eudicots
Clade	Rosids
Order	Rosales
Family	Urticaceae
Genus	_Urtica_
Species	**_U. cannabina_**

[2] Name of Species: _Cordyline fruticose_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Monocots
Order	Aspargales
Family	Asparagaceae
Subfamily	_Lomandroideae_
Genus	**_Cordyline_**
Species	**_C. fruticosa_**

[3] **Name of Species:** *Ixora chinensis*

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Asterids
Order	Gentianales
Family	Rubiaceae
Genus	*Ixora*
Species	***I. chinensis***

[4] **Name of Species:** *Acalypha wilkesiana*

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Asterids
Clade	Rosids
Order	Malpighiales
Family	Euphorbiaceae
Genus	*Acalypha*
Species	***A. wilkesiana***

[5] **Name of Species: _Rosa indica_**

Kingdom	Plantae
Subkingdom	Tracheobionta- Vascular Plant
Superdivision	Spermatophyta- Seed Plant
Division	Magnoliophyta- Flowering Plants
Class	Magnoliopsida- Dicotyledons
Subclass	Rosidae
Order	Rosales
Family	Rosaceae Juss- Rose family
Genus	_Rosa L._
Species	**_Rosa indica L._**

[6] **Name of Species: _Ixora_**

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperm
Clade	Eudicots
Clade	Asterids
Order	Gentianales
Family	Rubiaceae
Subfamily	Ixoroideae
Tribe	Ixoreae
Genus	**_Ixora_**

[7] Name of Species: _Ficus elastica Roxb._

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Rosids
Order	Rosales
Family	Moraceae
Genus	_Ficus_
Subgenus	_F. subg.Urostigma_
Species	**_F. elastica_**

_[8]_ Name of Species: _Hamelia patens._

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Asterids
Order	Gentianales
Family	Rubiaceae
Genus	_Hamelia_
Species	**_H.patens_**

[9] Name of Species: _Solenostemon scutellarioides_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Asterids
Order	Lamiales
Family	Lamiaceae
Genus	_Coleus_
Species	_C. scutellarioides_

_[10]_ Name of Species: _Caladium bicolor._

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Monocots
Order	Alismatels
Family	Araceae
Subfamily	Aroideae
Tribe	Caladieae
Genus	Caladium
Species	**_C.bicolor_**

[11]   Name of Species: _**Euphorbia tithymaloides**_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Rosids
Order	Malpighiales
Family	Euphorbiaceae
Genus	_Euphorbia_
Species	_E. tithymaloides_

[12]   Name of Species: _**Dieffenbachia Bowmannii**_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Monocots
Order	Alismatels
Family	Araceae
Subfamily	Aroideae
Tribe	Dieffenbachieae
Genus	Dieffenbachieae Bowmannii

[13]   Name of Species: _Polyscias scutellaria_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Asterids
Order	Apiales
Family	Araliaceae
Genus	_Polyscias_
Species	**_P. scutellaria_**

_[14]_   Name of Species: _Dypsis lutescens_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Monocots
Clade	Commelinids
Order	Arecales
Family	Arecaceae
Genus	Dypsis
Species	**_D. lutescens_**

[15] Name of Species: _Thuja occidentalis_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Gymnosperms
Clade	Pinophyta
Clade	Pinopsida
Order	Cupressales
Family	Cupressaceae
Genus	_Thuja_
Species	**_T. occidentalis_**

_[16]_ Name of Species: _Techoma stans_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Asterids
Order	Lamiales
Family	Bignoniaceae
Genus	Tecoma
Species	**_T.stans_**

[17] Name of Species: _Aglaonema Christina_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Monocots
Order	Alismatales
Family	Araceae
Subfamily	Aroideae
Tribe	_Aglaonemateae_
Genus	_**Aglaonema**_

[18] Name of Species: _Hibiscus rosa sinensis_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Rosids
Order	Malvales
Family	Malvaceae
Subfamily	Malvoideae
Tribe	Hibisceae
Genus	_**Hibiscus**_

[19] Name of Species: _Manihot esculenta Crantz_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Rosids
Order	Malpighiales
Family	Euphorbiaceae
Genus	_Manihot_
Species	**_M. esculenta_**

_[20]_ **Name of Species: _Tradescantia spathacea_**

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Monocots
Clade	Commelinids
Order	Commelinales
Family	Commelinaceae
Genus	Tradescantia
Species	T. spathacea

[21] Name of Species: _Catharanthus roseus_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Asterids
Order	Gentianales
Family	Apocynaceae
Genus	_Catharanthus_
Species	**_C. roseus_**

[22] Name of Species: _Tithonia diversifolia_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Asterids
Order	Asterales
Family	Asteraceae
Genus	Tithonia
Species	T. diversifolia

[23]   Name of Species: _Opuntia_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Caryophyllales
Order	Cactaceae
Family	Opuntioideae
Genus	_Opuntieae_
Species	_Opuntia_

_[24]_   Name of Species: _Agrostistachys indica_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Rosids
Order	Malpighiales
Family	Euphorbiaceae
Genus	Agrostistachys
Species	_A. indica_

[25] Name of Species: _Polyscias_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Asterids
Order	Apiales
Family	Araliaceae
Genus	_Aralioideae_
Species	**_Polyscias_**

_[26]_ Name of Species: _Codiaeum variegatum_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Rosids
Order	Malpighiales
Family	Euphorbiaceae
Genus	Codiaeum
Species	**_C. variegatum_**

Table No. 24: Vegetation at VMV: II] Climber Species

Sr. No.	Scientific Name	Common Name
1)	*Coccinia grandis*	Ivy Gourd
2)	***Epipremnum aureum***	Money Plant

[1] Name of Species: _Coccinia grandis_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Rosids
Order	Cucurbitales
Family	Cucurbitaceae
Genus	*Coccinia*
Species	**C. Grandis**

[2] Name of Species: _Epipremnum aureum_

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Monocots
Order	Alismatales
Family	Araceae
Genus	Epipremnum
Species	E. aureum

Table No. 25: Vegetation at VMV: II] Tree Species

Sr. No.	Scientific Name	Common Name
1)	*Ficus religiosa*	Peepal
2)	*Anadenanthera colubrina*	Curupay
3)	*Saraca asoca*	Ashoka
4)	*Prunus dulcis*	Almond
5)	*Luma*	Thorn
6)	*Alstonia scholaris*	Saptaparni
7)	*Mangifera indica*	Mango
8)	*Azadiracta indica*	Neem
9)	*Citrus limon*	Lemon
10)	*Orchidaceae*	Orchid
11)	*Cassia siamea*	Kassod Tree
12)	*Roystonea regia*	Royal Palm

[1] Name of Species: Peepal

Kingdom	Plantae
Phylum	Tracheophyta
Division	Magnoliophyta
Class	Magnoliopsida
Order	Rosales
Family	Moraceae
Genus	Ficus
Species	***Ficus religiosa***

[2] Name of Species: Curupay

Kingdom	Plantae
Class	Magnoliopsida
Order	Fabales
Family	Fabaceae
Genus	Anadenanthera
Species	***Anadenanthera colubrina***

[3] Name of Species: Ashoka

Kingdom	Plantae
Class	Equisitopsida
Order	Fabales
Family	Fabaceae
Genus	Saraca
Species	***Saraca asoca***

[4] **Name of Species: Almond**

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Rosales
Family	Rosaceae
Genus	Prunus
Species	***Prunus dulcis***

[5] Name of Species: Thorn

Kingdom	Plantae
Class	Equisetopsida
Order	Fabales
Family	Fabaceae
Sub-Family	Caesalpinioidae
Genus	Pithecellobium
Species	***Pithecellobium dulce***

[6] Name of Species: Saptaparni

Kingdom	Plantae
Sub-kingdom	Viridiplantae
Division	Tracheophyta
Class	Magnoliopsida
Order	Gentianales
Family	Apocyanaceae
Genus	Alstonia
Species	***Alstonia scholaris***

[7] Name of Species: Mango

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Sapindales
Family	Anacardiaceae
Genus	Mangifera L.
Species	***Mangifera indica***

[8] Name of Species: Neem

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Rutales
Family	Meliaceae
Genus	Azadirachta
Species	***Azadirachta indica***

[9] Name of Species: Lemon

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Sapindales
Family	Rutaceae
Genus	Citrus
Species	***Citrus limon***

[10] Name of Species: _Orchid_

Kingdom	Plantae
Division	Magnoliophyta
Class	Liliopsida
Order	Asperagales
Family	Orchidaceae
Genus	Caladenia
Species	**_Caladenia latifolia_**

[11] Name of Species: Cassia siamea

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Fabales
Family	Fabaceae
Genus	Senna
Species	**_Cassia siamea_**

[12] Name of Species: Royal palm

Kingdom	Plantae
Division	Tracheophyta
Class	Liliopsida
Order	Arecales
Family	Arecaceae
Genus	Roystonea
Species	**_Roystonea regia_**

Image No. 17: QR Code for Vegetation (Tree Species)

Image No. 18: QR Code for Vegetation (Tree Species)
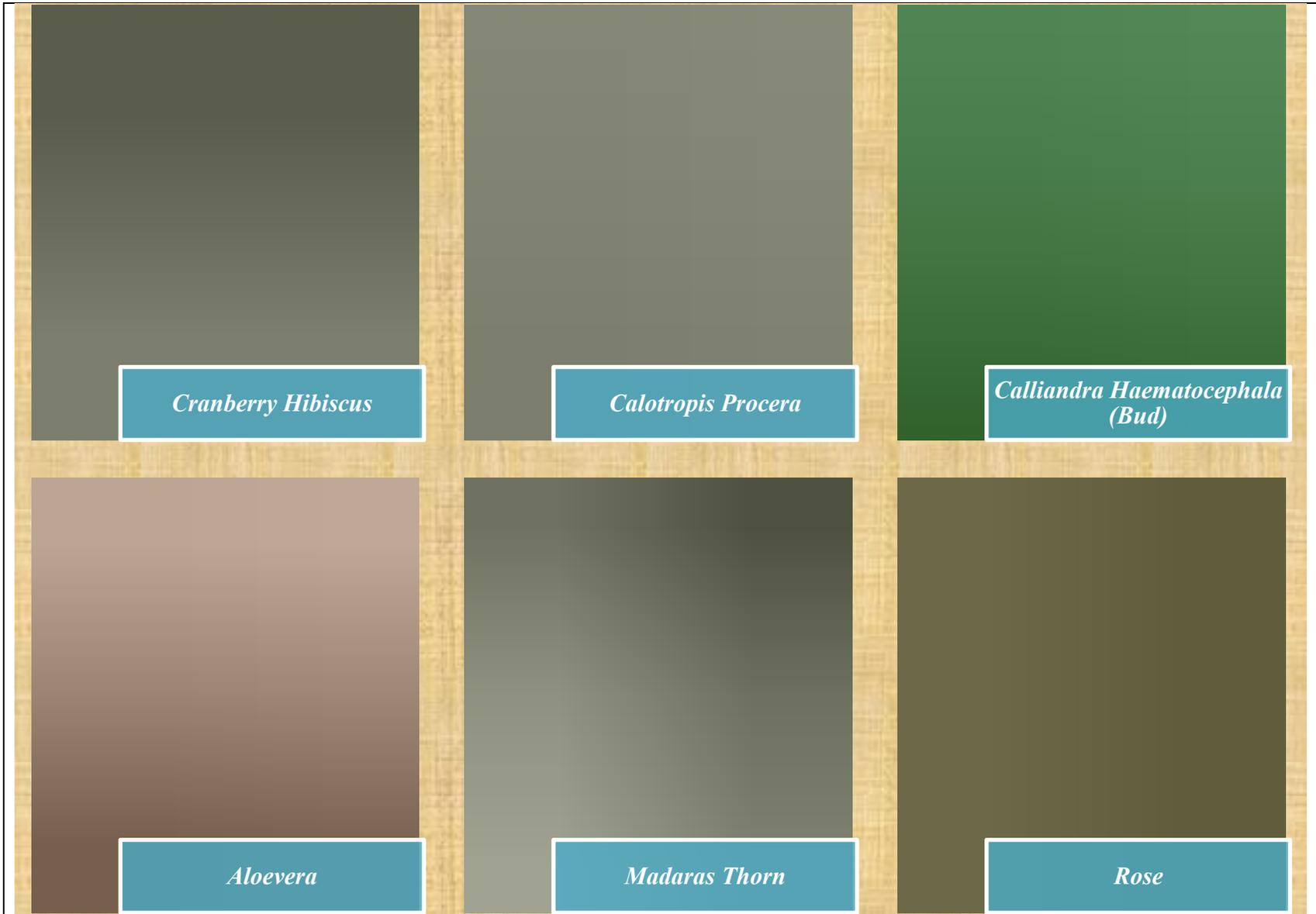
Image No. 19: Inflorescence Diversity at VMV Campus

Hibiscus	*Firebush*	*Tithonia Diversifolia*
Tradescantia	*Euphorbia Pulcherrima*	Dishani Trothic

Image No. 20: Inflorescence Diversity at VMV Campus
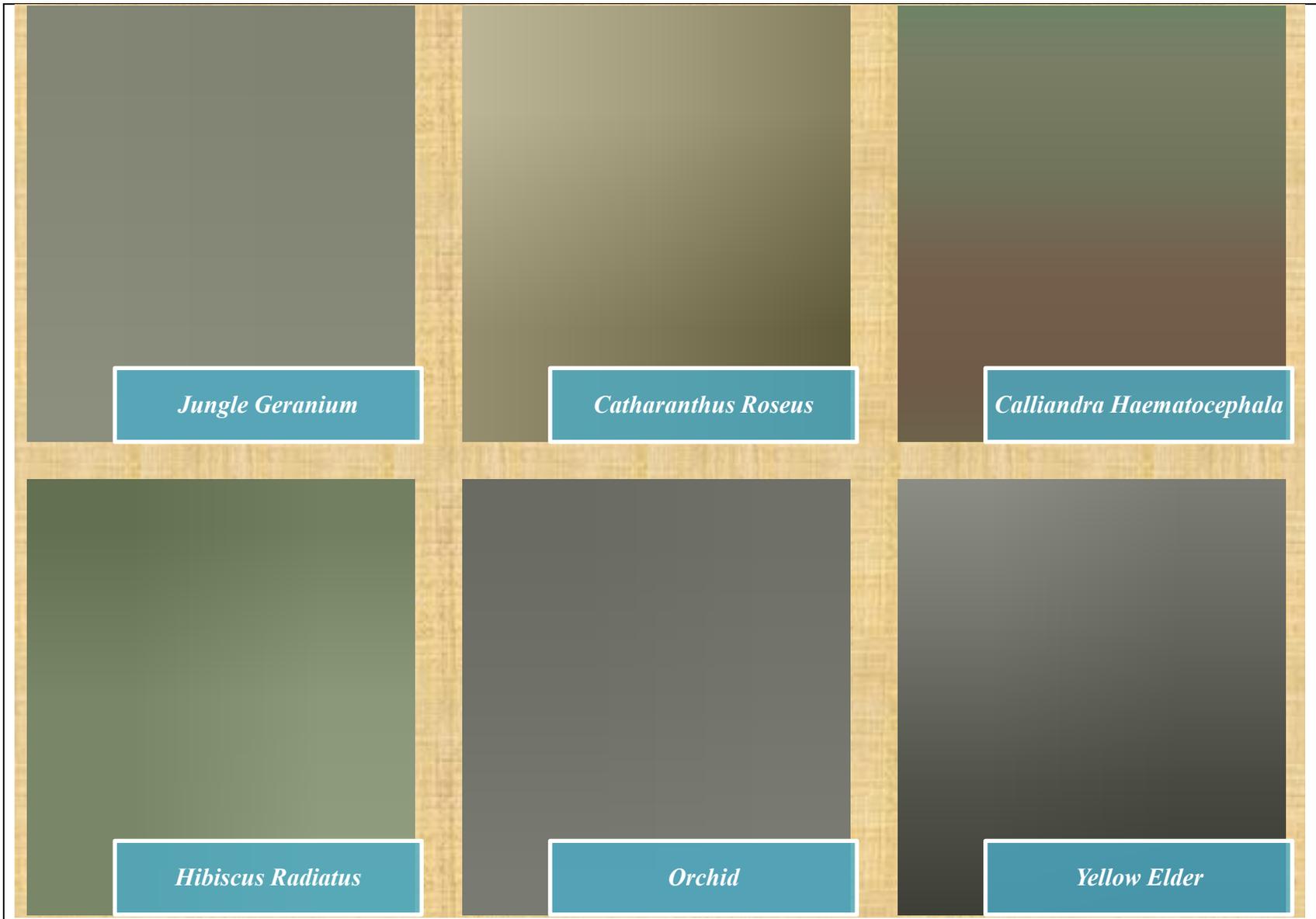
Jungle Geranium	*Catharanthus Roseus*	*Calliandra Haematocephala*
Hibiscus Radiatus	*Orchid*	*Yellow Elder*

Image No. 21: Inflorescence Diversity at VMV Campus

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Common Yellow Woodsorrel

Billygoat Weed

White Periwinkle
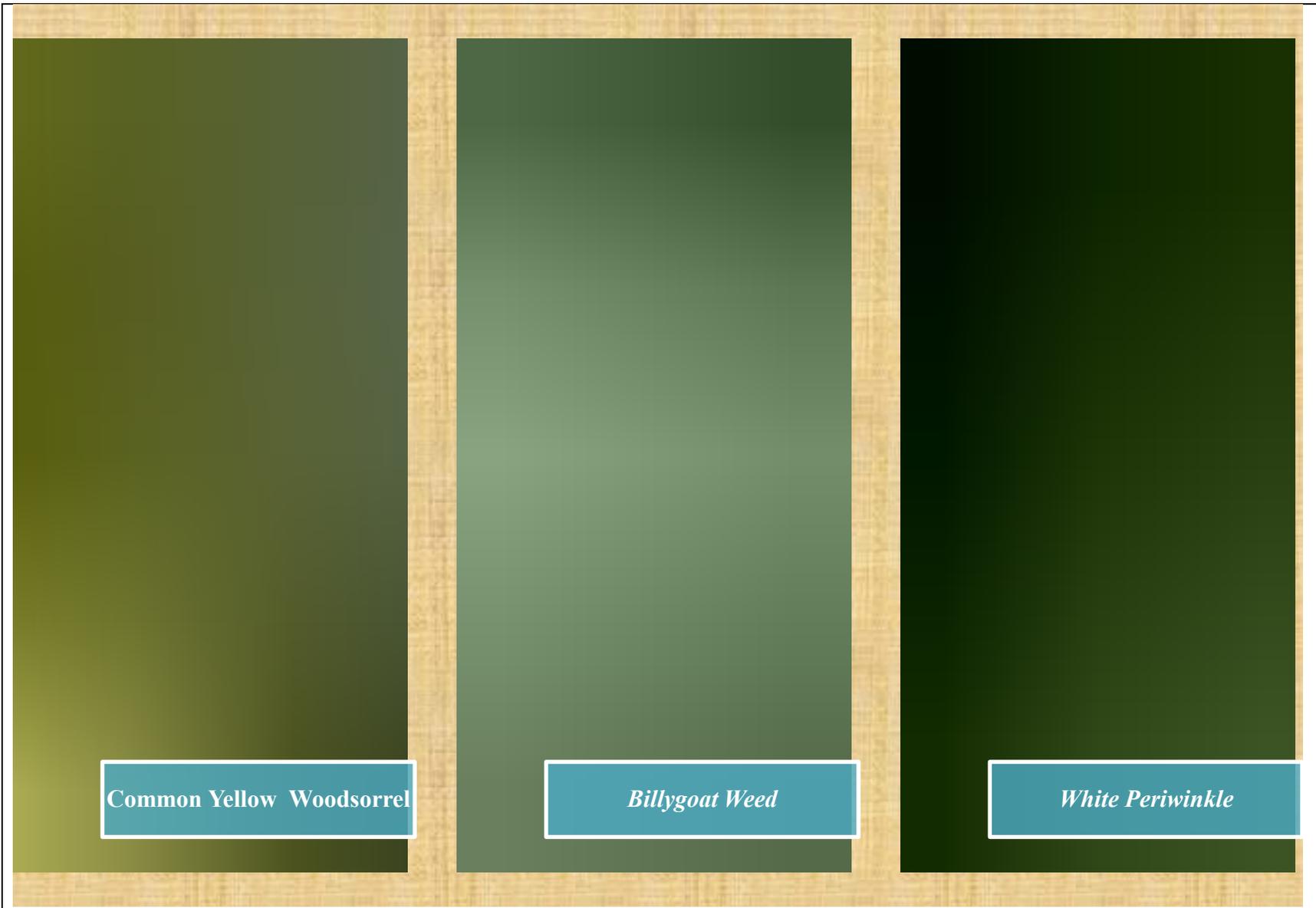
Image No. 22: Weed Species at VMV Campus

Image No. 23: Ornamental Plant Species at VMV Campus

Image No. 24: Ornamental Plant Species at VMV Campus

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Polyscias Scutellaria	*Areca Palm*	*Roy Pedley*
Hamelia	*Thuja*	*Yellow Elder*
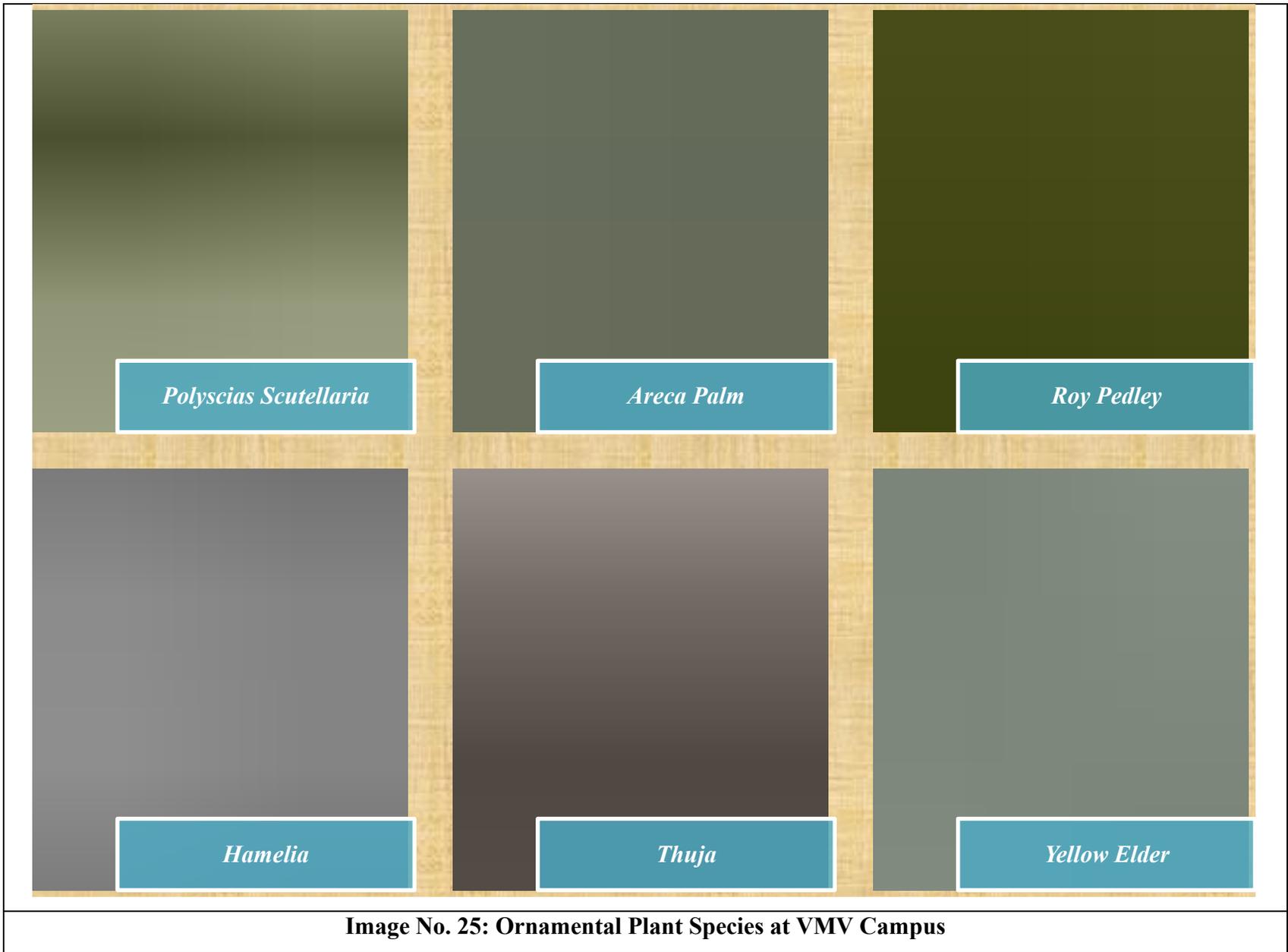
Image No. 25: Ornamental Plant Species at VMV Campus
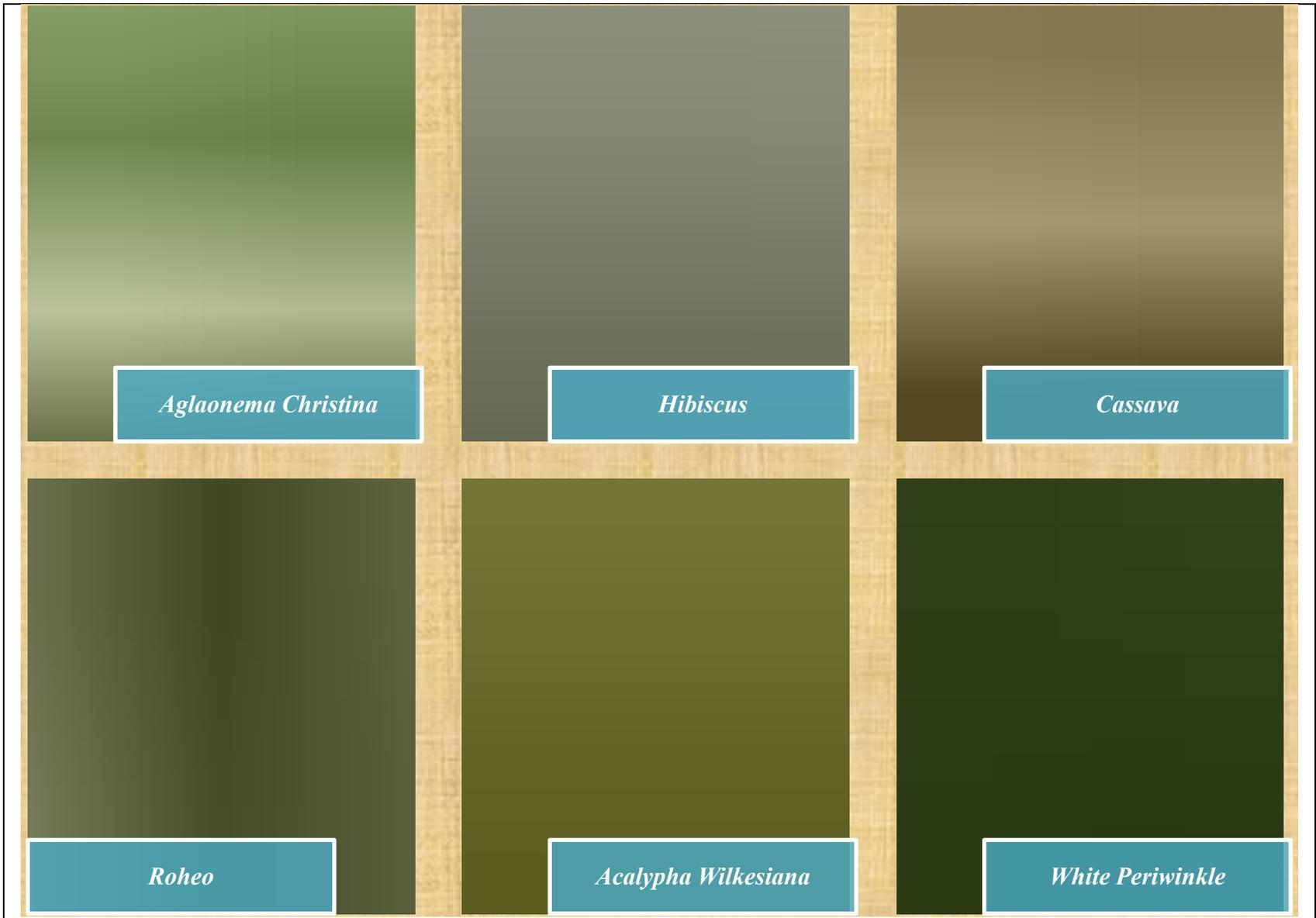
Image No. 26: Ornamental Plant Species at VMV Campus

| Tithonia Diversifolia | Nopal | Agrostistachys |
| Polyscias | Croton | Catharanthus Roseus |

Image No. 27: Ornamental Plant Species at VMV Campus

Ivy Gourd (Climber)	Money Plant (Climber)

Image No. 28: Climber Species at VMV Campus

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Aloevera	*Aloevera*	*Shatavari*
Calotropis Procera	*Nopal*	*Ipomoea Batata*

Image No. 29: Medicinal Plant Species at VMV Campus

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[VMV Env.tal Audit 2022-23]

Marasmius Oreades (Fungi) — *Marasmius Oreades (Fungi)* — *Inky Cap*
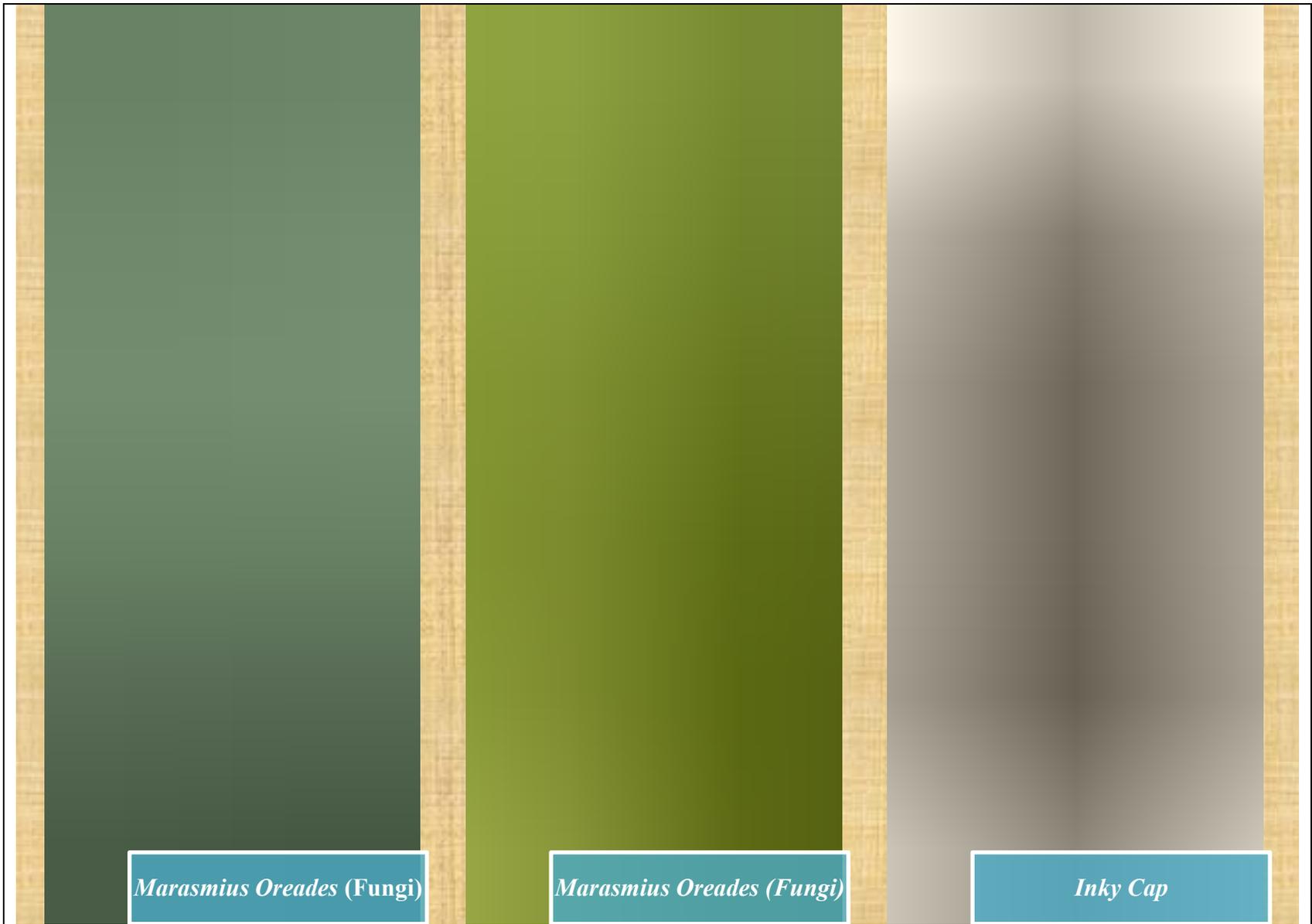
Image No. 30: Fungi Species within VMV Campus

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Peepal Tree	*Curupay*	*Ashoka*
Almond	*Madras Thorn*	*Saptaparni*
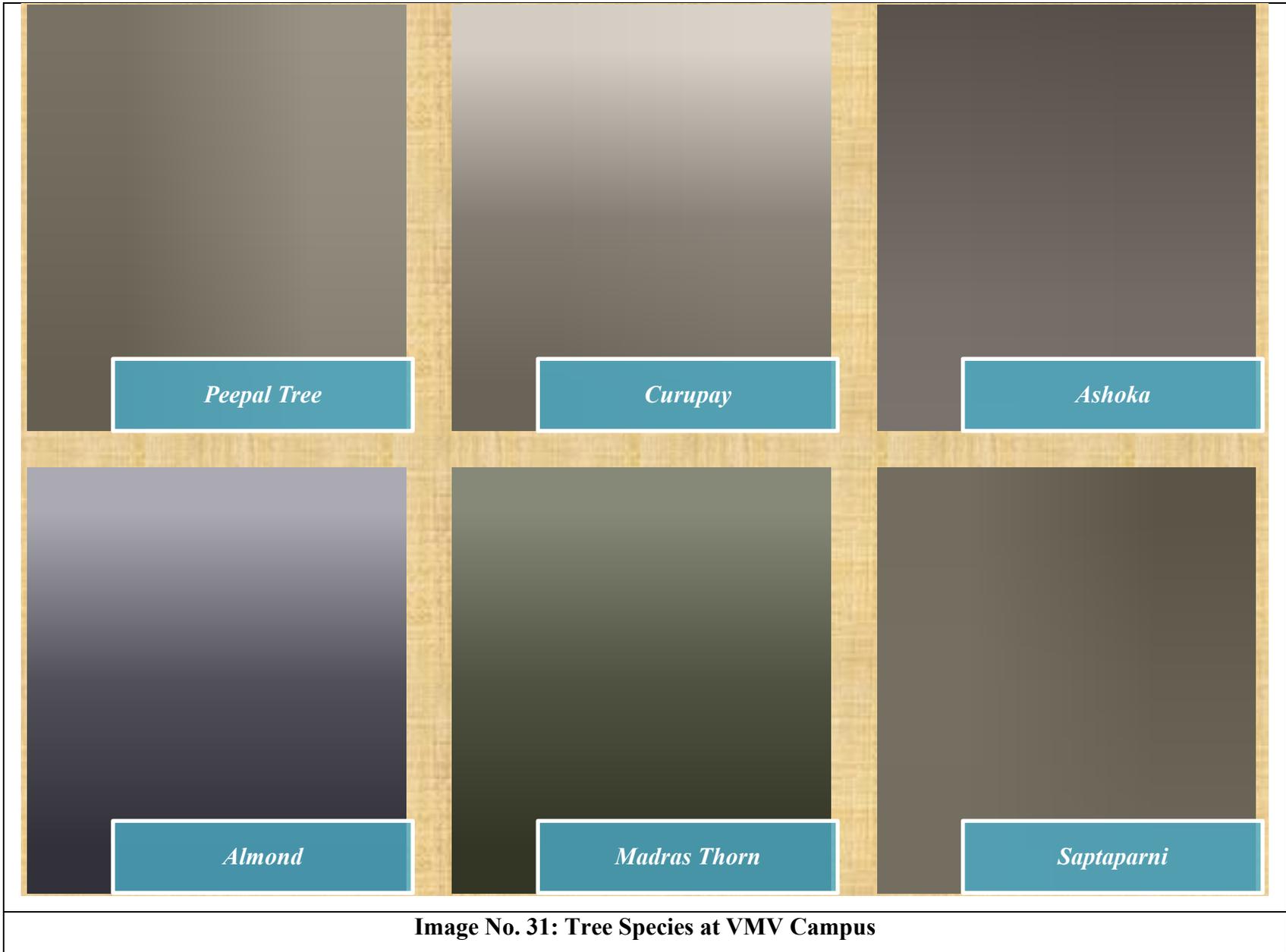
Image No. 31: Tree Species at VMV Campus

Mangifera Indica	*Azadiracta Indica*	*Citrus Limon*
Orchid	*Cassia siamea*	Royal Palm

Image No. 32: Tree Species at VMV Campus
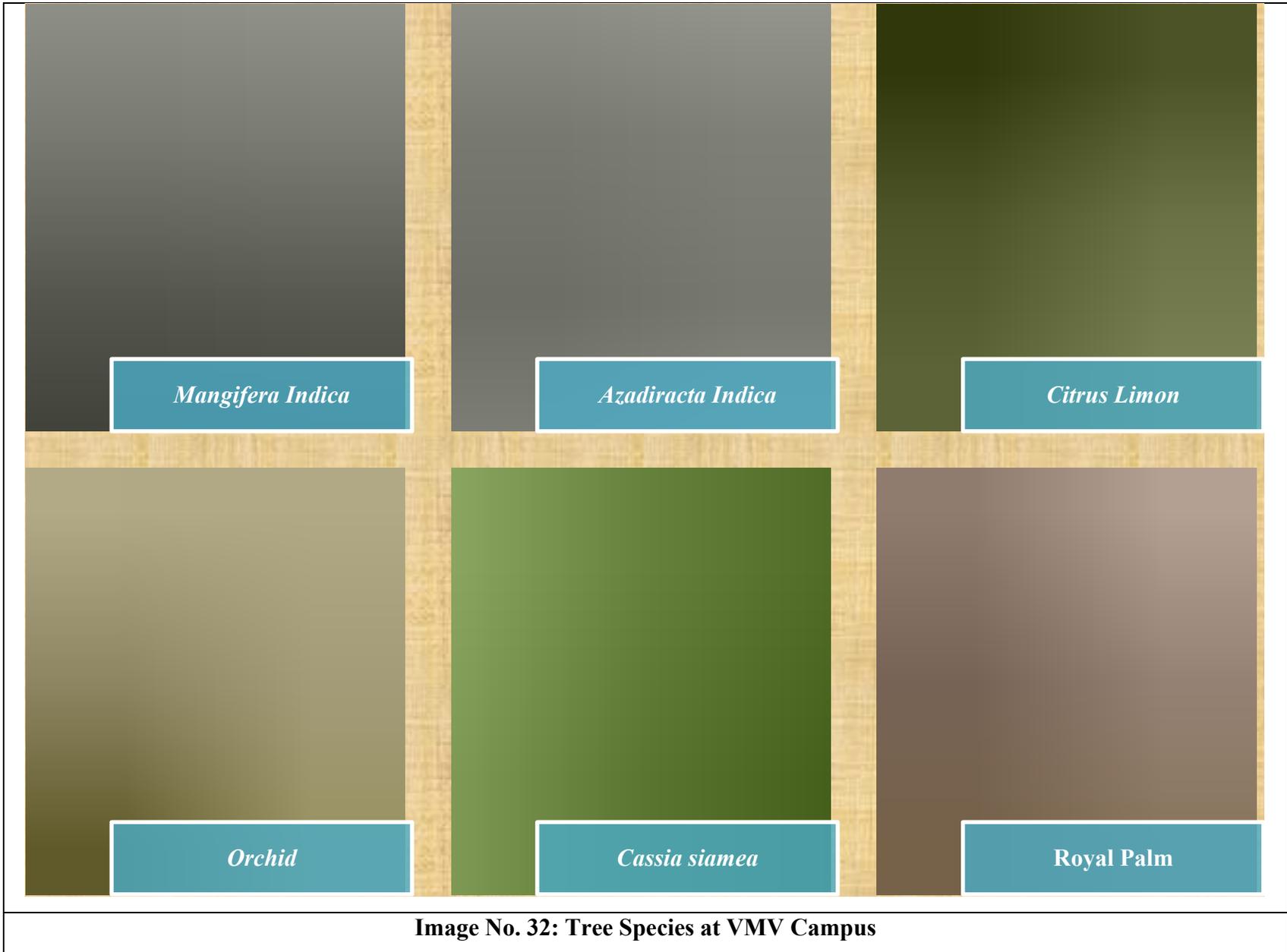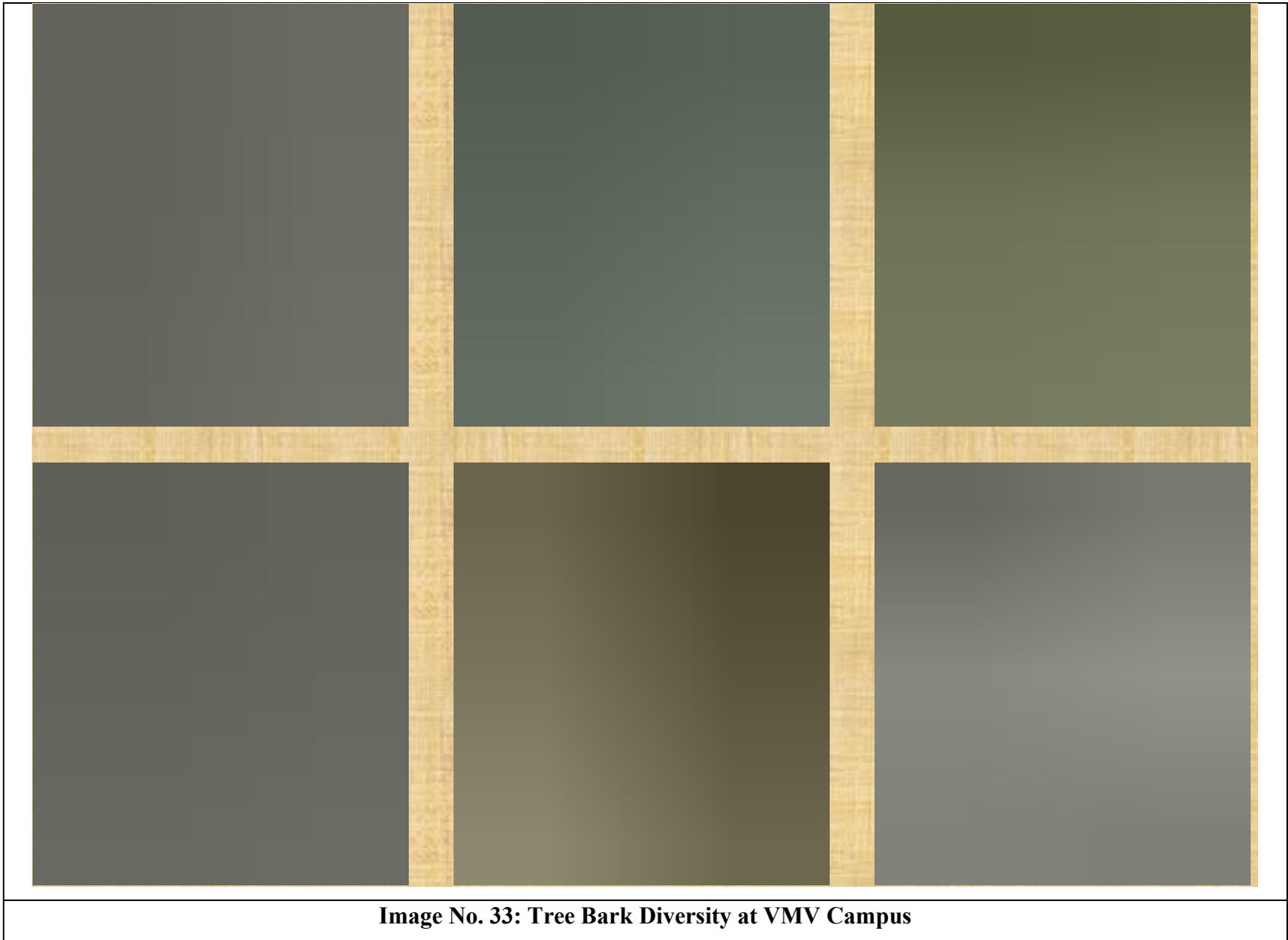
Image No. 33: Tree Bark Diversity at VMV Campus
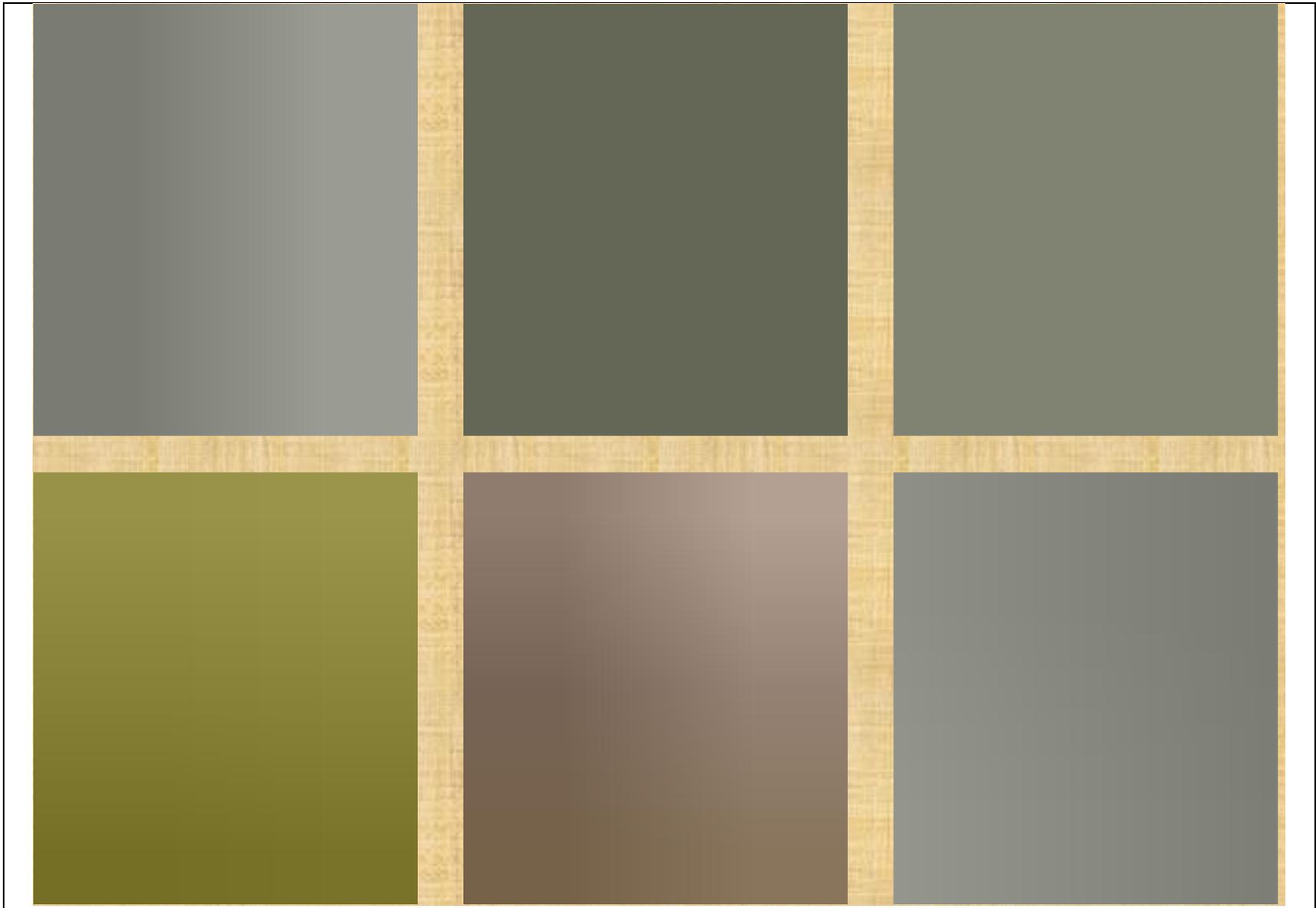
Image No. 34: Tree Bark Diversity at VMV Campus

Image No. 35: Tree Bark Diversity at VMV Campus

VI) FAUNA AUDIT

Diversity of avifauna is one of the most important ecological indicators to evaluate the quality of habitats. Random destruction of natural habitats by cutting nesting trees and foraging plants for commercial use of woods and lands are the main factors responsible in narrowing down the avian foraging habitat and nesting sites. Urban bird densities are normally extremely high (Walsh, 2006). Increase in bird densities may be the result of high food density, low predation pressure or combination of both (Shochat, 2004). Birds are essential animal group of an ecosystem that maintains a trophic level. Therefore, a detail study on avifauna and their ecology is important to protect them (Sruti, 2008).

Birds are considered as excellent bio-indicators of the effects urbanization has on ecosystems since they are highly diverse and conspicuous elements of the ecosystems. Also, they respond rapidly to changes in landscape configuration, composition and function (Hobson & Rempel, 2001). Comparative studies on avian community structure in different habitats can improve our knowledge of the general patterns and processes that characterize the bird species and communities.

The fauna species were documented by observation and identification method during the field excursion. The observed species are photographed as evidence of presence in the VMV campus. This data shall help understand the type of Ecological food chain existing in theenvironmental segment of VMV.

Satellite Imagery No. 10: Sampling Area for Fauna Audit

Table No. 26: Insect (Butterfly) Species at VMV

List of Butterfly Species		
Sr. No.	**Scientific Name**	**Common Name**
1)	*Spoladea recurvalis*	Beet Webworm moth
2)	*Zizeeria Karsandra*	Dark Glass Blue
3)	*Hypolimnas bolina*	Blue Moon Butterfly
4)	*Asota Caricae*	Tropical Tiger moth

Scientific Classification:

[1] **Name of Species:** *Spoladea recurvalis*

Kingdom:	**Animalia**
Phylum:	Arthropoda
Class:	Insecta
Order:	Lepidoptera
Family:	Crambidae
Genus:	*Spoladea*
Species:	*S. recurvalis*

[2] **Name of Species:** *Zizeeria Karsandra*

Kingdom:	Animalia
Phylum:	Arthropoda
Class:	Insecta
Order:	Lepidoptera
Family:	Lycaenidae
Genus:	***Zizeeria***
Species:	***Z. Karsandra***

[3] **Name of Species:** *Hypolimnas bolin*

Kingdom:	Animalia
Phylum:	Arthropoda
Class:	Insecta
Order:	Lepidoptera
Family:	Nymphalidae
Genus:	***Hypolimnas***
Species:	***H.bolina***

[4] **Name of Species:** *Asota Caricae*

Kingdom:	Animalia
Phylum:	Arthropoda
Class:	Insecta
Order:	Lepidoptera
Superfamily:	Noctuoidae
Family:	Erebidae
Genus:	***Asota***
Species:	***A.caricae***

Image No. 36: Insect Diversity within VMV Campus

Table No. 27: Insect species at VMV

List of Insect Species		
Sr. No.	**Scientific Name**	**Common Name**
1)	***Condylodtylus***	Green-Blue long-legged Fly
2)	***Laron isoptera***	Alate moth
3)	***Pantala flavescens***	Dragonfly/ Wandering Glider
4)	***Psyllobora vigintiduopunctata***	Yellow Ladybug
5)	***Pachydiplax longipennis***	Blue Dasher

Scientific Clasification:

[1] **Name of Species: *Condylostylus***

Kingdom:	**Animalia**
Phylum:	Arthropoda
Class:	Insecta
Order:	Diptera
Family:	Dolichopodidae
Subfamily	Sciapodinae
Tribe	Sciapodini
Genus:	***Condylostylus***

[2] **Name of Species: _Laron isoptera_**

Kingdom:	Animalia
Phylum:	Arthropoda
Class:	Insecta
Cohort:	Polyneoptera
Superorder:	Dictyoptera
Order	Blattodea
Infraorder:	Isoptera
Species:	**_L.isoptera_**

[3] **Name of Species: _Pantala flavescens_**

Kingdom:	Animalia
Phylum:	Arthropoda
Class:	Insecta
Order:	Odonata
Infraorder	Anisoptera
Family:	Libellulidae
Genus:	**_Pantala_**
Species:	**_P.flavescens_**

[4] **Name of Species:** *Psyllobora vigintiduopunctata*

Kingdom:	Animalia
Phylum:	Arthropoda
Class:	Insecta
Order:	Coleoptera
Infraorder:	Cucujiformia
Family:	Coccinellidae
Genus:	Psyllobora
Species:	**P. vigintiduopunctata**

[5] **Name of Species:** *Pachydiplax longipennis*

Kingdom:	Animalia
Phylum:	Arthropoda
Class:	Insecta
Order:	Odonata
Infraorder:	Anisoptera
Family:	Libellulidae
Genus:	Pachydiplax
Species:	**P. longipennis**
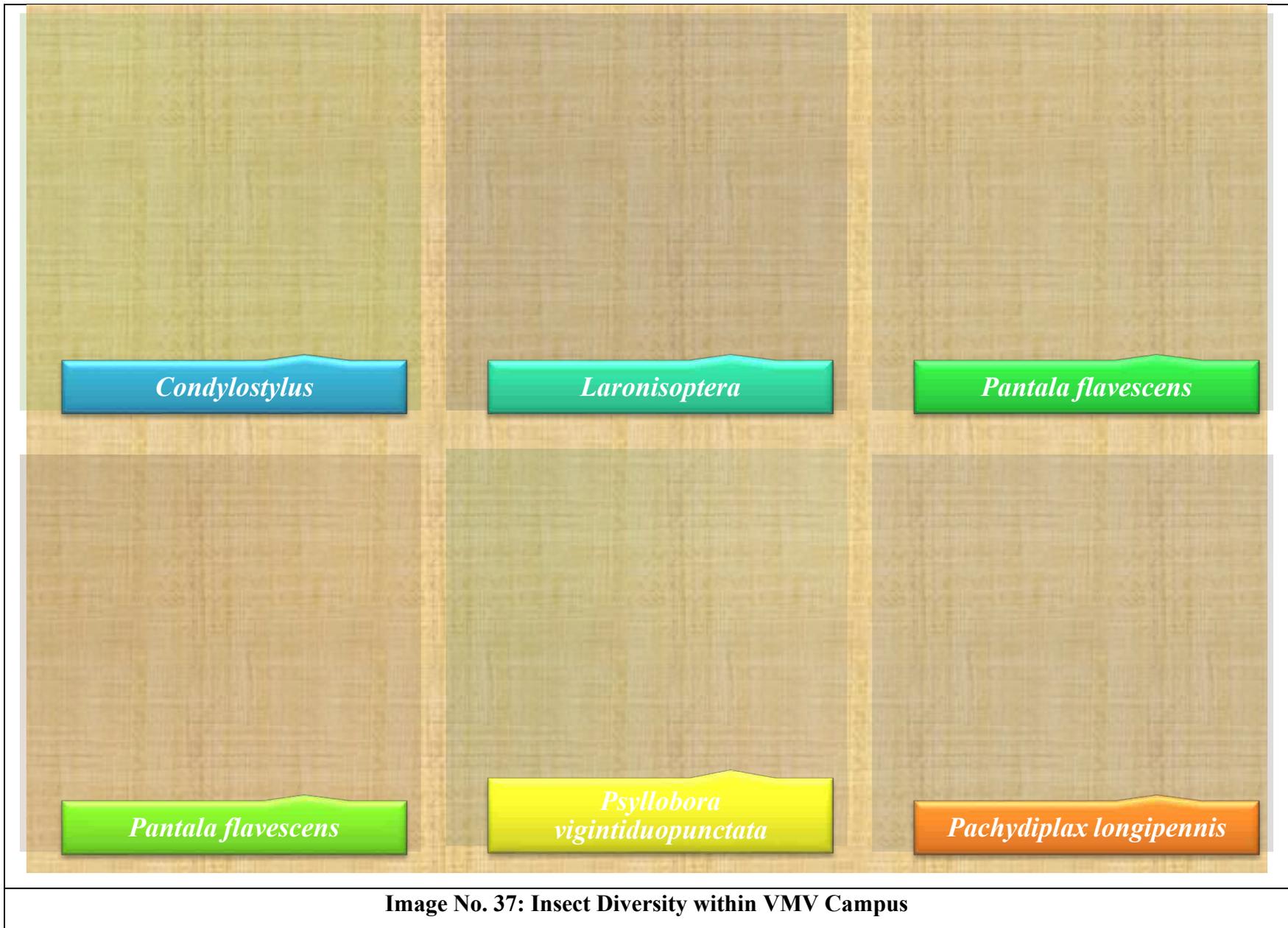
Image No. 37: Insect Diversity within VMV Campus
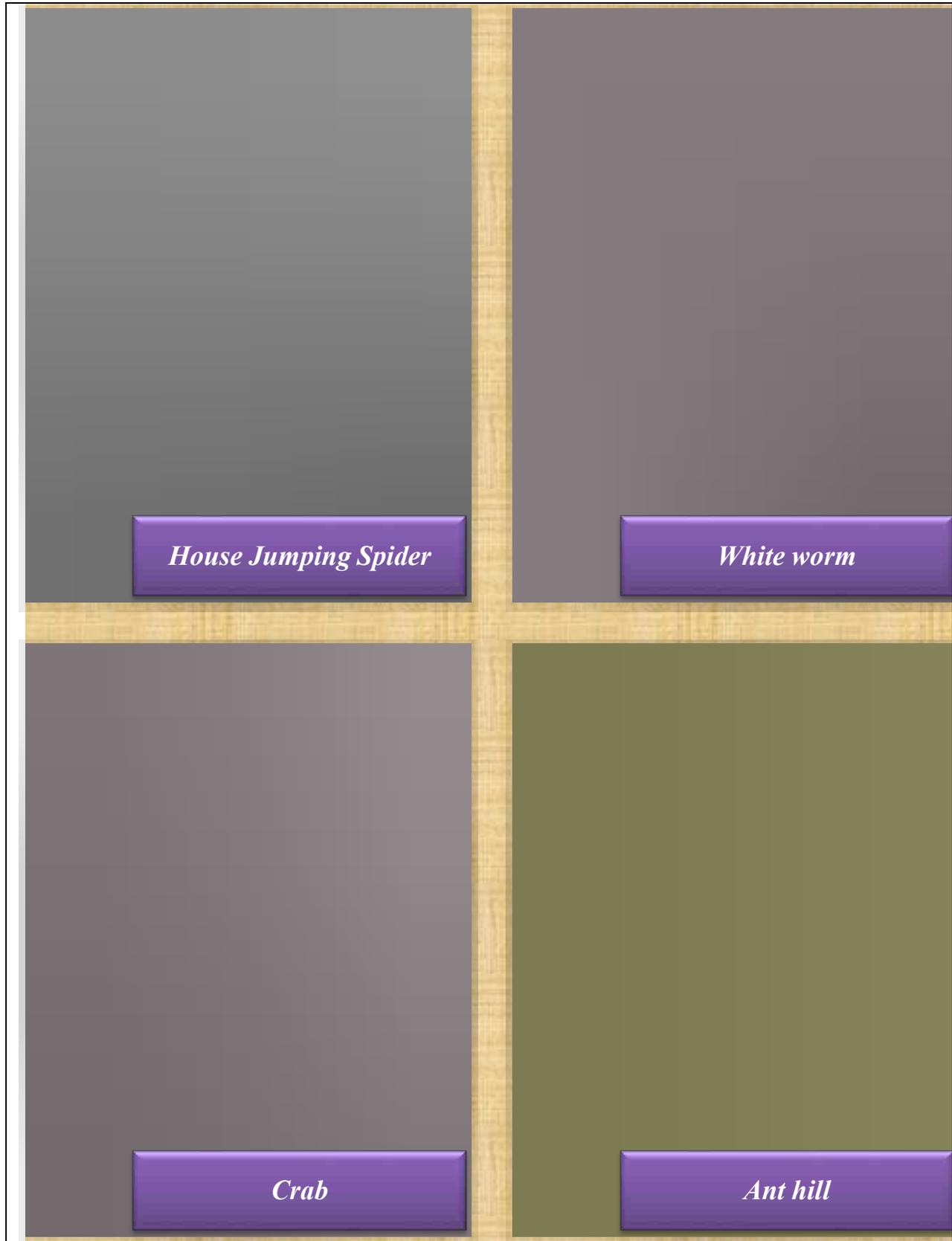
Image No. 38: Arachnids Species at VMV Campus

Table No. 28: Amphibian Species at VMV

List of Amphibian Species		
Sr. No.	**Scientific Name**	**Common Name**
1)	*Duttaphrynus melanostictus*	Asian common toad
2)	*Strongylopus grayii*	Gray's steam frog

[1] Name of Species: _True Toad_

Kingdom:	**Animalia**
Phylum:	Chordata
Class:	Amphibia
Order:	Anura
Family:	Hyloidae
Genus:	***True Toad***

[1] Name of Species: _C. Livia_ (_Pigeon_)

Kingdom:	**Animalia**
Phylum:	Chordata
Class:	Aves
Order:	Columbiformes
Family:	Columbidae
Genus:	Columba
Species:	***C. Livia***

Table No. 29: Rodent Species at VMV

List of Rodent Species		
Sr. No.	**Scientific Name**	**Common Name**
1)	*Funambulus palmarum*	Three-striped palm squirrel

Image No. 39: Amphibian & Rodent Species at VMV Campus

Pigeon

Bird Habitat

Bird habitat
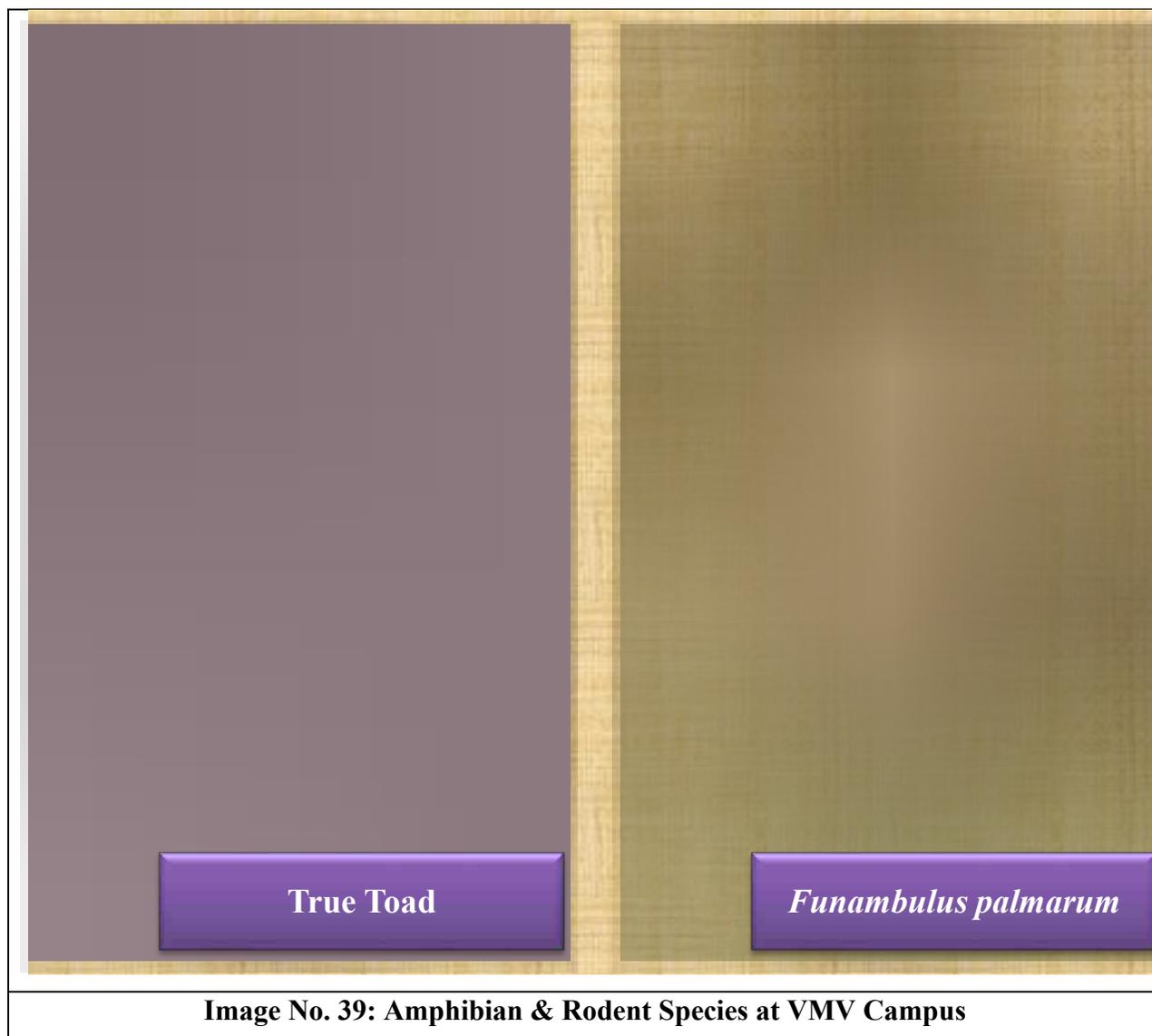
Image No. 40: Bird Species at VMV Campus

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VII) ENERGY AUDIT:
A] ELECTRIC ENERGY

Electricity is a basic part of nature and it is one of our most widely used forms of energy. Many cities and towns were built alongside waterfalls (a primary source of mechanical energy) that turned water wheels to perform work. An electric utility power station uses a turbine, engine, water wheel, or other similar machine to drive an electric generator or a device that converts mechanical or chemical energy to generate electricity. Electricity is measured in units of power called watts. It was named to honor James Watt, the inventor of the steam engine. The amount of electricity a power plant generates or a customer uses over a period of time is measured in kilowatt-hours (kWh).

The electric energy component was analyzed with due details about no. of units utilized daily/monthly and also department wise all the electrical equipment's utilizing electrical energy were enlisted with the amount of energy they utilize.

Table No. 30: List of Electrical Equipment's at Old Building

Sr. No.	Class Room No.	No. of Fans	No. of Tube Lights	Floor
1)	O-003	4	3	Ground Floor
2)	O-112	5	4	First Floor
3)	O-113	6	5	First Floor
4)	O-204	7	7	Second Floor
5)	O-205	7	6	Second Floor
6)	O-206	7	7	Second Floor
7)	O-207	7	6	Second Floor
8)	O-209	3	3	Second Floor
9)	O-211	5	2	Second Floor
10)	O-213	8	4	Second Floor
11)	O-214	7	4	Second Floor
12)	O-215	10	5	Second Floor
13)	O-216	5	5	Second Floor
14)	O-301	5	5	Third Floor
15)	O-302	5	4	Third Floor
16)	O-303	5	6	Third Floor
17)	O-304	5	4	Third Floor
18)	O-305	5	5	Third Floor
19)	O-306	5	4	Third Floor
20)	O-307	5	5	Third Floor

Sr. No.	Class Room No.	No. of Fans	No. of Tube Lights	Floor
21)	O-313	8	6	Third Floor
22)	O-314	7	6	Third Floor
23)	O-315	6	4	Third Floor
24)	O-401	2	4	Fourth Floor
25)	O-406	2	6	Fourth Floor

Table No. 31: List of Electrical Equipment's at New Building

Sr. No	Class Room No.	No. of Fans	No. of Tube Lights	Floor
1)	N-014	6	4	Ground Floor
2)	N-015	6	4	Ground Floor
3)	N-016	6	4	Ground Floor
4)	N-017	2	2	Ground Floor
5)	N-018	1	2	Ground Floor
6)	N-019	2	2	Ground Floor
7)	N-020	2	2	Ground Floor
8)	N-114	5	2	First Floor
9)	N-116	7	4	First Floor

Table No. 32: List of ICT Tool at Academic (Old & New) Building

Sr. No.	Departments	Computers	Printer	Scanner	Projector	Other Electrical Appliance
1)	Commerce	1	1			4 Fans 2 Regular lights
2)	Humanities	1	1			4 Fan, 2 LED, 4 Regular lights
3)	B.Sc Physics	2	1		1	1 Refrigerator, 2 Furnace, 2 Oven 1 Electric Kettle, 14 Fans, 1 LED, 10 Regular Lights
4)	B.Sc Chemistry	2	1		1	1 Refrigerator, 1 Oven, 13 Fans, 19 LED Lights, 6 Exhaust Fans
5)	CBZ	1				
6)	Chemistry Lab (CBZ)-4th Floor-1 Comp.	1				13 Fan, 4 Exhaust, 19 LED Light, 1 Hot Air Oven, 1 Weighing Balance, 2 Melting Point Operator, 2 Remi Machine
7)	Zoology Lab (CBZ)-4th Floor-1 Comp.	1				1 Hot Air Oven, 1 Refrigerator, 6 Fans,

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						9 LED, 3 Exhaust Fans
8)	Home Science	1 (Not Working)					1 Refrigerator, 1 Mixer, 1 Oven, 4 Fans, 8 LED Lights
9)	Languages	0	0	0	0	3 Fans, 1 LED Light, 1 Regular Light
10)	BBA	1	1	0	0	2 Fans, 1 LED, 1 Regular Light
11)	B.Sc. Comp. Science	21	1		1	4 Fans, 4 LED, 1 Speaker
12)	Computer Department	104				1 AC 1.5 Ton L1-10 LED Tubelight, 9 Fans L2-8 Small LEDs, 7 Fans L3-3 Led Tubelight, 4 Fans
13)		L1-27	2 (All in one)	2	3	
14)		L2-56				
15)		L3-21				
16)	B.VOC.	5	1			1 Promise Pegasus2 M4 3TB Raid System with Thunderbolt, 2 Adam Audio Near Field 2 way Monitor, 1 Adam Audio Sub-Woofer, 2 Rode Microphone Vocal, 1 Rode Microphone Stereo, 3 Shure Instrument Microphone, 1 Ahuja GMB-6C Microphone (Table Mic), 6 Samson Headphones
17)		1-Lap	(All in one)			
18)		4-System		1	1	

						(Musician),
						1 Beyerdynamic DT 770 Pro Headphone (Recordist),
						1 Powerplay Pro 8 PreAmp Headphone Amplifier,
						2 General AC,
						2 Sony Display,
						1 Fan,
						6 led Light
						(Video Studio)
						1 WD 10TB Hard Drive Storage System, 2 M-Audio Studiophile studio monitors, 1 Sony Display, 1 Canon Mark III Camera (With 24-105 Lens & 70-300mm Lens), 1 General AC, 1 Fan, 1 Epson Projector, 1 JK UPS BIG, 6 LED Light
						(Abhimanch)
						3 par light,
						1 profile light, 4 led Light, 6 Spot Light,
						6 Spot Light,
						2 Light Control System,
						3 AC,
						4 fan,
						2 Speaker
						(Office)
						2 Fans,
						1 Paper Shredder Antiva 5H 22,
						1 Vaccum Cleaner
						(Make-up Studio)

						2 Fans, 1 General AC
19)	M.Sc. Maths	0	0			
20)	M.Sc Chemistry	2	1		1	1 Deep Freezer, Weighing Balance, Muffle Furnance, 2 Centrifuge, Hot Air Oven, Microwave Oven, Conductometer, Hot Plate Oven, Induction Cook Top, Spectrophotometer, 6 Fans, 12 LED 4 Exhaust
21)	M.Sc. Physics	1	1		1	1 B-H Curve, 1 Fiber Optics analogue type, 1 Silicon Controlled Rectifier, 1 OP-Amp, 1 Bias Stability, 1 Astable Multivibrators 1 FET as an amplifier 1 MOSFET as an amplifier 1 E/M Bar Magnet 1 Stephan Constant Apparatus 1 He-Ne Laser using Ruler 2 Muffle Furnace 1 Hot Air Oven 1 Pallet Machine 1 G. M. Counter 1 Weighing Machine 1 Computer 1 Projector

						1 Printer 6 Ceiling Fan 1 Exhaust Fan
22)	MCA Library	1	1				7 Fans, 7 Regular Lights
23)	MCA Office	3	2	2			13 LED Tubelight, 5 Fans, 1 Refrigerator, 1 AC,
24)	MCA LAB/ DEPT.	107	5	3	5		56 LED Tubelight, 7 AC, 1 Refrigerator, 21 Fans, 2 Speakers, 1 Mike Receiver, 2 Mike, 1 Home Theatre
25)	Office +Server	19 +1	14	2			2 Xerox Machine, 1 Paper Shredder, 12 Fans, 2 AC, 12 LED, 9 Tubelight
26)	Network Res. Center	13	1	1	1		1 Invertor, 5 Fans
27)	Language Lab ROOM NO 201	25	0	0	1		4 Fans
28)	Junior Staff room	4+1(1 From Control room)	2				1 Refrigerator, 2 AC, 21 LED Tubelight, 6 Night Bulbs, 7 Fans
29)	Junior Principal	1	1				2 Fans, 2 LED Tubelights

30)	Library	8	2			26 Tubelights, 17 Fans, 1 Vaccum Cleaner 3 Barcode Reader
31)	Physical Education	1				2 Fans, Music Systems, 1 Treadmill
32)	Bio Lab	1	1		1	10 Fan, 17 Regular
33)	Electronic Lab ROOM NO 202	1	1 (All in one)	1	1	8 Fans, 4 Regular Lights
34)	NCC ROOM No. 203	1	1			2 LED Lights, 2 Fans
35)	Research Centre commerce	1	1			2 Fans, 2 LED Tubelights
36)	Seminar Hall	1			1	4 AC, 10 Fans, 9 LED Lights
37)	Auditorium	1			3	10 AC, 11 Table Fans
38)	IQAC	1	1			2 Fans, 2 LED Tubelights
39)	EXAM ROOM	1	1			4 Fans, 5 Regular Lights, 1 Xerox Machine
40)	Principal Cabin	1	1			2 Ac, 4 Fans, 25 LED
41)	**Total Computer**	**337**	**47**	**12**	**23**	

Table No. 33: List of ICT Tool at Office Building

Sr. No.	Departments	Computers	Printer	Scanner
1)	MCA Library	1	1	-
2)	MCA Office	3	2	2
3)	Office +Server	19 +1	14	2
4)	Library	8	2	-
5)	IQAC	1	1	-
6)	RESEARCH CENTRE COMMERCE	1	1	-
7)	EXAM ROOM	1	1	-
8)	NCC ROOM	1	1	-
9)	Principal Cabin	1	1	-
10)	Total Office Computers	**37**	**24**	**4**

Table No. 34: Monthly utilization of Electricity at VMV

Sr. No.	Months /Year	Total Units (KVA)	Amount charged per unit	Amount(Rs)
1)	**Jul-22**	2409	427	**20760**
2)	**Aug-22**	2344	427	**20210**
3)	**Sep-22**	2390	427	**20600**
4)	**Oct-22**	2544	427	**21900**
5)	**Nov-22**	1628	427	**14390**
6)	**Dec-22**	1513	427	**0**
7)	**Jan-23**	1697	427	**13540**
8)	**Feb-23**	1840	427	**15970**
9)	**Mar-23**	2015	427	**17440**
10)	**Apr-23**	2332	427	**18200**
11)	**May-23**	2795	427	**25050**
12)	June-23	2441	427	**22950**
13)	**July-23**	**2320**	**427**	20870

Table No. 35: Carbon Footprint based on Electrical Consumption

Sr. No.	Months /Year	Total Units	Amount	CO$_2$ Emission kt
1)	**Jul-22**	2409	20760	**2047.65**
2)	**Aug-22**	2344	20210	**1992.4**
3)	**Sep-22**	2390	20600	**2031.5**
4)	**Oct-22**	2544	21900	**2162.4**
5)	**Nov-22**	1628	14390	**1383.8**
6)	**Dec-22**	1513	0	**1286.05**
7)	**Jan-23**	1697	13540	**1442.45**
8)	**Feb-23**	1840	15970	**1564**
9)	**Mar-23**	2015	17440	**1712.75**
10)	**Apr-23**	2332	18200	**1982.2**
11)	**May-23**	2795	25050	**2375.75**
12)	**June-23**	2441	22950	**2074.85**
13)	July-23	2320	20870	**1972**

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Graph No. 10: Carbon Footprint based on Electrical Consumption

■ Total Units ■ CO2 Emission (kt)
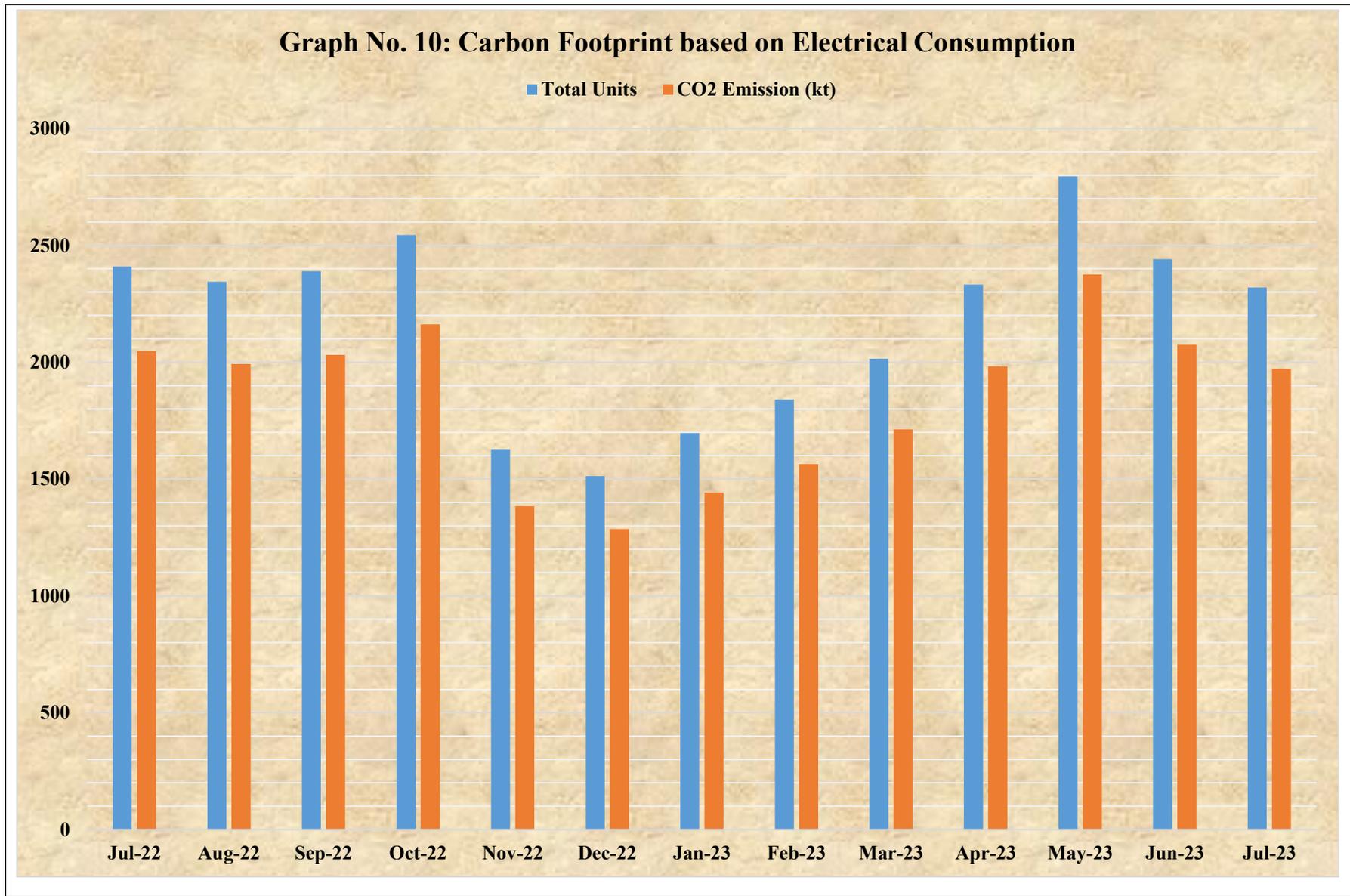
Graph No. 10: Carbon Footprint based on Electrical Consumption
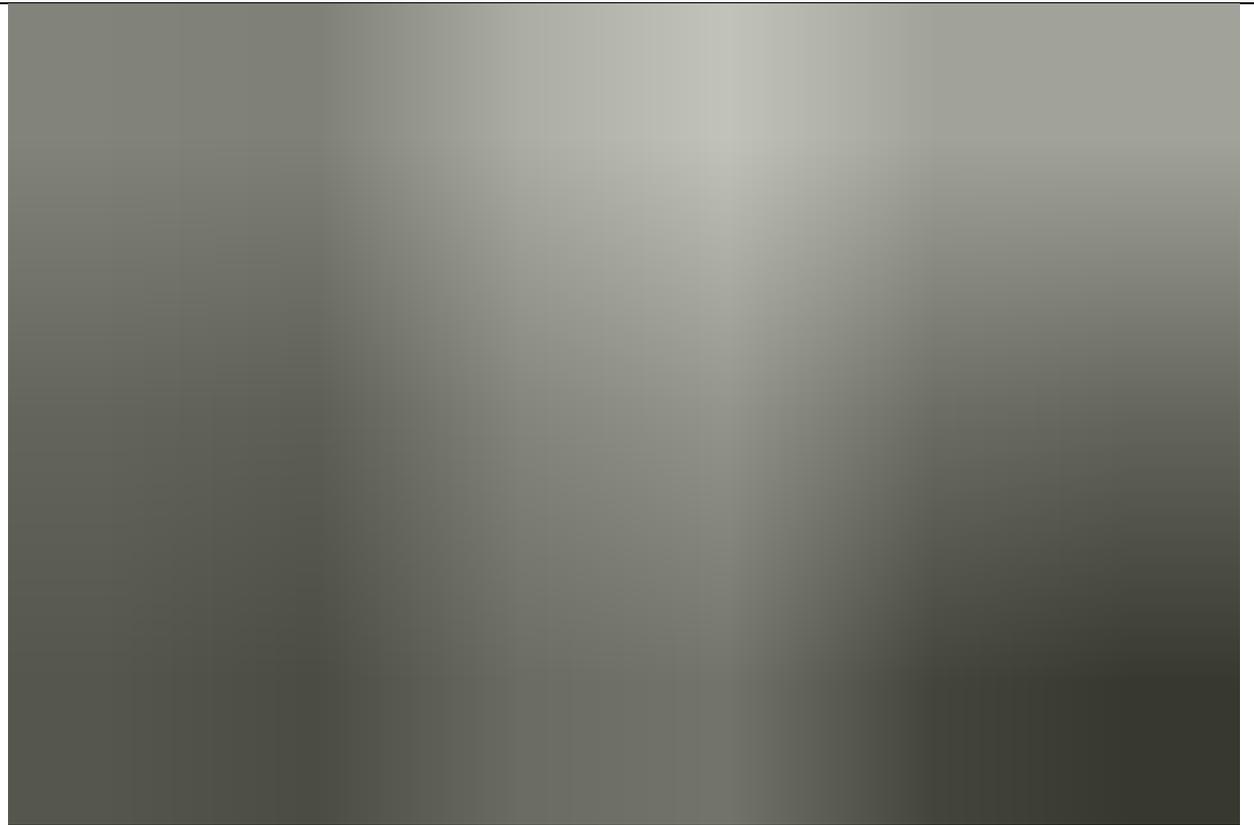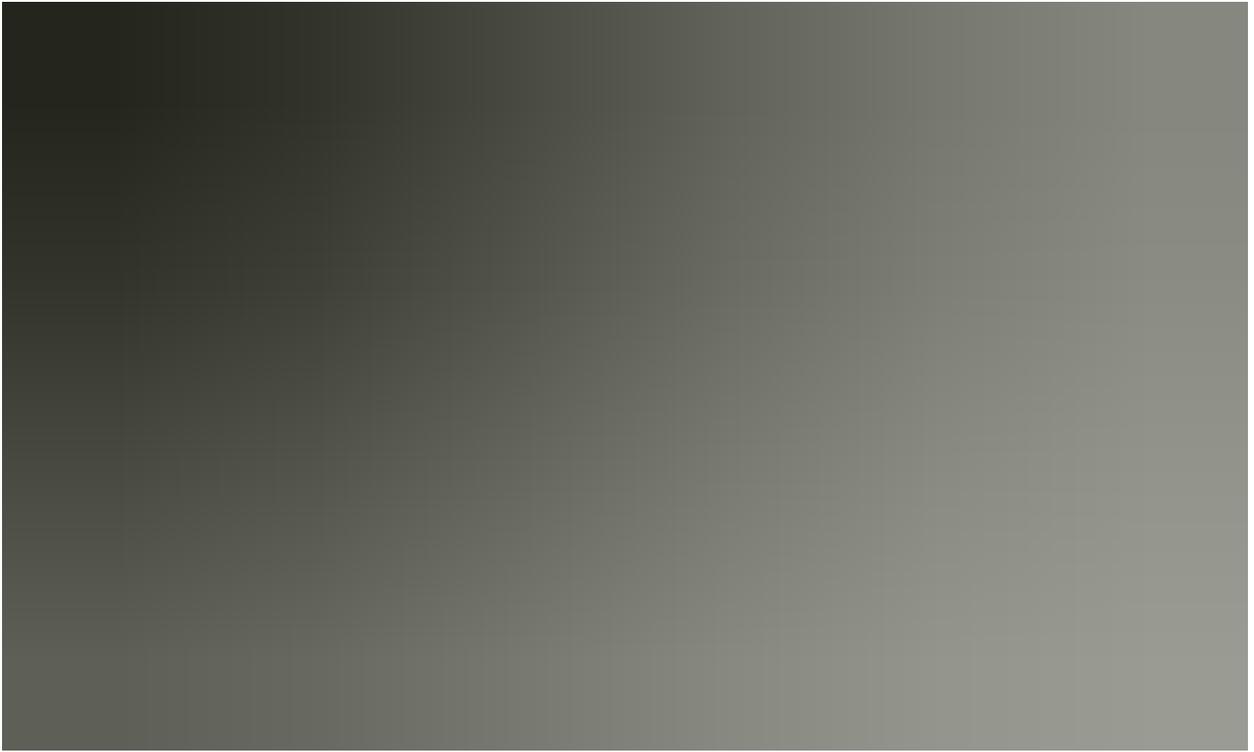
Image No. 41: Generator (62 kW and 80 kW capacity)
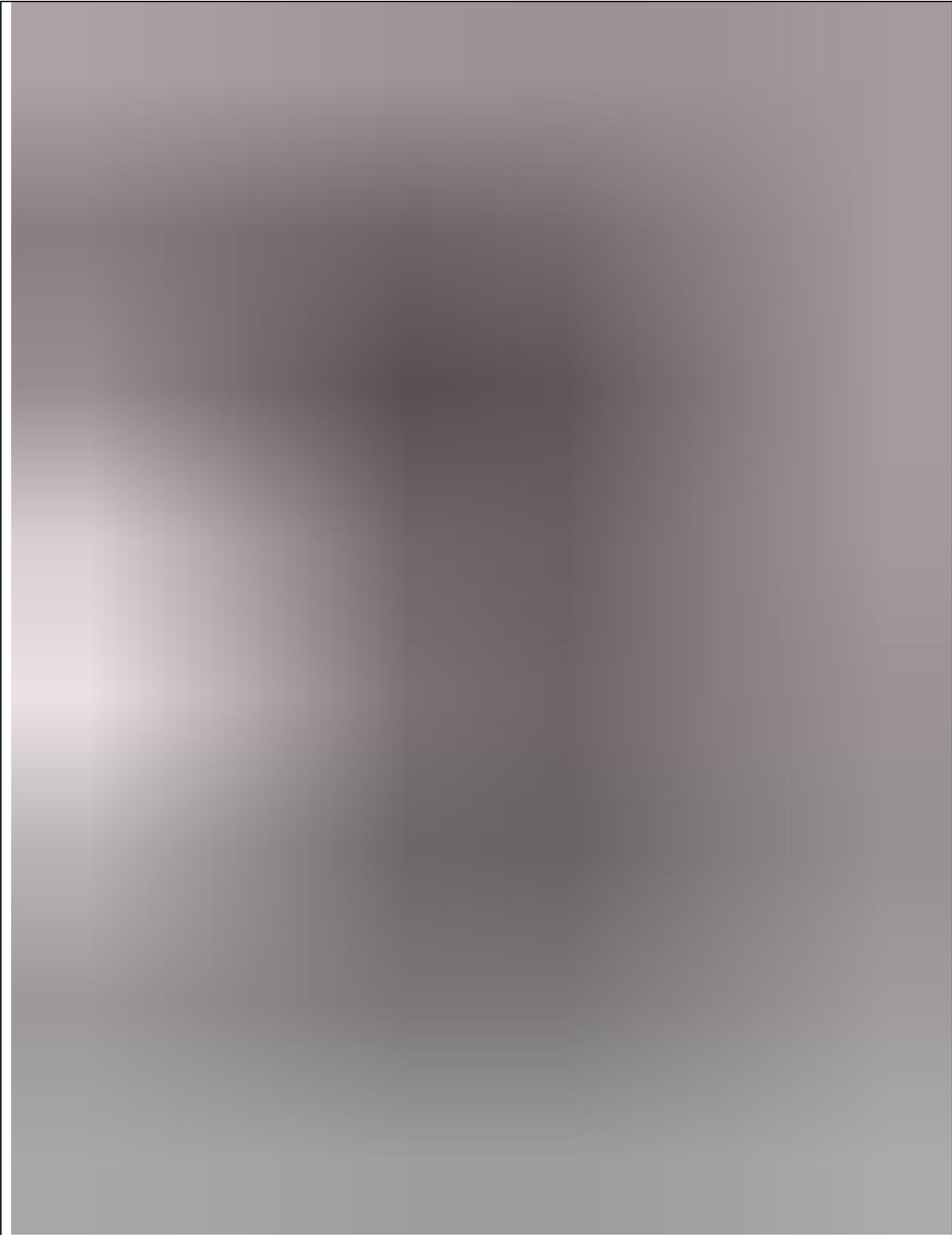
Image No. 44: Electric Mains

VII) ENERGY AUDIT:
B] SOLAR ENERGY

The sun is an incredible and renewable resource that has the power to fuel life on earth and provide clean, sustainable energy to all of its inhabitants. In fact, more energy from the sun reaches our planet in one hour than is used by the entire population of the world in one year. The sun's energy can be converted into electricity through solar photovoltaic (PV) modules. The potential for solar energy is enormous, since about 200,000 times the world's total daily electric-generating capacity is received by Earth every day in the form of solar energy. Unfortunately, though solar energy itself is free, the high cost of its collection, conversion, and storage still limits its exploitation in many places. Solar radiation can be converted either into thermal energy (heat) or into electrical energy, though the former is easier to accomplish.

The college campus is having **54 Solar panels** of capacity **15 kW** installed on rooftop of college building. The electricity generated is further directed where the required electric energy is utilized and the remaining unutilized is led to the power grid.

The data regarding Solar energy generation was measured to understand the solar energy potential at VMV campus.
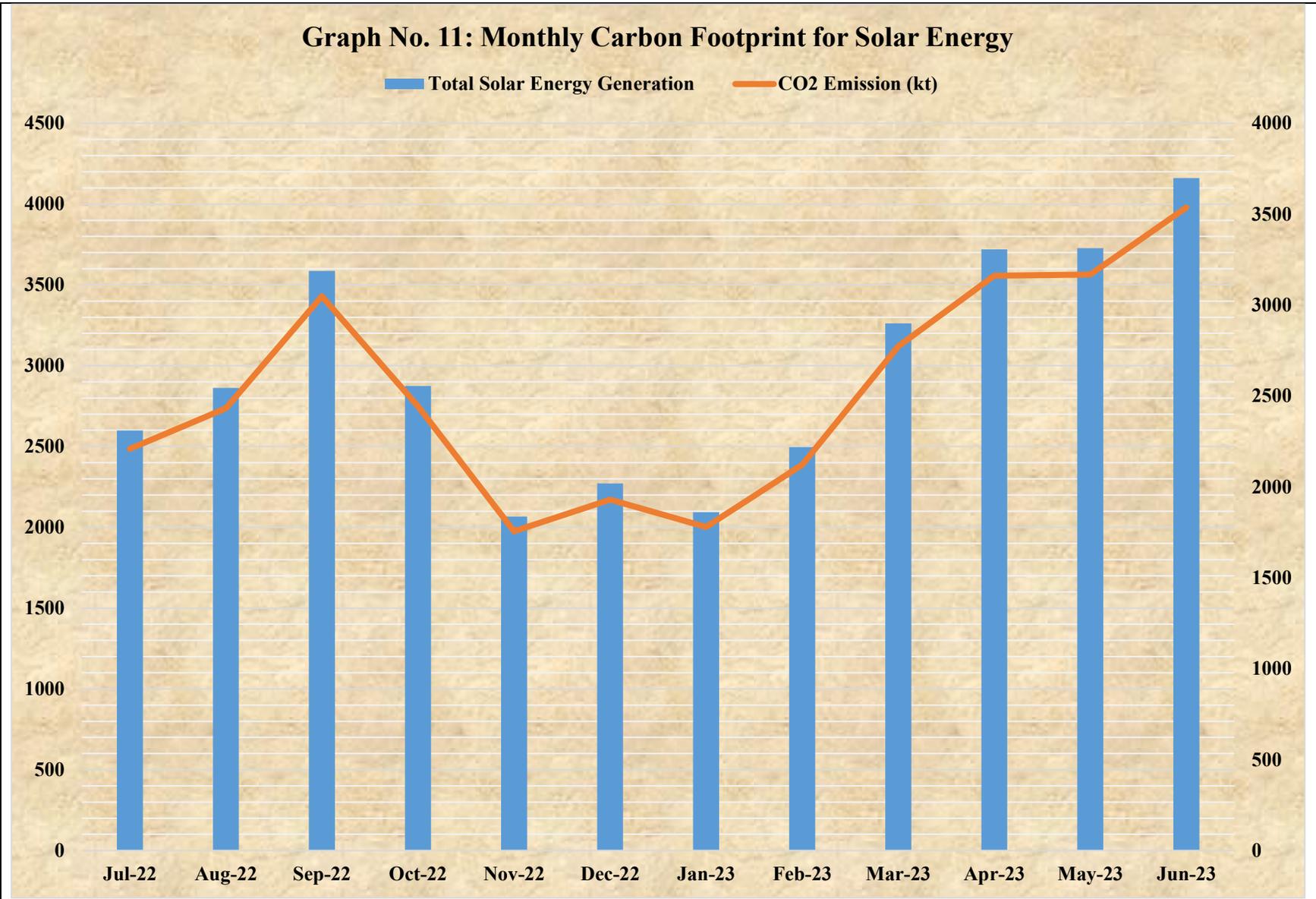
Table No. 36: Solar Energy Potential and CO_2 Emission at VMV

Sr. No.	Bill Month	Roof top solar net metering capacity (kW)	Total Solar Energy Generation	CO_2 Emission kt
1)	**Jul-22**	25	2599	**2209.15**
2)	**Aug-22**	25	2862	**2432.7**
3)	**Sep-22**	25	3587	**3048.95**
4)	**Oct-22**	25	2874	**2442.9**
5)	**Nov-22**	25	2066	**1756.1**
6)	**Dec-22**	25	2271	**1930.35**
7)	**Jan-23**	25	2094	**1779.9**
8)	**Feb-23**	25	2496	**2121.6**
9)	**Mar-23**	25	3262	**2772.7**
10)	**Apr-23**	25	3720	**3162**
11)	**May-23**	25	3727	**3167.95**
12)	**June-23**	25	4161	**3536.85**

* kW - KiloWatts

kt   - Kiloton

Emission factor – 0.8

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Graph No. 11: Monthly Carbon Footprint for Solar Energy

■ Total Solar Energy Generation ── CO2 Emission (kt)

**Graph No. 11: Monthly Carbon Footprint (Solar)**

Image No. 43: Rooftop Solar Panels Installed

VII) ENERGY AUDIT:
C] SOUND LEVEL

Sound is all around us and can be measured to inform and protect us, as some sounds are not safe. In fact, loud noise can be very damaging to hearing. The level of noise, where a person is in relation to the noise (distance to the noise), and the amount of time they listen to it can all result in risk for hearing loss. Sound can be measured with a device called a decibel meter. It samples and measures sound, giving a readout. Decibel meters (also called sound-level meters) can even be accessed on a smartphone through apps. Sound is measured in units called decibels (dB). The higher the decibel level, the louder the noise. On the decibel scale, the level increase of 10 means that a sound is actually 10 times more intense, or powerful. A Sound Level Meter (SLM) is an instrument (commonly hand-held) that is designed to measure sound levels in a standardized way.

The noise level was measured at different locations within the campus to understand the noise pollution level points and the calm zones. This help understand the sound level conforms to the prescribed range in daytime and night time in the educational institute.
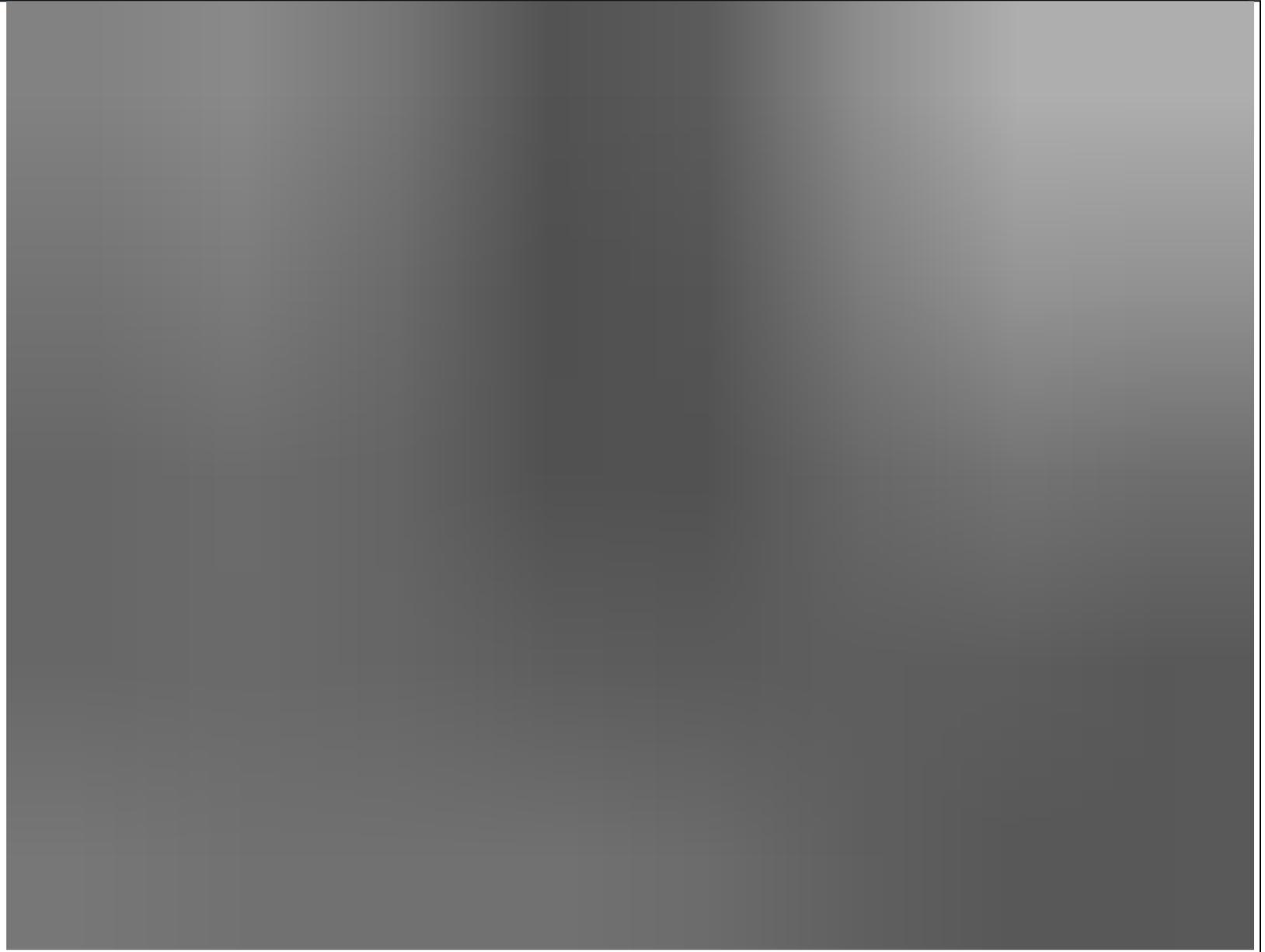
Satellite Imagery No. 11: Sampling Locations of Sound Component

Table No. 37: Sound Level Standard

CPCB Standards of Noise Levels					
Rural	**Sub-Urban**	**Residential (Urban)**	**Urban (Residential & Business)**	**City**	**Industrial**
25-35	30-40	35-45	40-50	45-50	50-60

Table No. 38: Noise Quality Standards

		Noise level in Leq dB (A)	
		Day Time	**Night Time**
1)	Industrial Area	75	70
2)	Commercial Area	65	55
3)	Residential Area	55	45
4)	Silence Zone	50	40

Source: Notification of MoEF, dated 26-12-1989

Note:

1. Day time is reckoned between 6 a.m − 10 p.m

2. Night time is reckoned between 10 p.m − 6 a.m

3. Silence Zone is defined as areas upto 100 m around premises as hospitals, educational institutions and courts. The silence zones are to be declared by Competent Authority. Use of vehicular horns, loudspeakers and bursting of crackers shall be banned in these Zones.

4. Mixed categories of areas should be declared as one of the four above mentioned categories by the Competent Authority and the Corresponding standards shall apply.

Table No. 39: WHO Guidelines for Sound Level

Specific Environment	Time Base (hours)	Standards limits as per WHO guidelines	
		LA eq (dB)	LA max, fast (dB)
Outdoor living area	16	50-55	-
Dwelling, indoors, inside bedrooms	16	30	-
	8	35	45
Outside Bedrooms	8	45	60
School Classrooms and preschool, indoors	During class	35	-
Preschool bedrooms, indoors	Sleeping time	30	45
School playground, outdoors	During play	55	-
Hospital, ward rooms, indoors	8	30	40
	16	30	-
Hospital, Treatment rooms, indoors	-	As low as possible	-
Industrial Commercial, shopping and traffic areas, indoors and outdoors	24	70	110
Ceremonies, festivals and entertainment events	4	100	110

Public addresses, indoors and outdoors	1	85	110
Music through headphones and earphones	1	85 (under headphones, adapted to free-field valued)	110
Impulse sounds from toys, fireworks and firearms	-	-	120-140 (peak sound pressure) not LAmax, fast), measured 100 mm from the car)
Outdoor in parkland and conversation areas	-	Exiting quite outdoor areas should be preserved and the of intruding noise to natural background sound should be kept low	-

Source: http://cpcb.nic.in/who-guidelines-for-noise-quality

Table No. 40: Quantitative Characteristics of Noise Level at VMV

Sr. No.	Locations	Noise level (Day Time)	Noise level (Night Time)
1)	**Location 1**	57 dB	48 dB
2)	**Location 2**	56 dB	41 dB
3)	**Location 3**	53 dB	46 dB
4)	**Location 4**	56 dB	45 dB
5)	**Location 5**	54 dB	42 dB

* dB - Decibel

VIII) WASTE AUDIT-
Generation & Disposal:
A) Institutional Municipal Solid Waste

Solid waste refers to the range of garbage materials arising from animal and human activities that are discarded as unwanted and useless. Solid waste is generated from industrial, residential, and commercial activities in a given area, and may be handled in a variety of ways. As such, landfills are typically classified as sanitary, municipal, construction and demolition, or industrial waste sites.

Waste can be categorized based on material, such as plastic, paper, glass, metal, and organic waste. Categorization may also be based on hazard potential, including radioactive, flammable, infectious, toxic, or non-toxic wastes. Categories may also pertain to the origin of the waste, whether industrial, domestic, commercial, institutional, or construction and demolition.

Regardless of the origin, content, or hazard potential, solid waste must be managed systematically to ensure environmental best practices. As solid waste management is a critical aspect of environmental hygiene, it must be incorporated into environmental planning.

The Institutional Municipal Solid Waste data was generated with due consideration to the number of individuals per department and the duration of day they spend at each of the department.

Table No. 41: Institutional Municipal Solid Waste Generation (IMSW) at VMV

Sr. No	Name of Program	Teaching Faculty	Non-Teaching Staff	Students	Daily Wages	Total No. of Individuals	Solid waste generated per department (kg)/day
1)	B.Com - I	Sr. Teacher + Sr. Approved + Sr. AdHoc + Sr. CHB Grant + Sr. CHB (Eve)	9	599	30	599	88.053
2)	B.Com - II			516		516	75.852
3)	B.Com - III			474		474	69.678
4)	BA - I			373		373	54.831
5)	BA - II			249		249	36.603
6)	BA - III			183		183	26.901
7)	B.Sc (PCM & CS & CBZ) - I			150		150	22.05
8)	B.Sc (PCM & CS & CBZ) - II			136		136	19.992
9)	B.Sc (PCM & CS) - III			88		88	12.936
10)	BCCA - I			120		120	17.64
11)	BCCA - II			91		91	13.377
12)	BCCA - III			78		78	11.466

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13)	BBA - I			125		125	18.375
14)	BBA - II			109		109	16.023
15)	BBA - III			107		107	15.729
16)	BCA - I			116		116	17.052
17)	BCA - II			93		93	13.671
18)	BCA - III			93		93	13.671
19)	M. Com. - I			159		159	23.373
20)	M. Com. - II	27 + 21 + 31 + 25 + 18 = **122**		152		152	22.344
21)	M.A. (English) - I			35		35	5.145
22)	M.A. (English) - II			15		15	2.205
23)	M.A. (Hindi) - I			36		36	5.292
24)	M.A. (Hindi) - II			30		30	4.41
25)	M.A. (Eco) - I			28		28	4.116
26)	M.A. (Eco) - II			14		14	2.058
27)	B.Voc (Acting)-I			13		13	1.911

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28)	**B.Voc (Acting)-II**			12	12	1.764
29)	**B.Voc (Acting)-III**			6	6	0.882
30)	**B.Voc (Theatre)-I**			15	15	2.205
31)	**B.Voc (Theatre)-II**			11	11	1.617
32)	**B.Voc (Theatre)-III**			8	8	1.176
33)	**M.Sc. (Maths) - I**			26	26	3.822
34)	**M.Sc. (Maths) - II**			26	26	3.822
35)	**M.Sc. (Phy) - I**			22	22	3.234
36)	**M.Sc. (Phy) - II**			25	25	3.675
37)	**M.Sc. (Che) - I**			26	26	3.822
38)	**M.Sc. (Che) - II**			23	23	3.381
39)	**PGDCCA**			26	26	3.822
40)	**MCM - I**			52	52	7.644
41)	**MCM - II**			27	27	3.969
41)	**MCA - I**			63	63	9.261

| 42)	MCA - II		62			62+9+30=101	14.847
43)	Library		8			8	1.176
44)	Administrative & General Purpose		6+6 = 12			122+12=134	19.698
45)	**Total**	**122**	**29**	**4612**	**30**	**4793**	**704.57**

Henceforth,

Table No. 42: Daily and Annual Institutional Municipal Solid Waste Generation (IMSW) at VMV

Sr. No.	Total Institutional Municipal Solid Waste (IMSW) generated at VMV per day	Waste generated for Session July 2022 -June 2023)
1)	**704.57 kg**	**257168.05 kg/yr**

**Institutional Municipal Solid Waste Management Plan for future**

❖ Future Projections

- Population Forecast of College

- Anticipated Lifestyle Changes

- Change in Socio-economic Status

❖ Conformation to Rules, Regulations and Municipal Bye-Laws

❖ Stakeholders Participation/Information, Education and Communication (IEC)

❖ Institutional and Financial Structuring

- Timeline

- Manpower Requirement

- Financial Viability

❖ Storage, Collection, Transportation

❖ Identification of Land within campus

❖ Selection of Process and Best Available Technology for Processing and Disposal
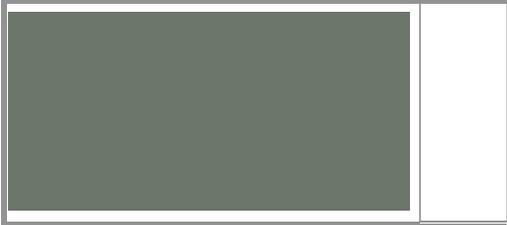
VIII) WASTE AUDIT- Generation & Disposal:
B) Municipal Sewage

Wastewater or sewage is the byproduct of many uses of water. There are the household uses such as showering, dishwashing, laundry and, of course, flushing the toilet. The sewer or collection system is designed so that it flows to a centralized treatment location. The collection system is comprised of smaller sewers with a diameter of about four inches. We need to remove the wastewater pollutants to protect the environment and protect public health. When water is used by our society, the water becomes contaminated with pollutants. If left untreated, these pollutants would negatively affect our water environment. For example, organic matter can cause oxygen depletion in lakes, rivers, and streams. Waterborne diseases are also eliminated through proper wastewater treatment. Sewerage (or sewage system) is the infrastructure that conveys sewage or surface runoff (storm water, rainwater) using sewers. It encompasses components such as receiving drains, manholes, pumping stations, storm overflows, and screening chambers of the combined sewer or sanitary sewer. Sewerage ends at the entry to a sewage treatment plant or at the point of discharge into the environment. It is the system of pipes, chambers, manholes, etc. that conveys the sewage or storm water.
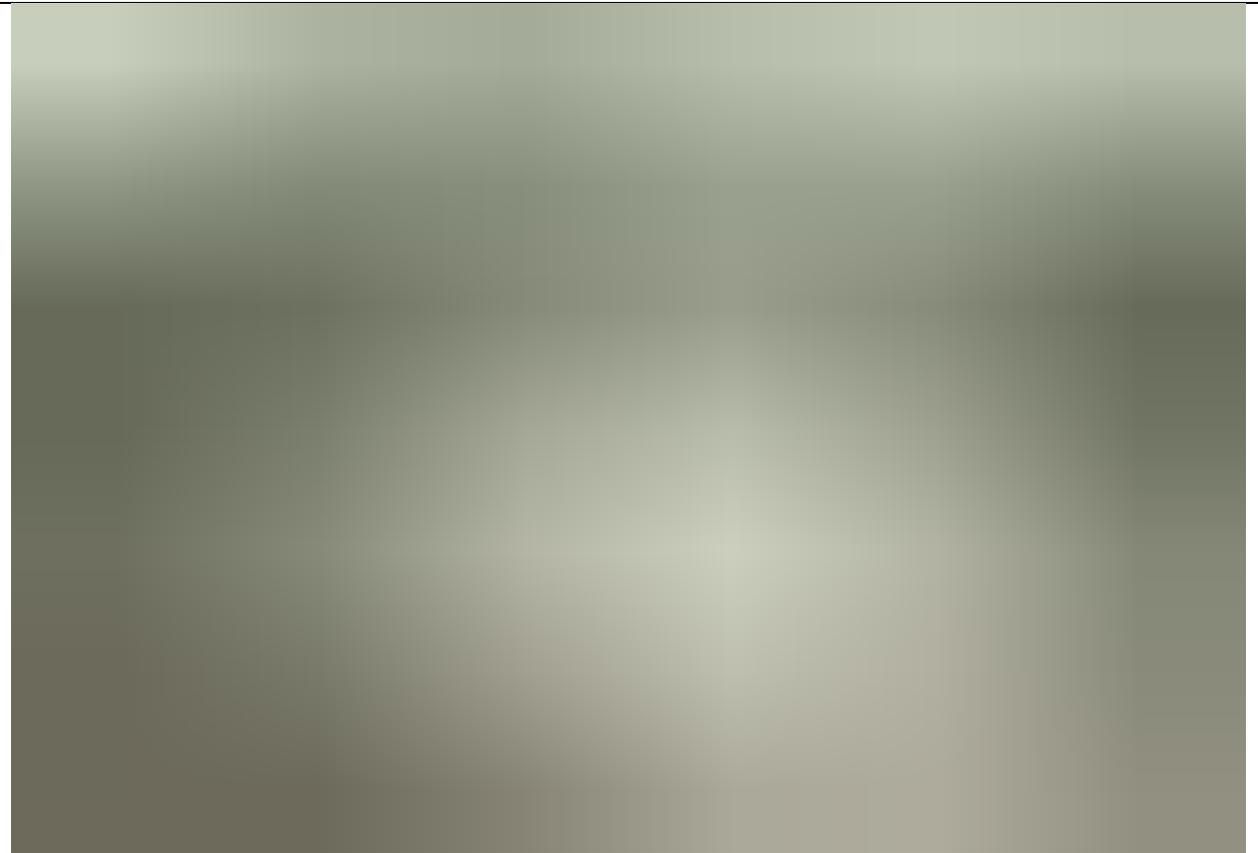
The VMV campus disposes its sewage and wastewater to the municipal sewer line which goes to municipal sewage treatment plant.
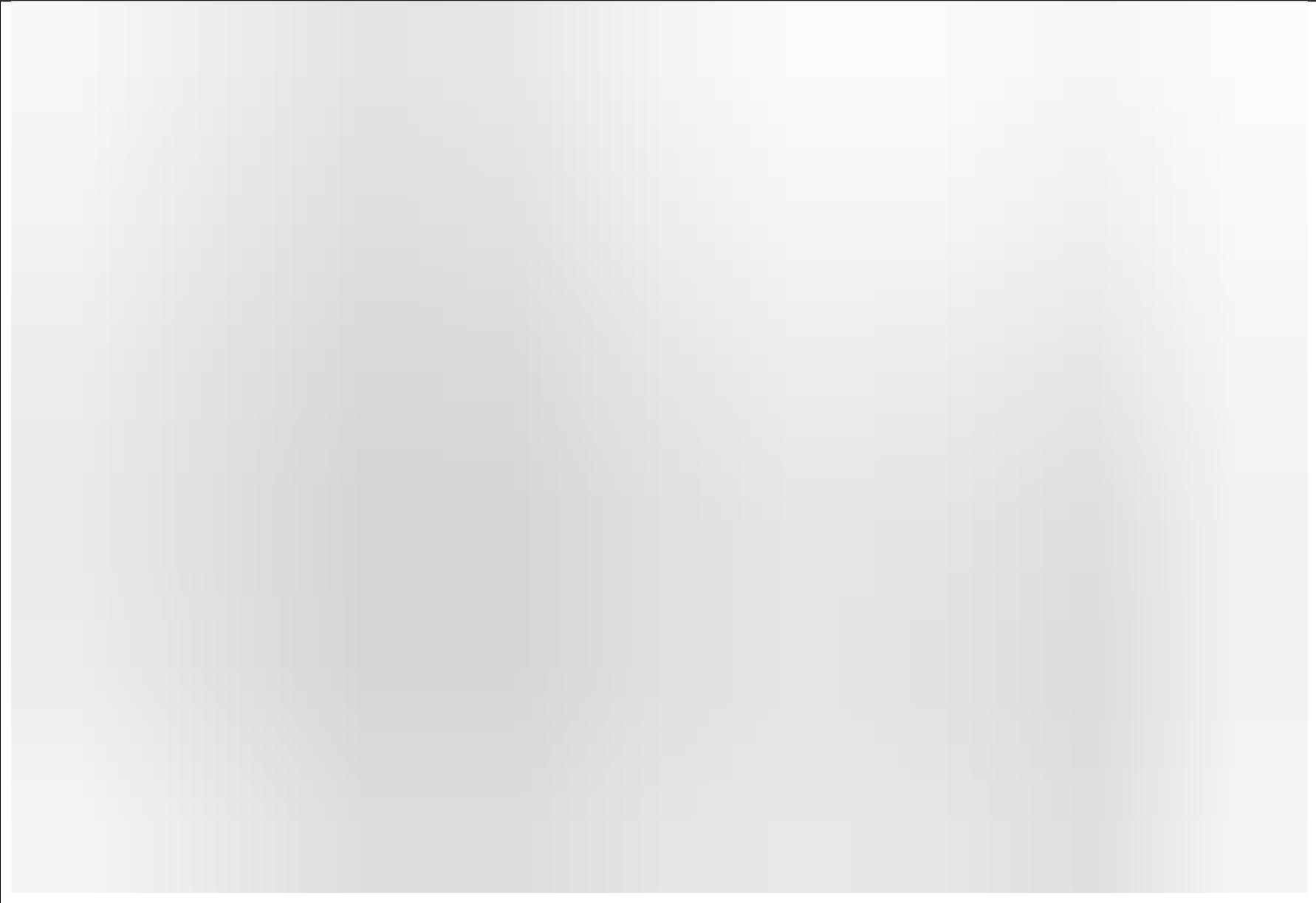
Map No.: Sewer Line Drainage Map
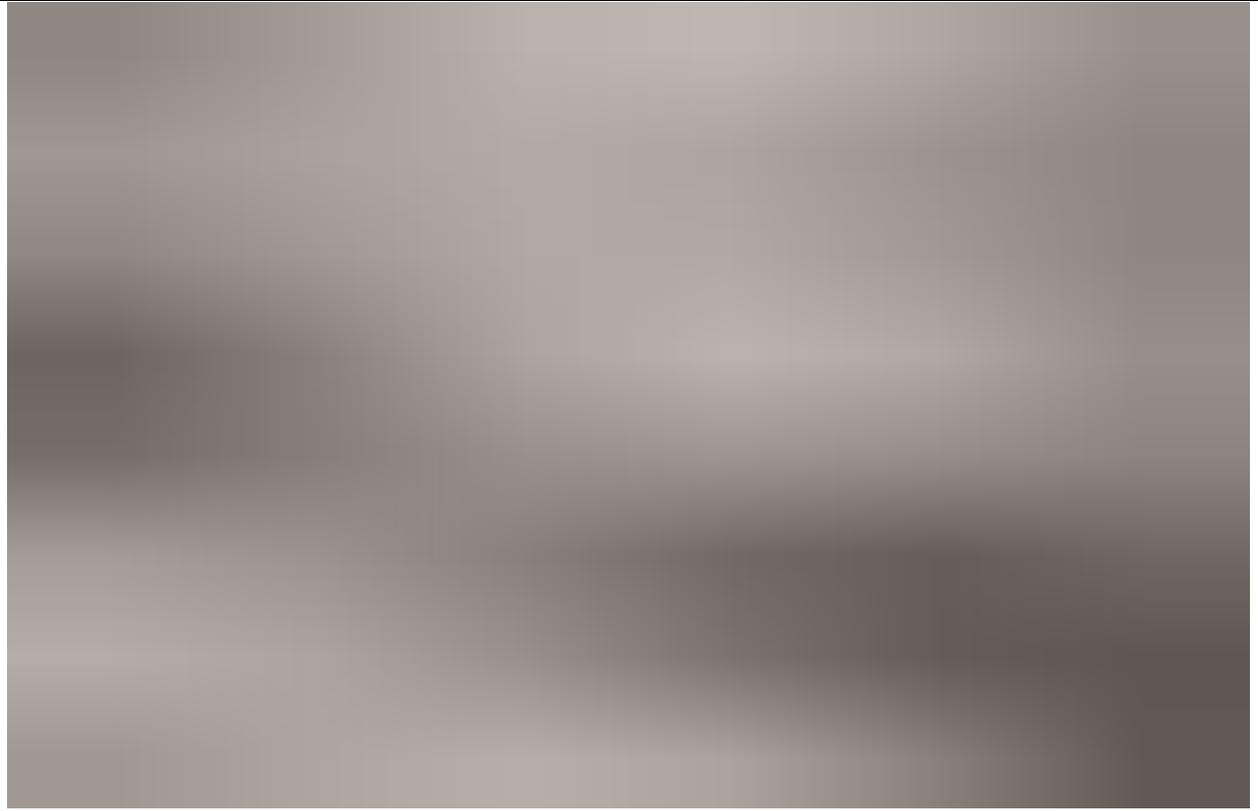
Image No. 44: (Drainage) Septic Tank

		VIII) WASTE AUDIT- **Generation & Disposal :** **C) Sanitation Utilities**

Rapid population growth, urbanization, climate change, pollution and inadequate financing, present unprecedented challenges to the provision of water and sanitation services.

Improving and managing universal services of water and sanitation in a holistic manner is critical to achieving the Sustainable Development Goals, and addressing the needs of millions of people around the world. To do so, it must take into account social, economic and environmental factors, while adapting to climate change risks to ensure the resilience of water and sanitation systems.

In 2020, 54% of the global population (4.2 billion people) used a safely managed sanitation service; 34% (2.6 billion people) used private sanitation facilities connected to sewers from which wastewater was treated; 20% (1.6 billion people) used toilets or latrines where excreta were safely disposed of in situ; and 78% of the world's population (6.1 billion people) used at least a basic sanitation service.

Benefits of improved sanitation extend well beyond reducing the risk of diarrhea. These include:

- reducing the spread of intestinal worms, schistosomiasis and trachoma, which are neglected tropical diseases that cause suffering for millions;
- reducing the severity and impact of malnutrition;
- promoting dignity and boosting safety, particularly among women and girls;
- promoting attendance: girl's attendance is particularly boosted by theprovision of separate sanitary facilities;
- reducing the spread of antimicrobial resistance;
- potential recovery of water, renewable energy and nutrients from faecal waste; and
- potential to mitigate water scarcity through safe use of wastewater for irrigation especially in areas most affected by climate change.

Table No. 43: Building-wise Provision of Sanitary Utilities

Sr. No.	Name of Department		Toilet					Wash Basin	Sanitary Napkin vending
			Male			Female			
			WC	Seat	Urinal	WC	Seat		M/C
1)	Old Building	Ground Floor	1-Principal 1-Staff	3-staff	5-staff	3-staff	-	6	2
		1st Floor	-	1	4	1	6	4	
		2nd Floor	-	3	8	2	1	3	
		3rd Floor	-	1	4	1	-	3	
		4th Floor	1	-	4	1	3	2	
2)	New Building	Ground Floor	-	1	5	-	3	-	
		1st Floor	3	1	7	2	1	8	
		2nd Floor	3	1	7	2	1	8	

* Incinerator is present in the campus for safe disposal of sanitary napkins.

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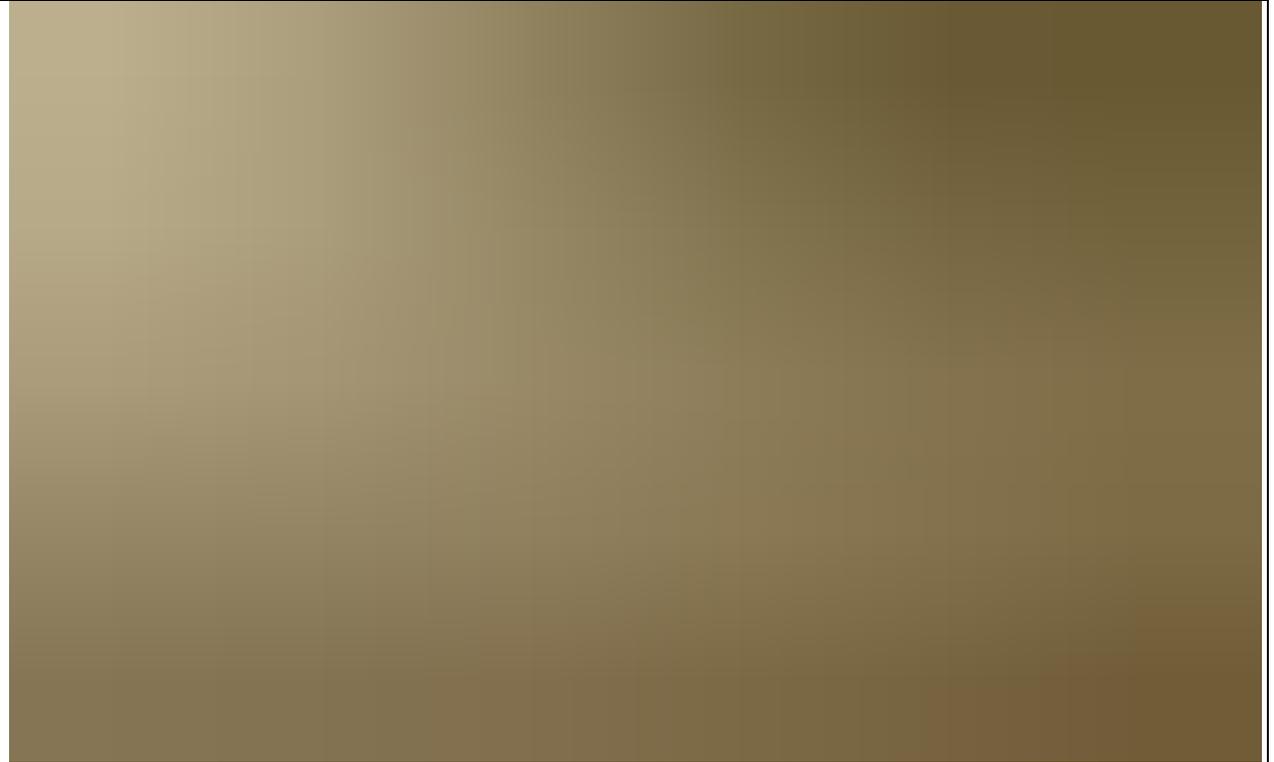
Image No. 45: Sanitary Napkin Vending machine and Incinerator
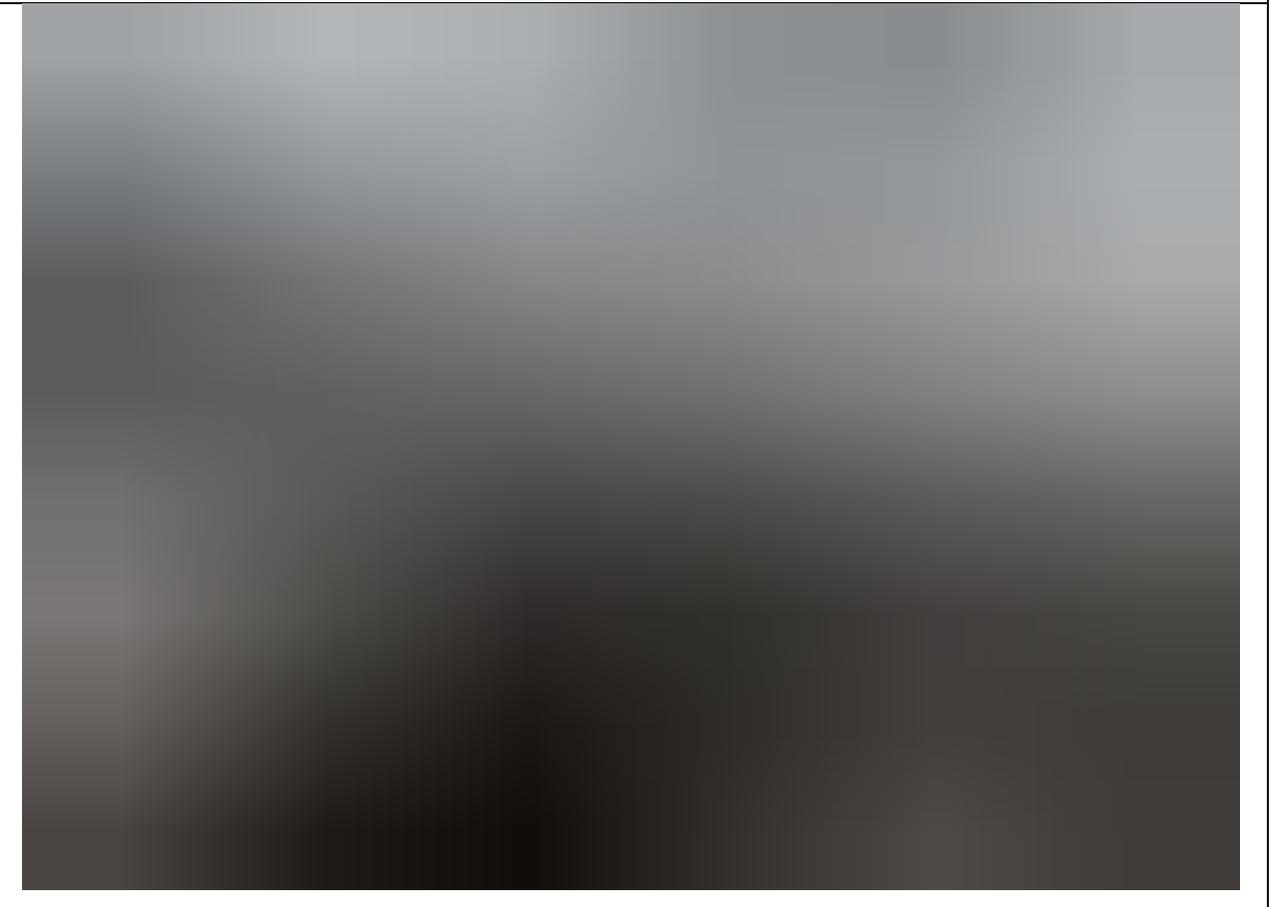
IX) Fire And Safety

Fire safety is the set of practices intended to reduce the destruction caused by fire. Fire safety measures include those that are intended to prevent the ignition of an uncontrolled fire and those that are used to limit the development and effects of a fire after it starts.

Fire safety measures include those that are planned during the construction of a building or implemented in structures that are already standing, and those that are taught to occupants of the building.

Threats to fire safety are commonly referred to as fire hazards. A fire hazard may include a situation that increases the likelihood of a fire or may impede escape in the event a fire occurs.

Fire safety is often a component of building safety. Those who inspect buildings for violations of the Fire Code and go into schools to educate children on fire safety topics are fire department members known as Fire Prevention Officers. The Chief Fire Prevention Officer or Chief of Fire Prevention will normally train newcomers to the Fire Prevention Division and may also conduct inspections or make presentations.

Table No. 44: Building-wise Availability of Fire Safety Systems

| Sr. No.	Buildings / Unit	Fire System Availability
1)	**Old Building**	Fire Hydrant, Fire Auto Detection, Fire Alarm, Fire Extinguishers
2)	**New Building**	Fire Hydrant, Fire Alarm, Fire Extinguishers

Fire Extinguisher

Fire Hydrants
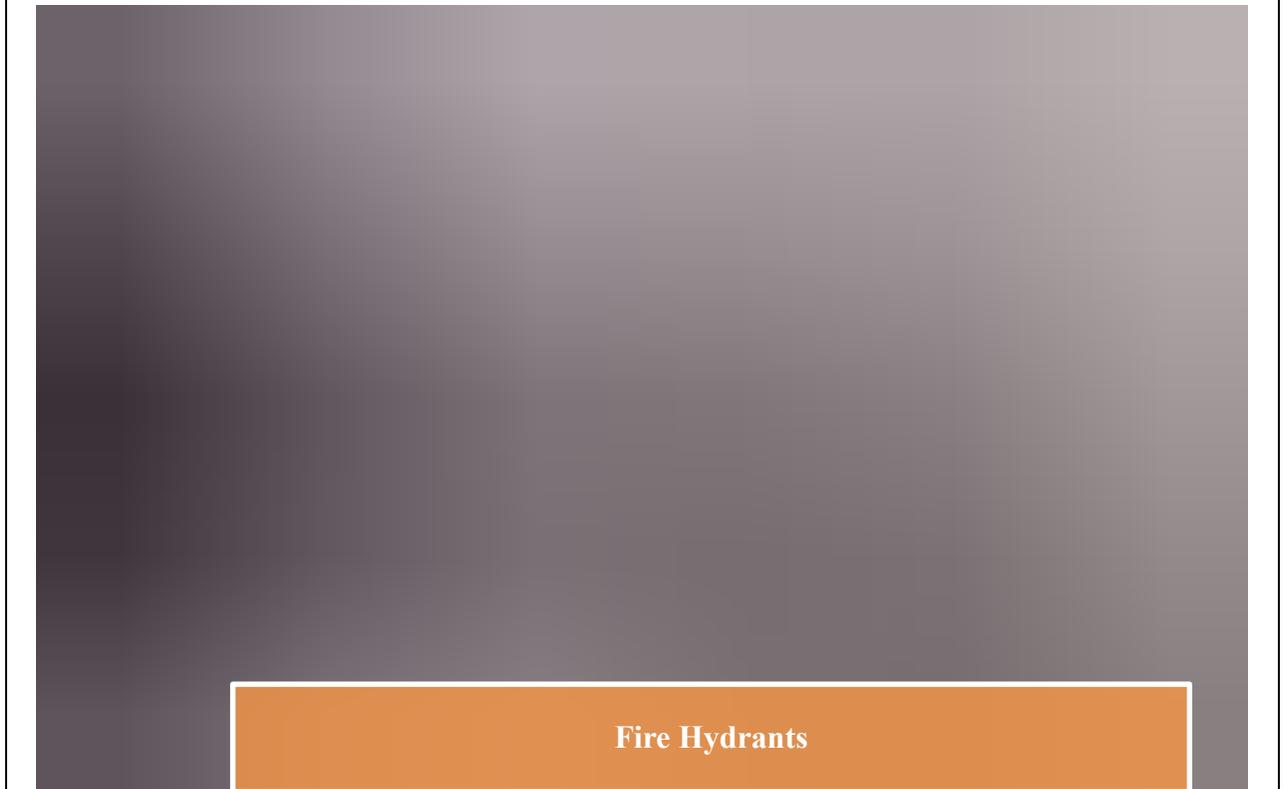
Image No. 46: Fire Extinguishing Equipment

Table No. 45: Fire Safety Details of Building

Name of Building & Nos. of floor	VMV Building			Date :- 09-12-2022	
Address	VMV Wardhaman Nagar, NAGPUR				
Fire NOC Received (Yes / No)	YES (Provisional)		Fire NOC Next Renewal Date :- NA		
Sr. No	Description	Specification / Details	Availability (Yes /No)	Capacity /Quantity/No's	Status as on date About the Working	Remarks
1	**WATER STORAGE TANK**	5 Water Tanks	YES	2 Tank-25000 Ltr. each 1 water tank - 5000 Ltr. 1 small water tank – 1000 Ltr. 1 underground water tank – 45000 Ltr.		NA
			YES	25000 LTR	NA	OK
2	**ELECTERICAL BACK UP**	Whether Electric Back-up Available or Not in Term of DG Set	YES 2 generators	NA	NA	DG SUPPLY CONNECTED
3	**FIRE HYDRANT & SPRINKLER SYSTEM**	Hydrant pump				
		Sprinkler pump				
		Diesel pump				

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|					
		Jockey pump			
		Booster pump			
		Fire pump Panel			
		Hydrant valve	YES	12	
		Hose Reel	YES	11	
		Hose Box	YES	11	
		Sprinklers			
		RRL Hose Pipe	YES		
		Branch pipe			
		Two Way			
		Four Way			
4	**Fire Detection & Alarm system**	Smoke Detector			
		Heat Detector			
		Manual call Point (MCP)	YES	05	
		Sounder	YES		
		Fire Alarm Panel			
5	**Fire Extinguisher**	ABC type	YES	17	
		CO_2 type	YES	04	
		Foam type	YES	02	
		Water type	YES	18	
6	**Fire Bucket**				
7	**Evacuation Plan & Signages**				
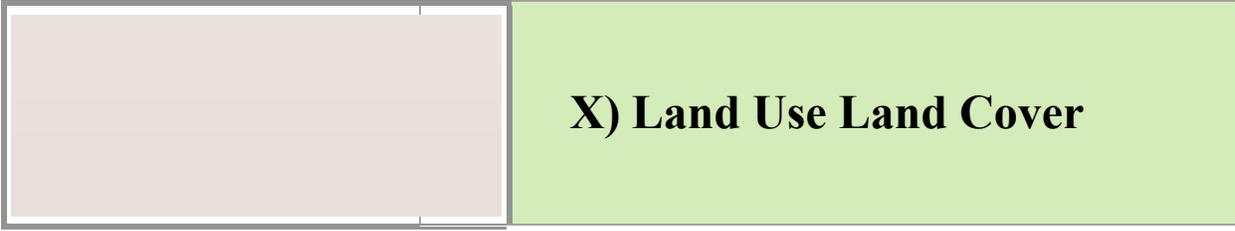
X) Land Use Land Cover

Land Use Land Cover (LULC) maps of an area provide information to help users to understand the current landscape. Annual LULC information on national spatial databases will enable the monitoring of temporal dynamics of agricultural ecosystems, forest conversions, surface water bodies, etc. on annual basis.

Land use and land cover change (LULCC) is **the conversion of different land use types** and is the result of complex interactions between humans and the physical environment. LULCC is a major driver of global change and has a significant impact on ecosystem processes, biological cycles and biodiversity.

They play an important role in agricultural policy making. Moreover, land-cover data are used as basic information for sustainable management of natural resources; they are increasingly needed for the assessment of impacts of economic development on the environment.
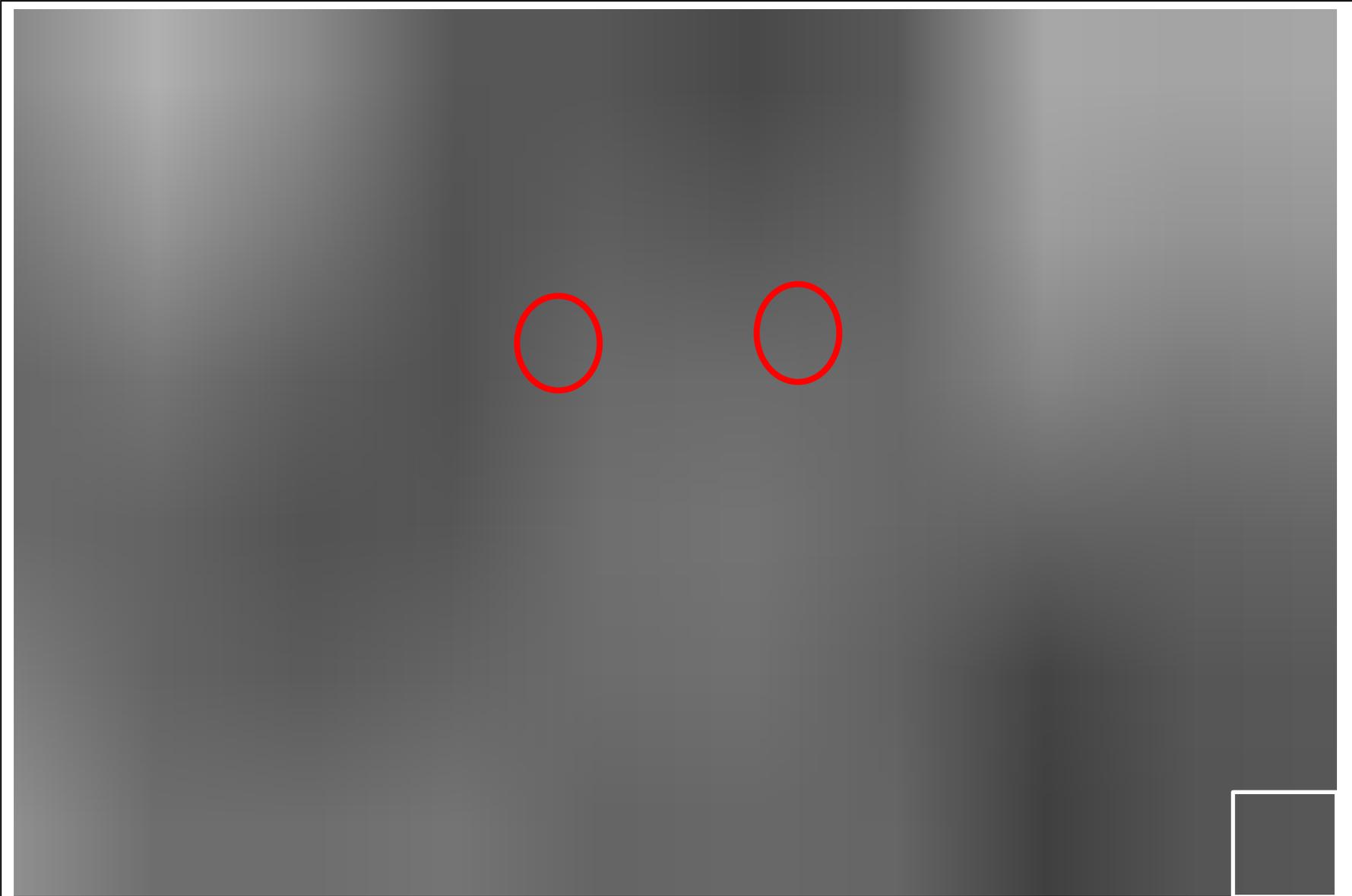
Land Use Land Cover Change Over the past 5 Years at VMV
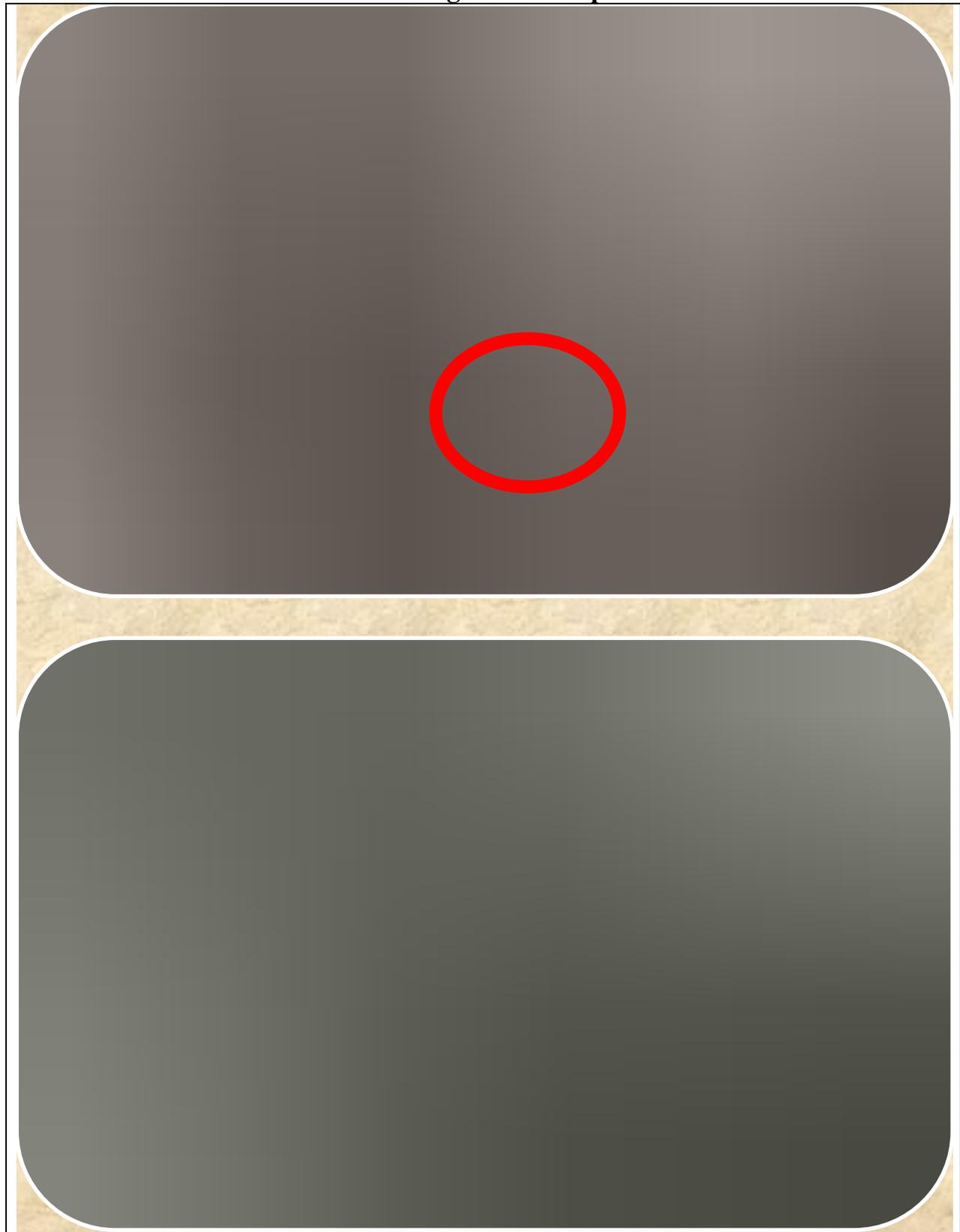
Satellite Imagery No. 12: Land Use Land Cover in 2018-2019
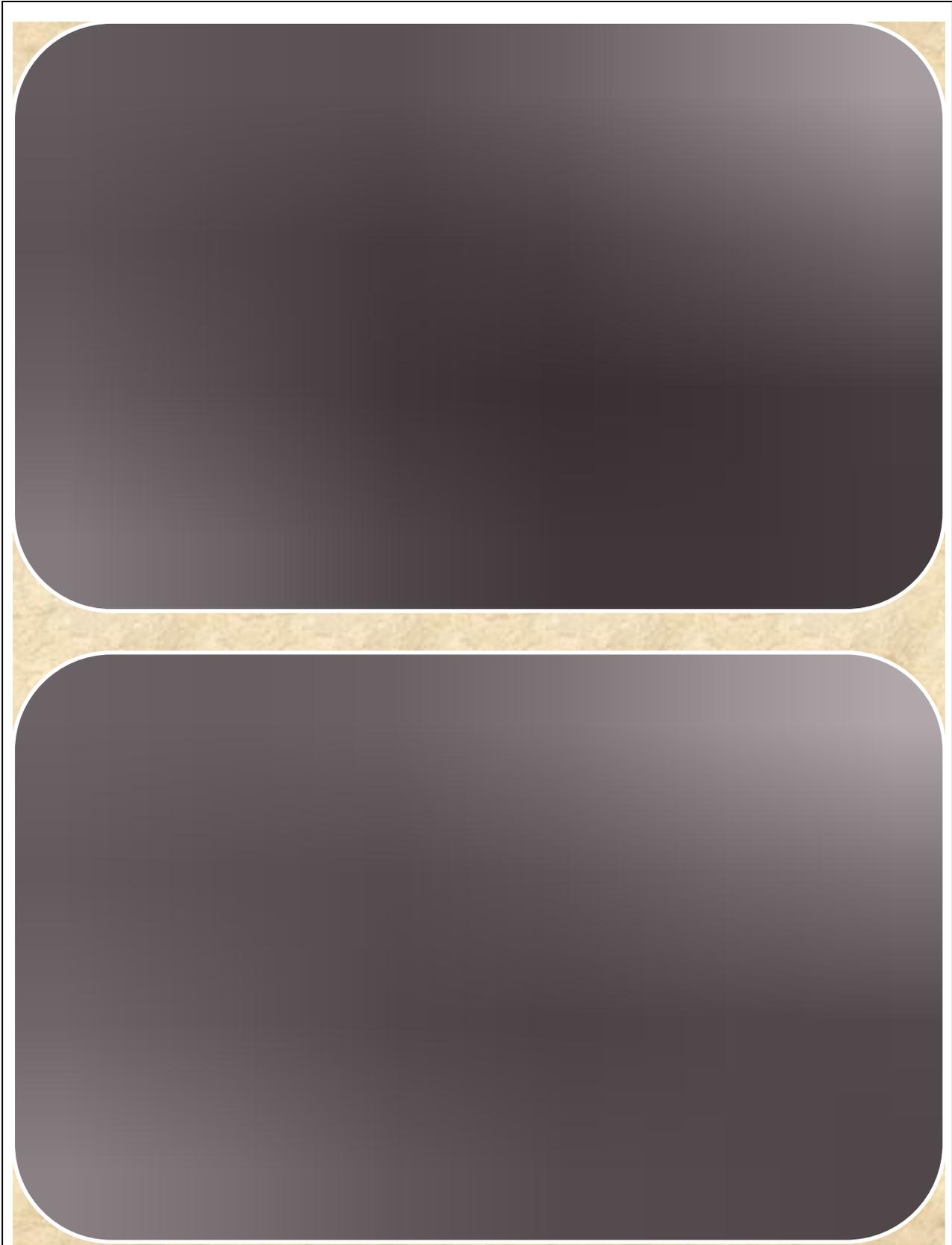
**Satellite Imagery No. 13: Land Use Land Cover in 2020-2021**

Satellite Imagery No. 14: Land Use Land Cover in 2022

Green Initiatives/ Activities in Campus

- ♣ Plastic collection day & no vehicle day in campus
- ♣ Plantation drive in the campus
- ♣ Plantation awareness campaign
- ♣ Cleanliness drive
- ♣ Intercollegiate Competition on awareness of Environment Conservation
- ♣ Interactive sessions for students to explore and channelize the young for environmental conservation
- ♣ Environment friendly and safe disposal of E-waste
- ♣ Sustainable construction of buildings with natural lighting and ventilation
- ♣ Display board of conservation and prevention of resources within the campus for awareness
- ♣ Surface water run-off recharge for Rainwater Harvesting.
- ♣ Solar Energy conversion to Electric energy
- ♣ Rooftop Rainwater Harvesting Systems is implemented

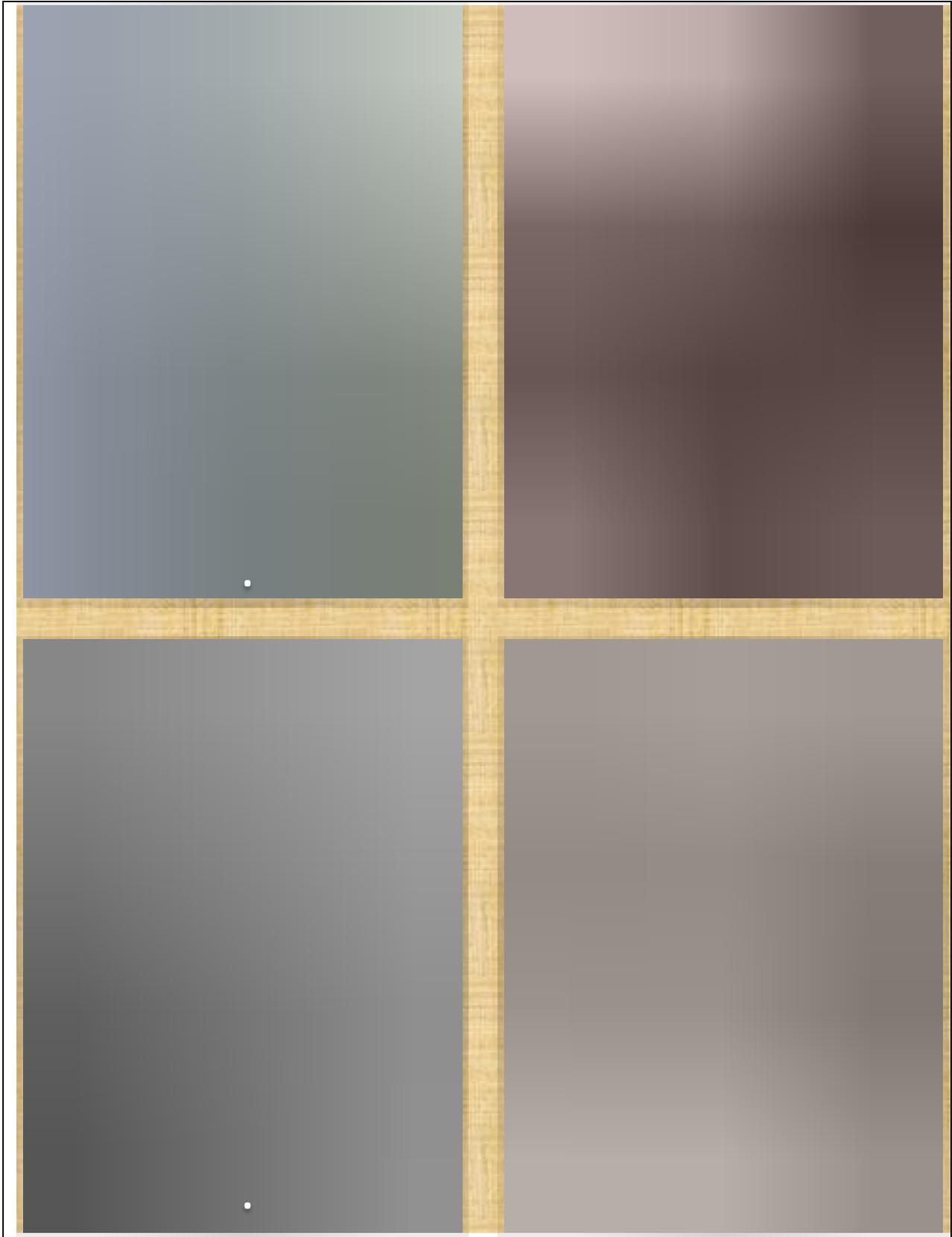**Table No. 46: Compliance to the Environment Friendly Practices**

Sr. No.	Description	Compliance
1)	Water Conservation	✓
2)	Prevention of Air Quality	✓
3)	Soil Conservation	✓
4)	Flora and Fauna Conservation	✓
5)	Waste Disposal	✓
6)	Fire & Safety measures	✓
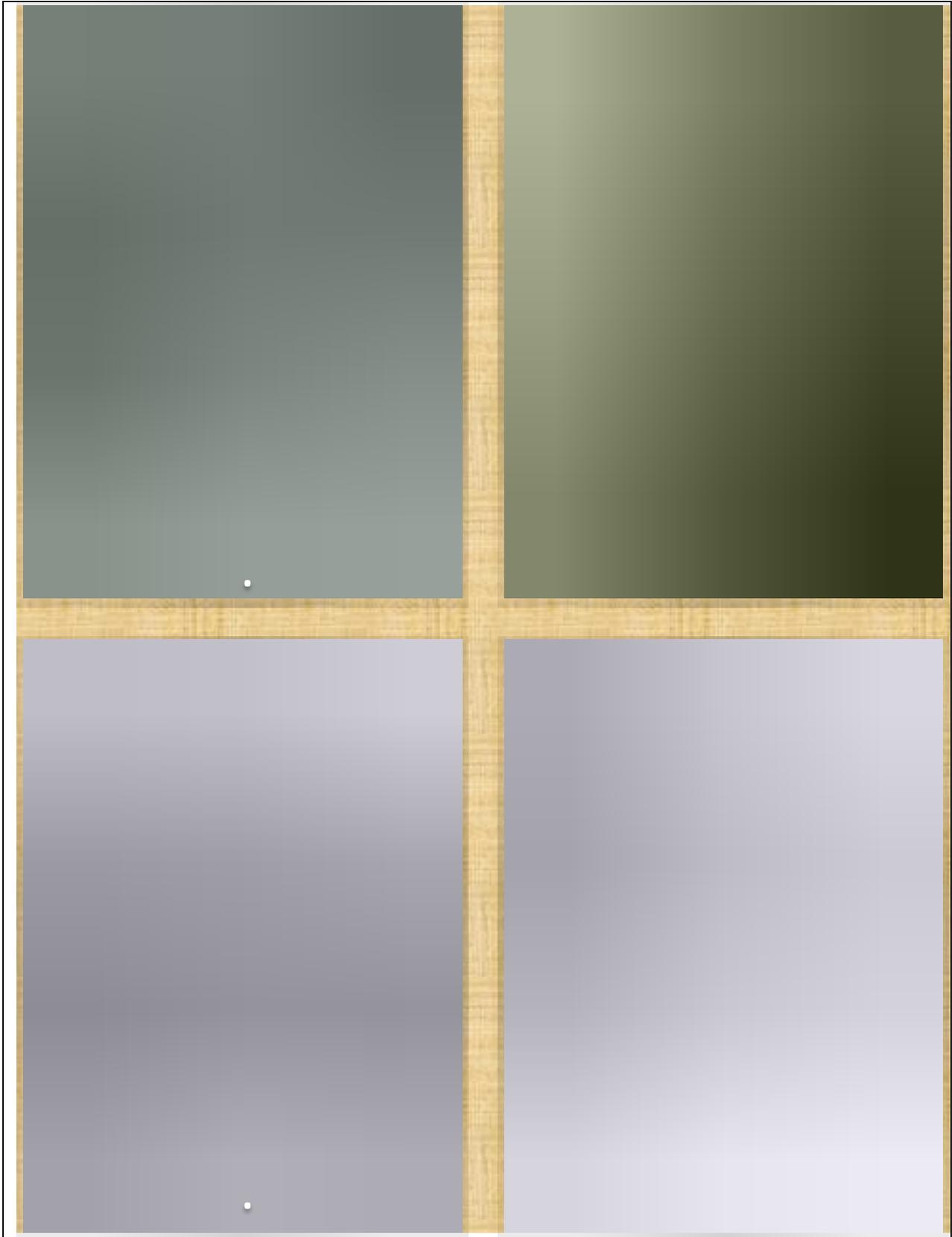
Image No. 47: Environment Friendly Activities
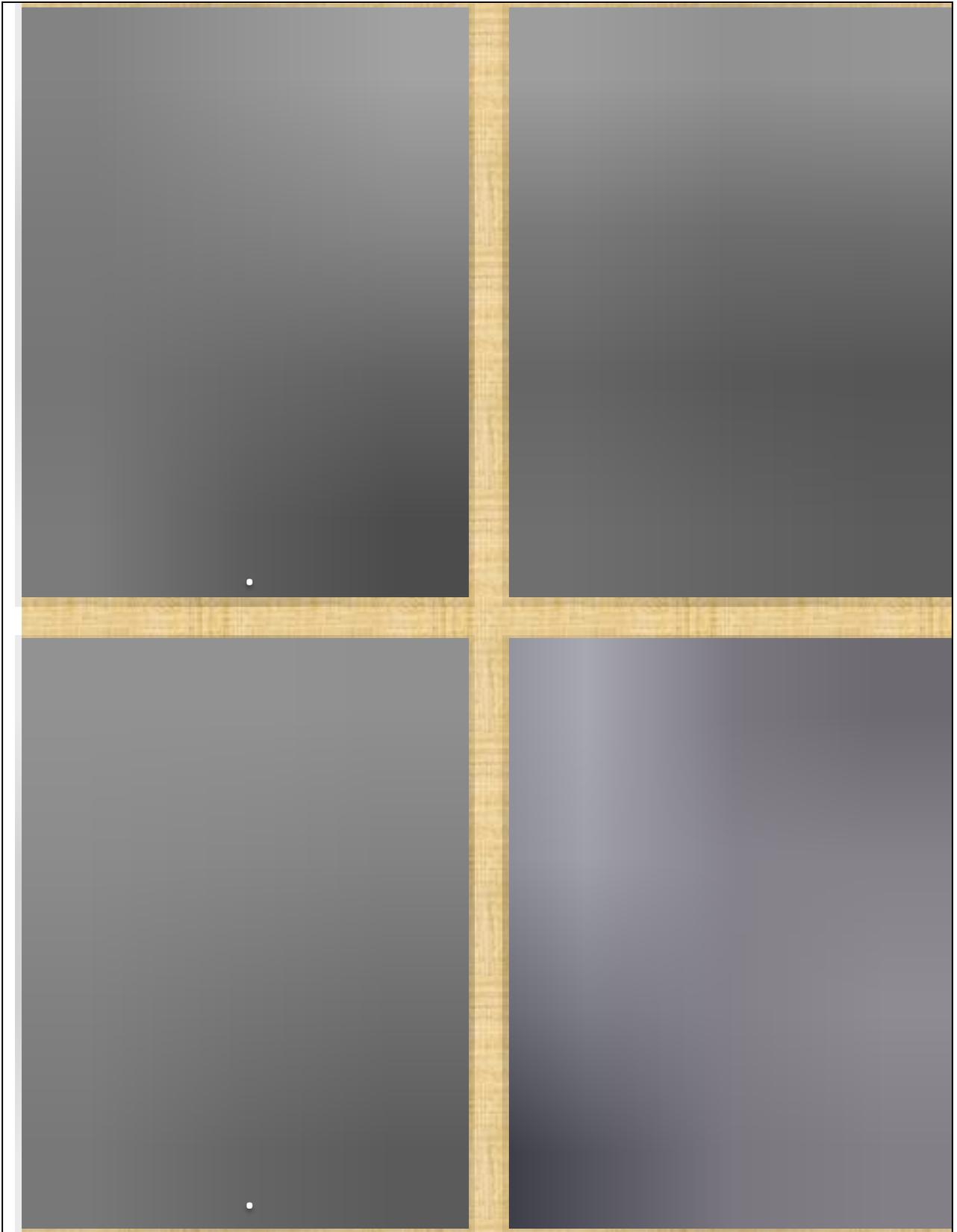
Image No. 48: Environment Friendly Activities

Image No. 4: Environment Friendly Activities

Suggestions

1) Celebration of environmental days with awareness campaign should be carried out every month.

2) Implementation of proper Institutional Municipal Solid Waste management plan is essential.

3) Ecosystem of the college should be managed properly.

4) Each of the trees and plants should be numbered and their scientific classification in regard of common name, genus and scientific name should be displayed.

5) Fallen twigs and leaves can be used for bio-composting by (NADEP) and the manure can be produced byintegrating students in these practices.

6) NADEP compost method easy to maintain can be practiced for composting of waste.

7) Installation of Biogas Digester for biodegradable waste management.

8) A piece of land could be dedicated for organic farming and the students could be motivated to take responsibility to maintain the same during their physical activity hours.

9) Plantation should be done with due consideration to the indigenous species for balancing the native ecology and for increasing the green cover to contribute in reduced vehicular pollution.

10) Wild species to be maintained with due consideration during infrastructure development.

11) Bird watching should be encouraged amongst students.

12) Identification of toxic and hazardous chemicals and their handling with disposal plan should be maintained.

13) Creation of small aquatic water body for natural habitat and ecosystem services to the ecological species.

14) Enhance the biodiversity and species existence through natural ecosystem restoration activities.

15) Engage students in initiating the plant nursery for native/endemic species in the college premises.

16) Dedicate the no noise areas in college premises.

17) Encourage students for clean fuel transportation and public transport or car pool for teaching faculties to reduce the carbon footprint.