Certificate

Academic and Administrative Audit (AAA)

This is to certify that Central Hindu Military Education Society's Bhonsala Military College, Nashik has been assessed by External Peer Review Committee under the Academic and Administrative Audit (AAA) on 30th August 2023

Dr. P.V. Rasal
Chairman, External Peer Review Committee,
Academic and Administrative Audit (AAA)

CENTRAL HINDU MILITARY EDUCATION SOCIETY'S
BHONSALA MILITARY COLLEGE
NAAC Reaccredited 3rd Cycle 'A' Grade
RAMBHOOMI, DR.MOONJE MARG, NASHIK 422005 (MAHARASHATRA)
E-Mail: principal@bmc.bhonsala.in
Website:-www.bhonsala.in, Fax: - *(0253) 2309611*. College Office: *(0253) 2309610*
AFFILIATED TO SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE *PUNCODE - CAAN017600*
IDENTIFICATION NO.PU/NS/ASC/031/1986 College Code:-188 Maharashtra State Board: J.13.17.021

GENDER AUDIT REPORT
2017-18 to 2022-23

Prepared by
Internal Quality Assurance Cell

Salient Findings

Student strength, particularly female strength is well in numbers in Arts, Commerce and Science UG programmers. Female student enrolment is approximately 50 percent of total number of student. Success rate of Female student is higher than that of Male student.

The participation of Female student in all the activities cultural activities is equal to the male students

Suggestions

1) To make a separate common room for Male student.
2) To place a Compliant box in ladies room.

The external peer gender audit committee scrutinized the college for Gender Audit for the year 2017-18 to 2022-23 on Saturday, 12/08/2023

Dr. Manjusha Kulkarni
Principal,
R.N. C. Arts, J.D.B. Commerce & N.S. C. Science College, Nashik Road, Nashik - 422101
(Chairman, external peer gender audit committee)

Dr. Rajashree Naik
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Nashik Road, Nashik – 422101

Dr. Sanjay M. Nikam
Associate Professor
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Lasalgaon, Nashik-422306

(Member, External Peer Gender Audit Committee)

Ajinkyatara Consultants

IGBC AP

Ar. Smita KasarPatil
M. Arch., M.A. (History & Archaeology),
P.G. Diploma in Heritage Management & Scientific Conservation

Er. Yogesh KasarPatil
M. Tech. (Environment & Water Resources), M.A. (History & Archaeology),
P.G. Diploma in Heritage Management & Scientific Conservation, Chartered Engineer (I)

No.AT/105/2023-24 Date: 08/08/2023

To,

The Principal,
Bhonsala Military College,
Rambhoomi, Nashik 422 005

Sub: Submission of Green Building Audit of your institute.

Ref: Your office Purchase order No. BMC/SE/478, dated: 25/08/2023.

Dear Sir,

As per above subject and reference, we are appointed for preparation of Green Building Audit Report for Bhonsala Military College, Nashik

We here by submit Green Building Audit Report for the same.

Please do the needful!

For Ajinkyatara Consultants

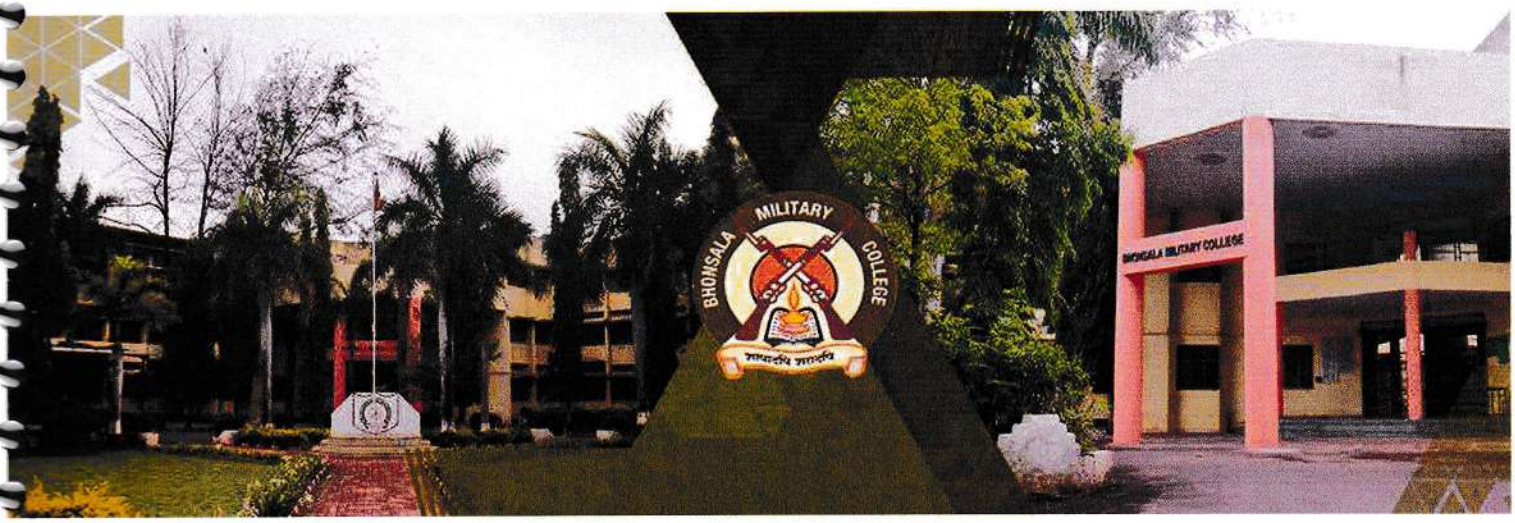
Authorised Signatory

Encl:

1) Green Audit Report

15, Poornam Center Point, Kanherewadi, Nasik - 422 001.
+91 253 2509271 094 222 55 730, 094 231 75 199

GREEN AUDIT REPORT
2023-24



BHONSALA MILITARY COLLEGE
शापादपि शरादपि
NASHIK

BHONSALA MILITARY COLLEGE, NASHIK

IGBC AP

Prepared By,
Ajinkyatara Consultants
15, Poornam Centre Point,
Kanherewadi, C.B.S.,
Nashik – 422001

Abstract

Buildings have major environmental impacts during their entire life cycle. The present scenario demands the need to design a responsive building, which address all the issues related to building environment in an integrated and scientific manner. Green Audit is a process of systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of institute. Green audit is a valuable means for a college to determine how and where they are using the most energy or water or other resources; the college can then consider how to implement changes and make savings. It costs less to maintain a green building that has tremendous environmental benefits and provides a better place for the occupants to live and work in. It provides staff and students better understanding of Green impact on campus. Thus it is imperative that the college evaluate its own contributions toward a sustainable future. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory that all Higher Educational Institutions should submit an annual Green Audit Report. Moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through carbon footprint reduction measures. So this report is comprised of the overall study of the educational campus of the 'Bhonsla Military College, Nashik'. It includes site analysis, water efficiency, rainwater harvesting, landscaping, heat island effect, solar efficiency, waste management, work environment with respect to indoor light quality, ventilation, colour application on internal and exterior facades, carbon footprints etc. report also gives some suggestions to improve the performance of building with respect to environment.

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AJINKYATARA CONSULTANTS Architects & Engineers NASHIK

1. Introduction

In the present scenario organizations are facing numerous challenges, issues and risks. One of the biggest one is the 'Global Warming'. Environmental changes, depletion of natural resources. A flexible, secure, dynamic infrastructure has to be devised to help organizations address critical energy and power costs.

In the present scenario, it has become immensely essential to unearth that up to what extent an organization is contributing towards environmental sustainability by adoption of techniques like Green Audit. Green Audit emphasizes the role of methods and practices that reduce an institution's environmental impact. Green audit advantage enables and empowers an organization to meet all the Global warming related challenges and at the same time help to contribute back so even an organization can participate and contribute to environmental corporate responsibility.

Energy use in institutions have risen in recent years because of the growth in information technology and air-conditioning. As a result, there has been a strong increase in cooling in warm & cold countries and in electricity consumption.

The institutional sector is emerging as a critical player in India's development process. Driven by the rising scale and intensity of environmental pressures and the society's changing expectations from the institutions, education and the environment, traditionally seen as divergent issues, are steadily coming closer. Realizing the increasing complexities facing the environment, institutions have begun to recognize their responsibility towards maintaining a cleaner, greener environment.

Buildings have major environmental impacts during their entire life cycle. Resources such as ground cover, forests, water, and energy are dwindling to give way to buildings. Resource intensive materials provide structure to a building and landscaping adds beauty to it — in turn using up water and pesticides to maintain it. Energy-consuming systems for lighting, air conditioning, and water heating provide comfort to its occupants. Water, another vital resource for the occupants, gets consumed continuously during building construction and operation. Several building processes and occupant functions generate large amounts of waste, which can be recycled for use or can be reused directly Buildings are thus one of the major pollutants that affect urban air quality and contribute to climate change.

Therefore, there's need to design a responsive building. The essence of which is to address all these issues in an integrated and scientific manner. It is also a proven fact that it costs less to maintain a green building that has tremendous environmental benefits and provides a better place for the occupants to live and work in.

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1.1 Aim

The aim of a green audit done is to check the demand on non-renewable resources, check the utilization efficiency of these resources when in use, and check the reuse, recycling, and utilization of renewable resources.

1.2 Objectives

The objectives of green audit are

- To become Energy Efficient
- Save Natural Resources
- Optimize Process
- Enhance Infrastructure
- Reduce dependency on Natural Resources
- Initiate Recycling Initiatives
- Imbibe in Institute's Environmental Responsibility Culture

1.3 Scope

The scope of an audit, and the methodologies used to uncover objective evidence, includes:

- Measuring key environmental parameters
- Analyzing raw and test data
- Reviewing purchase orders and invoices
- Inspecting facilities
- Interviewing employees &students
- Communicating with contractors, vendors, customers, and regulators

1.4 Methodology

The process adopted for assessment of the site, included a primary inspection of the site, after which details related to site, facilities, services incorporated, analysis of building materials used on site and assessment of energy bills with respect to energy consumption was done.

1.5 Site Visit

Organization :	Bhonsala Military College, Nasik.
Site Address :	C.H.M.E. Society's Bhonsala Military College, Rambhoomi, Dr. B.S.Moonge Marg, Nashik, Maharashtra- 422005.
Buildings :	Bhonsala Military College, Nasik.
Visited by:	Ar. Smita Kasarpatil, Er. Gaurav Thakare
Date of visits :	25/08/2023
Visits hosted by :	Prof. P.J. Ikhankar

A preliminary visit to the campus of Bhonsala Military College, Nasik, is conducted and the College campus is surveyed with respect to planning, climate, orientation, light quality during working hour, landscaping, water efficiency etc.

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1.5.1 Site Analysis

The report asses on the basis of study and analysis of the following: -

a) With respect to location of site: -

A. Erosion and Sedimentation Control

B. Site Selection

C. Development density and Community connectivity

D. Alternative transportation

b) Strategies incorporated towards achieving energy efficiency

E. Innovative waste water technologies

a) Storm water design

b) Rain water harvesting

c) Water use reduction

c) Factors considered for improving indoor environmental quality

F. Heat Island Effect

G. Light pollution reduction

H. Materials and resources

2.0 SITE INTRODUCTION

2.1 Erosion and sedimentation control

The site has effective sedimentation and erosion control plan that conforms to the best management practices. Advocates process like temporary or permanent vegetation, planted trees and soft scapes (lawns).New trees and plants that are non-invasive native species appropriate to the site's location soils and microclimate are there on site. The newly planted trees are located to provide shading in the summer and allow for heat gain in the winter.

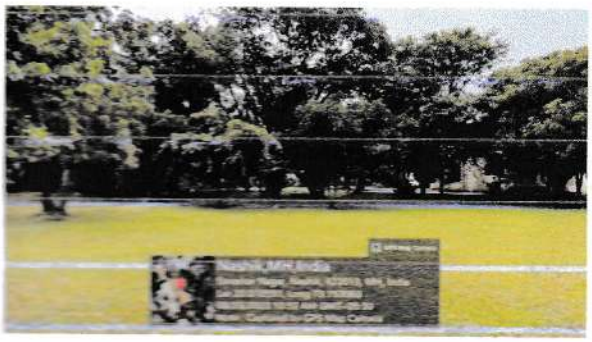
Intent Native vegetation is well adapted to the climate and provides excellent hold against erosion, sediment, and provides dust and pollution control. Hence there is preservation of topsoil and existing vegetation.

The Land was Barren land and 25 new trees are planted on the site.

** Separate annexure attached along with report, which specifies the number and types of trees planted in the campus.*

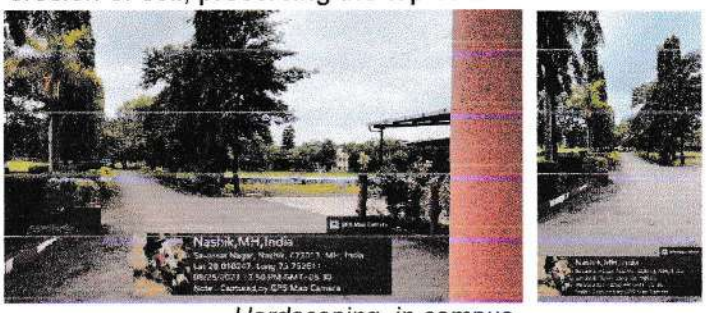
Methods incorporated on site:-

1. Provision of lawns (soft-scaping), which not only holds the top soil but also helps penetration of rainwater into ground. Green cover on the site checks soil erosion.



Lawns & Flower Beds

2. Hardscaping provided in the form of Tar Roads, grit and stone slabs, which reduces the erosion of soil, preserving the top soil.



Hardscaping in campus

3. Plantation of native varieties of plants and selection of such varieties has been done that consume not only less water for their growth but also belong to the microclimate and local vegetation. Some trees are like Mango, Neem, Coconut, Gulmohar, Palm, Amla, Bel, etc.can be seen on campus

Plants on campus

4. **Water efficiency**

Water efficiency can be described as the accomplishment of a function, task, process, or result with the **minimal** amount of water feasible. An indicator of the relationship between the amount of water required for a particular purpose and the amount of water used or delivered. It differs from water conservation

in that it focuses on reducing waste. A proposition is that the key for efficiency is reducing waste not restricting use. It also emphasizes the influence consumers can have in water efficiency by making small behavioral changes to reduce water wastage and by choosing more water efficient products. Examples of water efficient steps include simple measures like, fixing leaking taps, by consumers.

Methods incorporated:

a) Water efficient Landscaping: - The water required for landscaping is given through pipe systems provided and drip irrigation systems.

Drip irrigation system

b) Innovative wastewater technologies: - Rain water harvesting system incorporated provision of recharge pits on site done.

Rain Water Harvesting system

c) Water use reduction: - Efficient control measures adopted provision of float valves, water meter to keep a check on inflow and control of water.

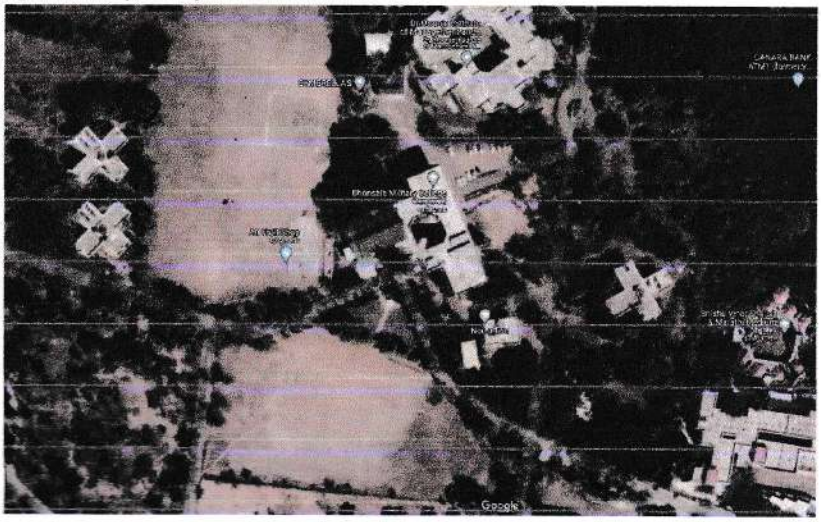
2.2 Site Selection

Site selection criteria in India, specifies the following criteria that are listed. The table below confirms these criteria with respect to the proposed site. As the site does not have any of the following parameters, it is suitable for development.

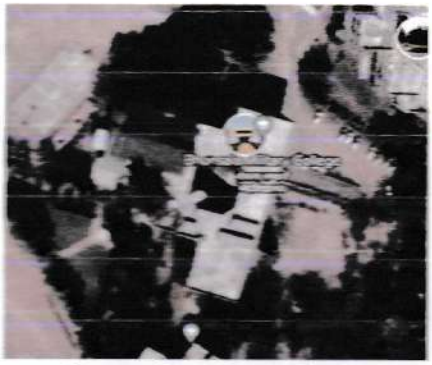
Is a prime farm land	No
Elevation is lower than 5'above the elevation of 100-year flood levels	No
Land specified as habitat for any species by wildlife Institute of India	No
Within 100' of any wetland	No
Prior to acquisition was allotted for any public parkland	No

Strategies incorporated to Reduce Site Disturbance

- Open spaces adjacent to building is more than the building footprint
- Preservation of topsoil
- Saving existing site vegetation
- Compact parking provided
- Maximum (75%) of indoor areas are day lit, by effective building orientation.
- Water reuse and landscape irrigation scheme is intimately tied with the site design and open spaces allotted.



Sufficient Open areas



Preservation of top soil.

Separate Parking facilities

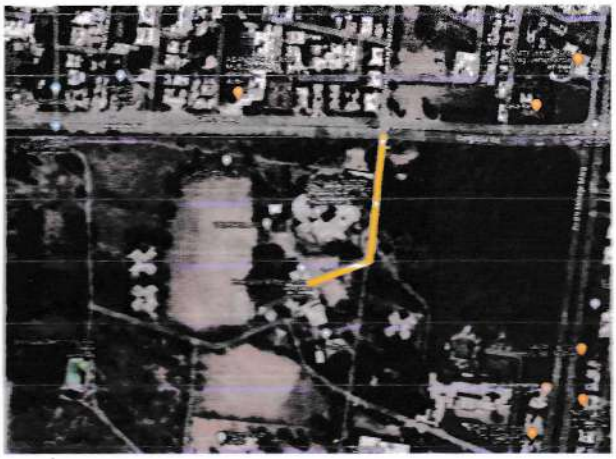
Effective use of day lighting by orientation of building; ample day light in the reading areas

2.3 Development density and community connectivity

The college premises are located on the outskirts of Nashik, which is the major connecting city with rail, road and bus connectivity. The public density is very less. Though there are community developments around the premises that help in functioning of day-to-day activities.

2.4 Alternative transportation

Public transportation Access Project 3.5 km from the nearest railway station well accessed by public bus network systems and campus bus lines used by occupants.



Transit systems

- Railway station 14.4 km
- Mass transit (City Bus Stop) 100 m
- Building within 1/2mile of Residential zone/neighborhood.
- Basic services Include: - Bank, Convenience store, Place of worship, Laundry, Medical, Pharmacy, Post Office, Cleaners, Restaurant, Beauty center.

Pedestrian access to nearly all the services mentioned above.

3. STRATEGIES INCORPORATED IN BUILDING

3.1 Innovative wastewater technologies

3.1.1 Storm water Design

Strategies incorporated

Pervious paving systems reduce storm water runoff by allowing precipitation to infiltrate the undersurface through voids in the paving material these systems are applied in the pedestrian traffic surfaces. Use of these alternative surfaces such as, pervious pavements/ grid pavers and technique such as rainwater recycling are incorporated, to reduce imperviousness and promote infiltration.

Surface type	Runoff coefficient	Area (SM)	Impervious area(SM)
Pavement, Asphalt	0.95	1000	950
Pavement, pervious	0.60	700	420
Vegetation average (1-3% slope)	0.20	5000	1000
Total area		6700	2370
Imperviousness			35.37%

Imperviousness % = Total Pervious Area (SF) / Total Site area
= 2370/ 6700
= 35.37%

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Rain water harvesting

Surface run off from various ground sources and terraces are connected to recharge pit. It helps to improve the water table of the land.

Rain water Harvesting system and recharge pit

Rain water can be harvested form terrace, and ground floor areas, for reusing in watering of lawns and flushing.

Rainwater harvesting means capturing rain where it falls or capturing the run off rain water in your own premises. The collected water is also kept clean by filtering and such design of facility that does not allow pollutants to mix with collected water.

There are three methods of water conservation.

a. Rain water collection and storage techniques.
b. Techniques to facilitate ground water recharge.
c. Soil and water conservation techniques.

Calculation of Rain water harvesting

Building population	= Students + Teaching, technical, Admin & Clerical staff
	= 2034
Water Consumption	= 45 X 2034 ..... for office use
	= 91,530 lit / day
Annual consumption	= 91,530 x 317 (Working days)
	= 2,90,15,010 lit / Annum .....A

Total rainfall catchments of academic building (Porch area +Terrace area)
= 2281+150 = 2431 sq m

Annual average rainfall of Nashik = 690.5 mm = 0.69 m

Water harvesting potential = Rainfall (mm) x Collection efficiency

Total rain water collection = 0.69 X 2431
= 1677.39 m3 / year
= 1677.39 X 1000 lit
= 16,77,390 lit/ year .....B

Water requirement that can be fulfill by rainwater harvesting (in %)

(B X 100) / A = (16,77,390 X100) / 2,90,15,010
= 5.78 %

3.1.2 Water use reduction

The water efficiency of the building is maximized which reduces the burden on municipal water supply.

The type of fixtures used in wash rooms are:-

Water closets (Indian type)

Urinals

Faucets

Metering faucets

Conclusion: -

While the baseline is good, there are many ways to exceed and achieve maximum standards, thereby achieving greater efficiency.

Methods should be adopted to reduce potable water use by including use of surface runoff water for non-potable applications. This will also benefit in reduced energy use and chemical inputs at municipal water treatment levels. The institute is using runoff water for landscaping.

Water conservation can be achieved by:-

1. Using aerated flow type taps
2. Minimizing piping distances by proper positioning of water tanks
3. Install low flow flushing cistern (3 lit per flush)
4. Install water efficient urinals
5. Use low flow irrigation systems for garden area.
6. Use the open area to collect the water through Storm water drains and use the same water for ground water recharge and also for gardening nf flushing purposes so as to reduce water dependency on other sources

3.1.3 Solid Waste and Recycling

On site, both the recyclable and the disposable wastes are segregated. Hence every recyclable item has the opportunity to be diverted from the waste and to be sent to landfill.

Composting is also available offsite. All the biomass of the campus is converted into compost.

Annual extrapolation of each waste category (by mass)

A. Solid waste

Building population = 2034 (Students, Teachers, Admin & Clerical staff)

Solid waste generation = 0.042 cu m X 2034 persons
= 85.42 cum

A septic tank is provided to treat the waste.

Location of Septic Tank

B. Organic waste

Total plot area of site is 40500.00 sq m. 50% of site is landscaped. There are only 10 evergreen tree verities planted in a front open area. Other landscaped area is covered with lawn and few shrubs are planted along the pathway. Organic waste generated by these plants is disposed off in trenches made in the campus. Manure created by this waste is used for the landscaped area.

Location of Compost Tank

C. Paper, Newsprint, and Cardboard

About 700-800 kg per year of the garbage by mass found to be recyclable paper including cardboard and newsprint. Recyclable mixed paper and newsprint represent a strong opportunity for diverting a significant

portion of Institute's waste and lowering its carbon and deforestation footprints. Some of the most common paper items from the college area that include: copy/printer paper, newspapers, and paper packaging. This waste paper is sending for recycling through the venders in city.

D. E- waste

E – Waste is created in the form of CDs. Those are used artistically to create statues, structures, mementoes etc. Thus it avoids their entry in dump yards.

3.1.4 Solar Energy:

Solar energy is radiant light and heat from the Sun that is harnessed using a range of ever-evolving technologies such as solar heating, photovoltaic, solar thermal energy, solar architecture, molten salt power plants and artificial photosynthesis. It is an essential source of renewable energy, and its technologies are broadly characterized as either passive solar or active solar depending on how they capture and distribute solar energy or convert it into solar power. Active solar techniques include the use of photovoltaic systems, concentrated solar power, and solar water heating to harness the energy. Passive solar techniques include orienting a building to the Sun, selecting materials with favorable thermal mass or light-dispersing properties, and designing spaces that naturally circulate air.

The building has 20 KW Solar power plant of PV Modulus of VIKRAM make and Solar grid Inverter of SMA make. Modules are mounted on GI Frame with all the cable and accessories.

It has 1 inverters of 20 KW on rooftop of main building.

Roof Top Solar Panels and Inverters

Solar energy calculations:

The solar PV energy Output is given by a global formula

E = A x r x H x PR

Where,

A = Total Solar Panel Area = 250 Sqm.

r = Solar Panel yield = 6.54%

H = Annual Average radiation on tilted panels = 2098.75 KWh/m^2.an

PR = Performance ratio = 0.75

Therefore,

E = 250 x 6.54 x 2098.75 x 0.75 = **25,735.92 KWh/an.**

Daily energy output = 25,735.92 / 365

A = 70.51 KW.

Monthly average Unit Consumption by building = 1352 units = 1352 KWH

Estimated daily energy consumption = (1352/30)

B = 45.07 KW

Surplus Energy generated = **A – B** = 70.51 – 45.07 KW

= 25.44 KW

Hence **25.44 KW** surplus energy is generated by employing solar PV panels on roof top.

4.0 Indoor environment

4.1 Heat Island Effect

This occurs when warmer temperatures are experienced in urban landscapes, compared to adjacent rural areas as a result of solar energy retention on constructed surfaces. Principal surfaces that contribute to heat island effects are streets, sidewalks, pathways, parking lots and buildings.

- Strategies incorporated:
- Provision of shady trees within the premises
- Ground cover in the form of landscape, plantations

Use of light colors on façade to reflect light and heat
Use of light colored ground covers and landscapes to reduce heat island effect.

4.2 Light pollution reduction

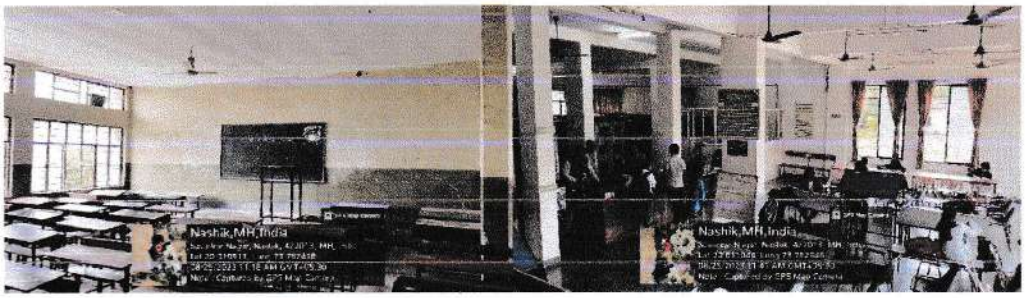
Details of lighting source:- Lighting fixtures and lamps (Artificial lighting)

Descriptions	Value
Wattage	28
Base	Tube
Diameter	16mm
Length	1149mm
Colour Temperature	4000
EEL	A+
Manufacturers Part Number	63948655
Part L Compliant	No

Part Number: F28T5/84 PHI

Use of single 20 W LED Tube & single tube 40 W, 230 V fluorescent light fixtures in the indoor areas. Average artificial lighting lux of **1011 lux** is observed inside the building. Which is well under limit set by National building code.

Separate annexure attached along with report, which specifies the LUX levels at all the rooms in Building. *(Annexure I)*



The above pictures show ample natural light conditions in the rooms

Conclusion: -

The above calculations measure the lux level of artificial lights provided in the rooms. It must be noted that the building has sufficient, unobstructed, natural light from all sides, which brings in plenty of sunlight in the indoor spaces specially class rooms and labs. The natural light available in the rooms is around 1000 lux, which makes it comfortable to use the space during day time, without artificial lights. *(Also shown in pictures above)*. The artificial lights hence support during cloudy weather days.

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5.0 Estimated Energy consumption

5.1 Energy Consumption

Electricity for light, fan and laboratory equipment's is the main energy consumption in this institute. There is no hot water supply in the premises. Ample amount of natural light as already shown reduces the dependency on artificial lights, and consequently energy.

5.2 Indoor Environment

Major part of building faces east and south side. Classrooms along these two sides are also facing courtyards from internal side. Bilateral lighting system provides adequate natural light and cross ventilation for these most occupied spaces during working hours. Most of the laboratories are facing north – west are also getting sufficient light.

This campus is located 3 km away from major highway. Adjoining road is internal road with very less vehicular traffic. Students are using public transport or buses provided by institution itself. Also the site is surrounded by farmland. Hence there is no sound and air pollution observed.

5.3 Carbon foot print of institution

Emission factors

Sr. No.	Item	Emission factor
1	Electricity	0.85 kg CO_2 per KWh
2	Petrol	2.27 kg CO_2 per liter
3	Diesel	2.68 kg CO_2 per liter
4	LPG	2.99 kg CO_2 per kilogram

Source:

1. CO_2 emission factor database, version 06, CEA (Government of India), http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
2. Emission factors are taken from the file "Emission factors from across the sector -tool", extracted from http://www.ghgprotocol.org/calculation-tools/alltools

Annual consumption of resources

- Electricity required per year = 1352 X 12 months = 16224 Kwh
- Petrol required per year = 0 lit. X 12 months = 0 lit.
- Diesel required per year = 700 X 12 months = 8400 lit.
- LPG required per year = 7.5 kg X12 months = 90 kg

*Above information is facilitated by administration Dept. of institute.

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Actual carbon footprint

1. Electricity = 16224 X 0.85 = 13,790.40
2. Petrol = 0.00 X 2.27 = 0.00
3. Diesel = 8400 X 2.68 = 22,512.00
4. LPG = 90.00 X 2.99 = 261.10
5. Total (1+2+3+4) = 36,571.50.00 kg i.e. 36.57 ton
6. 36.57 ton / 2034 (no of persons) = **0.018 ton per person**

6.0 Suggestions

Strategies that can make building energy efficient:-

6.1 Solar energy

A building which not only makes use of efficient building technology but is also geared to energy savings potential, is completed by a façade which apart from its conventional function also contributes to energy generation. India is blessed with ample sunlight that can be effectively harvested throughout the year. Solar energy if properly harvested can reduce the burden on energy consumption of the buildings, adding on to considerable savings for the users.

If photovoltaic panels be installed, it will save on electricity consumption of building.

Solar energy calculations:

Average photovoltaic cell energy output = 0.15 Kwh / Sq.m

Total sunlight hours / day = 7 hours

Daily energy output = 0.15 X 7 = 1.05 Kw / Sq.m

Area of photovoltaic cell = 20 X 2.40

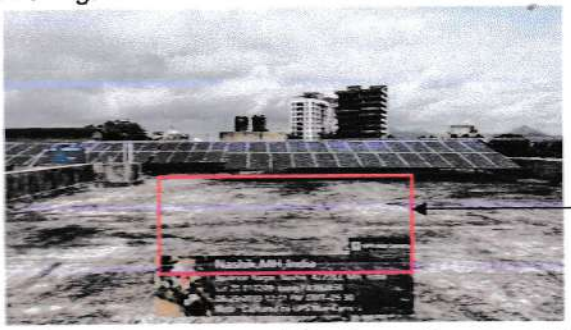
= 48 sq m

Energy output = 48 X 1.05

Energy output = 50.4 Kw

Hence 50.4 Kw energy can be generated by employing only 8' long solar PV panel on the southern side of building. This can bring in considerable savings and make building green.

In addition, if Solar panels are placed on the West facades also this will also add on to capture and conversion, and effective harnessing of solar energy to reduce energy consumption of the building.



Addition of solar PV panels on the western and Southern sides can reduce the energy load of building

6.2 Implementation of green wall

A **green wall** is a wall, either free-standing or part of a building that is partially or completely covered with vegetation and, in some cases, soil or organic growing medium plants reduce overall building temperatures which helps reduce energy consumption.

7.0 Conclusion

1. The building performs satisfactorily on the criteria studied through this report. The microclimate solves various heat gain issues which are otherwise an issue in sites which are in urban areas.
2. The site does not pose connectivity issues and is equally connected through, bus and road networks.
3. There have been measures undertaken by the designers and authorities to add on the existing plantation of the site, and to conserve top soil by landscaping. However, if ground cover and landscaping is increased which is possible by landscaping of open areas around the building this will help in reducing the heat island effect of the building thereby contributing towards the microclimate.
4. The surrounding area lack the storm water drainage system which is vital in ground water recharge and will help the water dependency on municipal supply.
5. The segregation of waste is a factor where it needs to work on positively as the organic waste generated by the site is treated at compost pit near the mess. New composting methods such as pipe composting or NADEP Composting can also be taken by institute to prepared manure which will be reused for gardening and landscaping purpose and will make the campus more green.
6. The building is very well oriented to fetch maximum day light in all indoor major function areas such as classrooms and labs. This saves on considerably on artificial lighting requirements.
7. The institute measures and disposes the E-waste generated by selling to scrapyard.
8. The paper waste generated is being reused and sent to the recycling agencies instead of being burnt, thus helping and maintaining the green environment.
9. RO plants with water coolers are located at all suitable locations.
10. No seepages were observed in the building premises.
11. Energy efficient computers and monitors have been procured. Approximately less than 1% computers are having CRT screen. Rest all is having TFT monitors.
12. Electronic communication is encouraged to minimize usage of papers.
13. Most of the paper waste generated by the campus is reused for doubled sided printing.

14. Air Conditioning usage is only limited less than 1% in the campus, thereby making it more 'Green'.
15. The garden areas partly use pipe line irrigation system and partly use Drip irrigation.
16. The provision of impervious floors in the outdoor areas can further be increased by which ground water table of water will benefit, as of now it is only 65%, which should be increased to 90%, by employing perforated pavers, grass joints etc.
17. The building must replace the existing fluorescent tube lights to LED light fixtures which will help in reducing the electricity consumption to a large extent. For this institute has taken steps and ordered LED tube lights.
18. The building is also harnessing solar energy which is very welcoming.
19. Students and Staff members are totally aware of pollution that is caused by use of vehicles & bicycles as no vehicles are allowed with in the campus. Still a carbon consumption awareness programme must be undertaken to check and improve the carbon emissions at individual as well as campus level so that it avoids Air and Noise pollution in the campus due to vehicles or any activity in it.
20. The Institute must also provide Solar panels and harness lighting that can be used to lit outdoor areas of campus. Solar lights in the campus can also be provided. It can reduce electrical bills and contribute to Carbon neutrality.
21. The Institute must also take measures to install water closets and fixtures that use less water. Similarly, all the fixtures of the toilets which have water leakage must be checked and replaced. This will not only help in achieving maximum standards, but also greater efficiency.
22. The sewage water is disposed of through storm drainage to the municipal waste water line. However, the human intake in premises being very high, it is advisable to propose Sewage Treatment plant which will save the requirement of local water tankers and treated STP water can be used for gardening applications
23. For barrier free access, the ramp need to be provided in the campus at each floor, provision of barrier free toilets, equipped with grab bars and must be done.

CERTIFICATE

This is to certify that the Green Audit for year 2023-2024 for the **'Bhonsala Military College, Nashik'.** was done by us. The building performs well on the criteria's studied through this report. We have covered the area of environmental consciousness, energy conservation, waste management, use of renewable energy, water efficiency etc. All necessary data is provided by institute and the analysis is enclosed in the report.

The aim of conducting green audit is to check the demand on non-renewable resources, check the utilization efficiency of these resources when in use, and check reuse, recycling, and utilization of renewable resources.

While the baseline is good, there are many ways to exceed and achieve maximum standards, thereby achieving greater efficiency of the buildings energy performance, which are mentioned in the Report.

AJINKYATARA CONSULTANTS Architects & Engineers NASHIK

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References

No. of Teaching staff	No. of Non-teaching staff
89	65

Total no. of students in campus = 1880

Total occupancy in the campus = 2034

Documents enclosed:

1. Annexure I: Light levels and electrical points in the rooms.
2. Annexure II: List of trees planted in the campus

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Annexure I:

Sr. no.	Room	Artificial light			Fan	Power Points		MCB	LUX level			
		Fixture	lumens/ fixture	no. of fixtures		3 pin	power points			Near window	Centre of the Room	Passage/ Entrance Side
1	Principal Office	Tube Light		1	1		5		With Lights on			
		LED Tube light		2					Without Lights	300	60	130
2	Room	Tube Light			1		2		With Lights on			
		LED Tube light		2					Without Lights	280	40	110
3	Sever Room	Tube Light		1			8	1	With Lights on			
		LED Tube light		3					Without Lights		100	
4	Room	Tube Light		2					With Lights on			
		LED Tube light		4					Without Lights	265	70	50
5	Adiminstrative Office	Tube Light		4	11		32		With Lights on			
		LED Tube light		7					Without Lights	300	80	40
6	Class Room	Tube Light							With Lights on			
		LED Tube light		3					Without Lights	280	80	60
7	Class Room	Tube Light		2	4				With Lights on			
		LED Tube light		2					Without Lights	500	150	50
8	Class Room	Tube Light		2	4				With Lights on			
		LED Tube light		3					Without Lights	1500	80	60
9	Class Room	Tube Light		3	3				With Lights on			
		LED Tube light		1					Without Lights	1800	50	50
10	Class Room	Tube Light		2	4				With Lights on			
		LED Tube light		3					Without Lights	2100	60	40
11	Class Room	Tube Light		1	5				With Lights on			
		LED Tube light		4					Without Lights	2250	80	20
12	Liabrary	Tube Light		4	17		50		With Lights on			
		LED Tube light		12					Without Lights	5300	100	20
13	Exam Room	Tube Light		3	5				With Lights on			
		LED Tube light		3					Without Lights	2100	50	60
14	Hostel Office	Tube Light		1	2		10		With Lights on			
		LED Tube light		1					Without Lights	4100	70	400
15	Class Room	Tube Light		3	5				With Lights on			
		LED Tube light		1					Without Lights	3450	80	340

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Sr. no.	Room	Artificial light			Fan	Power Points		MCB	LUX level			
		Fixture	lumens/ fixture	no. of fixtures		3 pin	power points			Near window	Centre of the Room	Passage/ Entrance Side
16	Seminar Hall	Tube Light			14				With Lights on			
		LED Tube light		21					Without Lights	2000	50	100
17	Class Room	Tube Light		2	4				With Lights on			
		LED Tube light		1					Without Lights	1800	60	140
18	Class Room	Tube Light		3	5				With Lights on			
		LED Tube light		3					Without Lights	2100	90	155
19	Chem Dept. Lab	Tube Light			6		30		With Lights on			
		LED Tube light		1					Without Lights	1600	150	60
20	Class Room	Tube Light		1	3				With Lights on			
		LED Tube light		2					Without Lights	1750	180	40
21	Class Room	Tube Light			3				With Lights on			
		LED Tube light		4					Without Lights	1450	160	60
22	Dept. Of Chemistry	Tube Light		2	3		4		With Lights on			
		LED Tube light		3					Without Lights	1200	50	380
23	Room	Tube Light			1				With Lights on			
		LED Tube light		3					Without Lights	1400	40	350
24	Staff Room	Tube Light			4		4		With Lights on			
		LED Tube light		4					Without Lights	1000	50	460
25	Class Room	Tube Light			4				With Lights on			
		LED Tube light		3					Without Lights	1400	80	450
26	Class Room	Tube Light			3				With Lights on			
		LED Tube light		4					Without Lights	1430	60	420
27	Class Room	Tube Light			4				With Lights on			
		LED Tube light		4					Without Lights	1380	50	450
28	Geograohy Dept.	Tube Light		3	6		8		With Lights on			
		LED Tube light		4					Without Lights	1000	150	45
29	Class Room	Tube Light		1	3				With Lights on			
		LED Tube light		2					Without Lights	900	130	30
30	Commerse Dept.	Tube Light		2	5				With Lights on			
		LED Tube light		5					Without Lights	150	60	200
31	Class Room	Tube Light		3	2				With Lights on			
		LED Tube light							Without Lights	200	80	170
32	Class Room	Tube Light		1	5				With Lights on			
		LED Tube light		3					Without Lights	150	50	30

Sr. no.	Room	Artificial light			Fan	Power Points		MCB	LUX level			
		Fixture	lumens/ fixture	no. of fixtures		3 pin	power points			Near window	Centre of the Room	Passage/ Entrance Side
33	Class Room	Tube Light			3				With Lights on			
		LED Tube light		2					Without Lights	160	40	30
34	Class Room	Tube Light		1	3				With Lights on			
		LED Tube light		3					Without Lights	240	75	20
35	Class Room	Tube Light		2	4				With Lights on			
		LED Tube light		2					Without Lights	210	50	25
36	Class Room	Tube Light		3	2				With Lights on			
		LED Tube light							Without Lights	240	65	40
37	Class Room	Tube Light		1	2				With Lights on			
		LED Tube light		2					Without Lights	200	80	20
38	Class Room	Tube Light			2				With Lights on			
		LED Tube light		4					Without Lights	450	90	50
39	Dept. of Defence	Tube Light		2	4		6		With Lights on			
		LED Tube light		3					Without Lights	510	90	39
40	Class Room	Tube Light			3				With Lights on			
		LED Tube light		3					Without Lights	600	80	30
41	Class Room	Tube Light		1	4				With Lights on			
		LED Tube light		2					Without Lights	4500	150	50
42	Math Dept.	Tube Light			2				With Lights on			
		LED Tube light		3					Without Lights	5100	210	70
43	Room	Tube Light			2		12		With Lights on			
		LED Tube light		2					Without Lights	500	100	200
44	Psychology Dept.	Tube Light		2	5		4		With Lights on			
		LED Tube light		10					Without Lights	2700	80	1100
45	Room	Tube Light		1	1				With Lights on			
		LED Tube light		2					Without Lights	2670	110	1400
46	XII th Science Class room	Tube Light			2				With Lights on			
		LED Tube light		4					Without Lights	2550	140	1300
47	Class Room	Tube Light		2	8			1	With Lights on			
		LED Tube light		7					Without Lights	2100	220	30
48	Botany	Tube Light		3	4		2		With Lights on			
		LED Tube light		6					Without Lights	900	150	40
49	Class Room	Tube Light			4				With Lights on			
		LED Tube light		3					Without Lights	800	140	40

Sr. no.	Room	Artificial light			Fan	Power Points		MCB	LUX level			
		Fixture	lumens/ fixture	no. of fixtures		3 pin	power points			Near window	Centre of the Room	Passage/ Entrance Side
50	Class Room	Tube Light		2	5			1	With Lights on			
		LED Tube light		1					With Lights on	190	170	25
51	Class Room	Tube Light			4				With Lights on			
		LED Tube light		2					Without Lights	230	180	30
52	Political Science	Tube Light			1		2		With Lights on			
		LED Tube light		2					Without Lights		120	1500
53	Class Room	Tube Light		2	5				With Lights on			
		LED Tube light		3					Without Lights	250	40	1300
54	Class Room	Tube Light		1	5				With Lights on			
		LED Tube light		4					Without Lights	1800	250	3100
55	Exam Room	Tube Light		1	5				With Lights on			
		LED Tube light		2					Without Lights	1600	250	2600
56	Class Room	Tube Light		4	3				With Lights on			
		LED Tube light							Without Lights	1800	350	2400
57	Class Room	Tube Light			4			1	With Lights on			
		LED Tube light		7					With Lights on	750	650	90
58	Class Room	Tube Light			4				With Lights on			
		LED Tube light		4					Without Lights	820	510	50
59	Class Room	Tube Light			4			1	With Lights on			
		LED Tube light		8					Without Lights	3100	120	50
60	Class Room	Tube Light			5				With Lights on			
		LED Tube light		2					Without Lights	2800	150	60
61	C.C.E(Cell For Competetive Exam)	Tube Light		7	4	2			With Lights on			
		LED Tube light							Without Lights	3500	250	1300
62	Room	Tube Light		1	2				With Lights on			
		LED Tube light							Without Lights	3200	310	1350
63	Dept. of Physics	Tube Light		9	13		32	1	With Lights on			
		LED Tube light		5					Without Lights	1850	173	172
64	T.Y.B.Sc Class Room	Tube Light		2	2		5		With Lights on			
		LED Tube light		1					With Lights on	6000	290	172
65	Class Room	Tube Light		2	7				With Lights on			
		LED Tube light		2					Without Lights	8300	340	100
66	Class Room	Tube Light		1	5				With Lights on			
		LED Tube light		4					Without Lights	7885	285	120

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Sr. no.	Room	Artificial light			Fan	Power Points		MCB	LUX level			
		Fixture	lumens/ fixture	no. of fixtures		3 pin	power points			Near window	Centre of the Room	Passage/ Entrance Side
67	Class Room	Tube Light		5	5		5		With Lights on			
		LED Tube light		0					Without Lights	4650	660	390
68	Class Room	Tube Light		2	3				With Lights on			
		LED Tube light		2					Without Lights	4600	565	340
69	IT Dept.	Tube Light		1	5	98		1	With Lights on			
		LED Tube light		3					Without Lights	850	230	35
70	B.Sc Computer Class Room	Tube Light		1	3				With Lights on			
		LED Tube light		2					Without Lights	780	220	35
71	Class Room	Tube Light			7		120	2	With Lights on			
		LED Tube light		10					With Lights on	600	175	25
72	Class Room	Tube Light			4				With Lights on			
		LED Tube light		3					Without Lights	550	140	30
73	English Dept.	Tube Light			2				With Lights on			
		LED Tube light		2					Without Lights		360	450
74	Class Room	Tube Light		2	3				With Lights on			
		LED Tube light		3					Without Lights	3400	250	1750

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Annexure II
List of Plants

Sr.No.	NAME OF THE PLANT OR TREE	NUMBERS OF TREES/PLANTS
1	Acacia auriculiformis Benth	38
2	Acacia catechu Willd	47
3	Acacia leucophloea (Roxb) Wild.	36
4	Aegle marmelos(L) Corr.	5
5	Albizia lebbeck (L) Corr.	28
6	Albizia procera (Roxb)Benth.	12
7	Annona reticulata L.	10
8	Annona squamosa L.	16
9	Araucaria heterophylla	3
10	Atrocarpus heterophyllus Lam.	1
11	Azadirecta indica L.	98
12	Bauhinia recemosa Lam	36
13	Bauhinia verigate L.	32
14	Bombax ceiba L.	10
15	Butea monosperma (Lam)	1
16	Caesalpinia pulcherima(L.)	1
17	Callistemon lanceolatus (Smith)	3
18	Capparis grandis L.	2
19	Carissa carandas	1
20	Caryota urens L.	16
21	Cassia fistula L.	30
22	Cassia siamea L.	22
23	Casurinia equisetifolia L.	40
24	Ceiba pentandra (L.) Gart.	15
25	Cocas nucifera L.	5
26	Dalbergia sissoo de candolle	50
27	Delonix regia (Hook.) Raf	38
28	Dendrocalamus strictus (Roxb) Nees	45
29	Dypsis lutescens (H.Wendl.)Beentje and Dransf	15
30	Emblica officinalis Gaertn	6
31	Erythrina indica	1
32	Eucalyptus globulus Labill.	60
33	Ficus benghalensis L.	4
34	Ficus recemosa L.	3
35	Ficus religiosa L.	4
36	Gliricidia sepium (Jacq.)Kunth ex Walp	8
37	Grevillea robusta A. Cunn.ex .R.Br.	2
38	Jacaranda mimosifolia D.Don	9
39	Khaya senegalensis (Desrousseaux) A Jussieu	4
40	Laucaena latisiliqua L. Gillis	12
41	Madhuca longifolia (J.M.Macbr)	17
42	Mangifera indica L.	24
43	Manilkara hexandra (Roxb)Dubard	2
44	Manilkara zapota (L.)P. Royen	1
45	Melia azadarach.	6

Sr.No.	NAME OF THE PLANT OR TREE	NUMBERS OF TREES/PLANTS
46	Michelia champaka L.	2
47	Millingtonia hortensis Linn.	36
48	Niolamarkia cadamba (Roxb)	6
49	Nyctanthus arbr-tristis L.	2
50	Peltophorum pterocarpum (DC) Baker ex K.Heyne	25
51	Phyllanthus acidus (L.)K.Skeels	1
52	Pithecllobium dulce (Roxb.) Benth	4
53	Plumeria alba L.	20
54	Polyalthia longifolia (Sonn)	53
55	Pongamia pinnata (L.)Thw	5
56	Psidium guajava (L.)	6
57	Punica granatum L.	1
58	Roystonia regia (Kunth) O.F. Cook	42
59	Samanea saman (Jacq) Merr.	2
60	Santalum album L.	35
61	Senegalia chundra (Roxb.Ex Rottl)Willd	12
62	Spathodea campanulata Palisot de Beauvious	8
63	Syzygium cumini (L.) Skeel	6
64	Tabebuia argentea (Bur.and Schum) Britt	10
65	Tamarindus indicus L.	20
66	Tecoma grandis L.F.	8
67	Tecoma stance (L.)	10
68	Terminalia arjuna	1
69	Terminalia catappa	6
70	Thespesia populnea (L.) Soland	3
71	Vitex negunda L.	6
72	Ziziphus mauritiana Lam	20