GREEN AUDIT REPORT FOR

ACHARYA NARENDRA DEVA UNIVERSITY OF AGRICULTURE & TECHNOLOGY

Kumarganj, Ayodhya-224229, Uttar Pradesh



Carried For For Academic Year 2021 - 2022

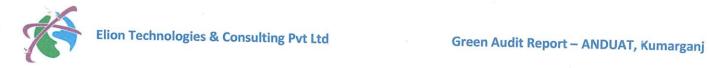
Carried Out By



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1. INTRODUCTION

Acharya Narendra Deva University of Agriculture and Technology (ANDUAT), formerly Narendra Deva University of Agriculture and Technology (NDUAT), is a university located in Kumarganj, Uttar Pradesh, India, established in 1975. It is named after the politician and educator Narendra Deva, who served as vice chancellor of the University of Lucknow and Banaras Hindu University. It has constituent colleges in Ambedkar Nagar district and Azamgarh district.

The foundation stone of was laid on 15 January 1974, by Prime Minister Indira Gandhi at Mashodha near Faizabad. Laxmi Narain Rai was the first officer on special duty, succeeded by A.S. Srivastava in October 1974 and by the first vice-chancellor, A.D. Pandey in October 1975. In the same year the government of Uttar Pradesh decided that the main campus of the university would be established at Kumarganj, (Faizabad) Ayodhya instead of Mashodha. The university started functioning in a borrowed building of Gram Swalambi Vidyalaya Acharya Nagar, Naka, Faizabad.

Elion Technologies and Consulting Pvt Ltd (Elion) team carried out the green audit of premises. During the audit Elion team carried out visit of entire campus i.e. classrooms, library, washrooms, staff rooms, administration department, accounts department and hostels.

Campus Information

University constitutes various colleges which offers graduation, post-graduation and research program in field of agriculture, horticulture & forestry, veterinary science, community science, agri business, fisheries and bio technology.

Total cover area ground- 193 Hectares Total Green area- 135.1 Hectares

Building Name	Areas (m²)	Number of Floors
College of Agriculture	22000	Four
College of Veterinary Science	16000	Three
College of Fisheries	6200	Two
College of Horticulture & Forestry	8395.1	Three
College of Community Science	3300	Three



Boys Hostel (12 Buildings)	33000	Three/Two
Girls Hostel (4 Buildings)	4000	Two
Residential Quarters	60000	Two
Administrative Building	8395.1	Three
Vice Chancellor Residence	500	Two
Guest House (Two Numbers)	3000	Three
Kisaan Bhawan (Two Buildings)	4000	Three
Institute of Bio – Technology	5931	Two
Auditoriums (Two Numbers)	3000	Two
College of agri business	3200	Three
Stadium	15000	Two
NDDAV School	16000	Two
Nehru Library	1500	Two

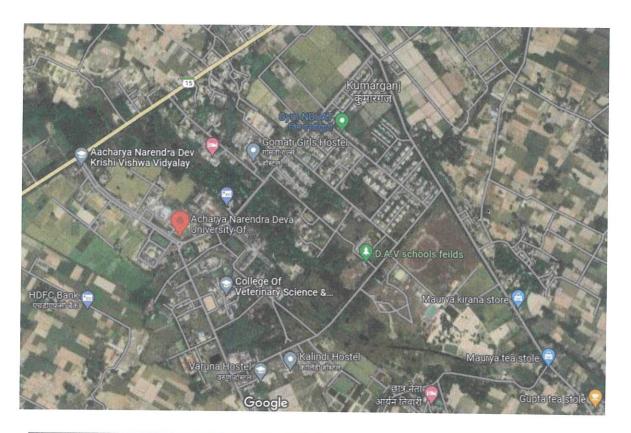
List of personal interacted during audit

Name	Designation
Dr. A.K. Singh	Associate Professor/DAM
Shri Om Prakash	Executive Engineer
Shri Shyam Sunder Singh	Assistant Engineer

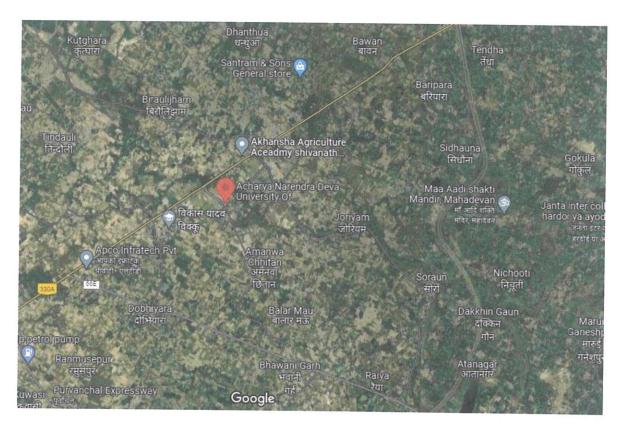


2. ENVIRONMENTAL SETTING

The land use around the campus is mainly comprises of residential and agricultural land. The campus is located in Kumarganj region with lush green area.



Acharya Narendra Dev University of Agriculture & Technology



Location of Acharya Narendra Dev University of Agriculture & Technology



3. GREEN AUDIT

For Green Audit following 13 major areas (including their subsections) were covered and compliance/initiatives under these areas were verified/validated.

- a) Good Daylight Design and Ventilation
- b) Water Efficiency
- c) Wastewater Management
- d) Indoor Air Quality
- e) Energy Efficiency
- f) On-site Energy Generation
- g) Temperature and Acoustic Control
- h) Paper Waste Management
- i) E-Waste Management
- j) Canteen and Solid Waste Management
- k) Universal Access and Efficient Operation and Maintenance of Building
- I) Green Belt
- m) Green Programs (Green initiatives)

3.1 Good Daylight Design and Ventilation

- a) Corridors are wide with good ceiling height. All the corridors receive good daylight.
- b) Curtains are provided on some of the windows to avoid glare.
- c) Laboratories are provided with exhaust fans to disperse heat, fumes and odours.
- d) Stair cases receive daylight through windows provided at various levels.
- e) Classrooms, Labs and Library have large windows. Windows are kept open to adequate daylight.
- f) Classroom walls, corridors and labs are white-washed, this enhances the daylight received.





Daylight in stair cases and corridors





Classrooms & Labs receiving daylight

3.2 Water Efficiency:

- a) Main source of water is bore well and water is stored in the overhead tanks.
- b) For drinking, water coolers are provided in each building.
- c) Rain water harvesting system is installed for buildings in the campus.
- d) Water conservation faucets in washrooms were not seen. Installation of such faucets can save water and will help in minimizing the water footprint of the institute.
- e) Normally mops are used for floor cleaning and hose is used for cleaning once a week.
- f) Dual flushing system is provided in the washrooms.
- g) Signage are not provided in washrooms emphasizing water conservation.
- h) Water from air conditioning unit and reject water from water purifiers is reused within the institute for watering indoor and outdoor plants.



Rain Water Harvesting



Overhead Water Tank





Water conservation faucets are not seen

3.3 Wastewater Management:

- a) Sewage Treatment plant is not present in the campus area.
- b) Waste water is used for fish hatchery.









Waste water management



3.4 Indoor Air Quality:

Indoor Air Quality (IAQ) refers to the air quality within and around buildings and structures, as it relates to the health and comfort of building occupants. Some common indoor pollutants are listed as below:

- Molds and other allergens This may arise from water seeping into the building envelope or skin, plumbing leaks, condensation due to improper ventilation, or from ground moisture penetrating a building part.
- Volatile organic compounds (VOCs) VOCs are emitted by paints and lacquers, paint strippers, pesticides, office equipment such as copiers and printers, correction fluids and carbonless copy paper, graphics and craft materials including glues and adhesives, permanent markers, and photographic solutions etc.
- Carbon monoxide Sources of carbon monoxide are incomplete combustion of fossil fuels.
- Carbon dioxide Due to human respiration
- Particulate matter Due to construction and maintenance activities

Major observations under indoor air quality are as below:

- a) In classrooms the mode of ventilation is natural (through windows) and is enhanced by fans.
- b) Green belts have been set up in campus area and the area is surrounded by lush green environment.
- c) Heating Ventilation and Air Conditioning (HVAC) system does not exist.
- d) Indoor plants are seen in the College. Indoor plants can be plotted not only for the aesthetic appearance but also for health benefits. Refer **Annexure 1** for details.
- e) Exhaust fans are provided in labs and washroom.
- f) IAQ awareness signage was missing in college. Information on sources, impacts and mitigation of indoor air pollution to be displayed within college for increasing awareness about indoor air pollution.
- g) Indoor Air Quality tests have not been carried out. Same needs to be carried out at least once a year.











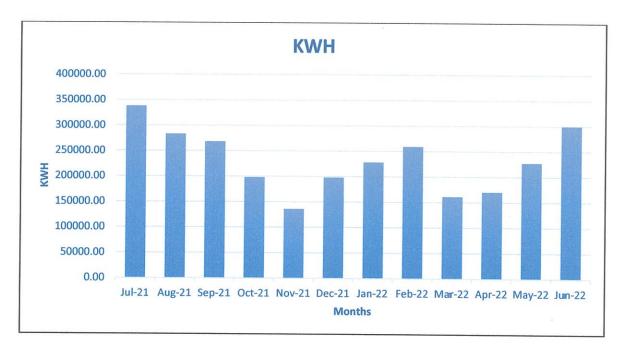
Green Campus

3.5 Energy Efficiency:

Electricity:

Power is supplied by Madhyanchal vidyut vitran nigam ltd. The major electricity consuming equipment installed in the campus are Motors, Desktop, Printer, Fan, Tube light, LED Bulb, Street Lights and research machineries (advanced machineries).

Following is details of energy consumption



It was observed that:

- a) LED tube lights & fans are installed in classrooms and labs. CFL and conventional tube lights are also used. College is in the process of replacing periodically the dysfunctional conventional tube lights with LED lights.
- b) Solar Power Plant of 750KW is installed in the campus.



Solar Panels

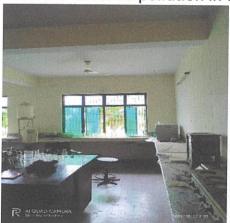


3.6 On Site Energy Generation (usage of LPG/ Natural Gas):

- a) LPG is used in canteen, mess and guest houses for cooking.
- b) Back Up diesel generators are available.
- c) Solar Power plant of capacity 750KW is provided in the campus.

3.7 Temperature and Acoustic Control

- a) White washed rooms & corridors and white/ off-white flooring improve the lighting conditions.
- b) The entire campus has green area.
- c) There is no noise pollution in the campus.









White washed rooms & corridors

3.8 Paper Waste Management:

Being academic institution, waste paper is the main solid waste generated in the premises. The College has taken steps to minimize and avoid paper usage. It was observed that:



- a) Prints and photocopies are taken on both sides of the pages to avoid excess paper usage. Rather than photocopy, digitalization (scanning) is practiced.
- b) Faculty and administration staff uses old papers and envelops for internal usages as rough work, file markers, page separators etc.
- c) Internal notices and communications are through E-mail/SMS.



Digital Communication

3.9 E-Waste Management:

- a) The campus is digitalized. This includes classrooms, library, internal mails etc.
- b) E-Waste is disposed off by selling to the vendors.

3.10 Solid Waste Management:

It was observed that:

- a) Wet waste and dry waste segregation is practiced in the premises. Separate bins are provided for wet biodegradable and dry recyclable waste.
- b) Institute has kept dustbin with markings of wet and dry waste. After collection of waste it is processed accordingly as per category of waste.



Separate Bins

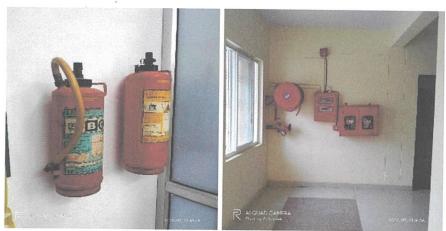
3.11 Universal Access and Efficient Operation and Maintenance of Building:

It was observed that:

- a) College is easily accessible. Staircase is provided for staff and students.
- b) Ramps are provided for specially abled.
- c) Fire extinguishers are provided in major areas for emergency. They are inspected and serviced regularly.
- d) Exit signage is not provided. This is of crucial importance during emergency.
- e) Since the access and staircases are wide and uncluttered, it is possible to have a safe evacuation during emergency.
- f) Fire Safety Training is not given to the staff. Fire safety training shall be provided for staff members on annual basis.



Ramps are provided



Fire extinguisher & fire hydrants are provided

3.12 Green belt/ Landscaping:

- a) Large trees are planted in the premises. Plantation also helps maintaining lower temperatures of the area. .
- b) Potted plants are also kept around the campus.
- c) Indoor plants are kept along the corridors and entrance of the building.



Potted Plants provided inside the whole campus

3.13 Green Initiatives:

Campus is regularly celebrating Environment Day, yoga Day, Festivals and other Cultural programs.









Cultural Programs



4. RECOMMENDATIONS/ SUGGESTIONS

4.1 For Improving Energy Consumption:

- a) Every classroom and lab with central switch board can have a diagram linking location of a tube light, fan etc. with corresponding switch. This will ensure that correct fitting is switched on/ off and can save time & unnecessary operation.
- b) Installation of automatic lights with sensors can be considered.
- c) Standard Operation Procedures (SOPs) should be prepared and followed for green purchasing. Equipment with star rating, using eco-friendly materials; with safe disposal policy to be preferred. Policy of returning equipment at the end of life span to the supplier to be preferred.
- d) Conduct energy audit every two or three years and determine the lux levels within College. Energy audit can help in reduction in number of light fittings/ energy usage in the College.
- e) For purchasing new electronic appliances, star rating provided by Bureau of Energy Efficiency (BEE) should be considered. The equipment which has maximum star ratings could be purchased, which will consume less energy, ensure environmental sustainability and also operate at low cost.
- f) Usage of light reflectors is recommended as the reflectors can spread light to relatively large areas.
- g) Notices/ signages can be put up/ displayed near switches and on notice boards, informing students and staff to switch off all electricals when not in use.
- h) If possible, computers should be switched off from main power connections.
- i) Control sensors can help to reduce consumption by automatically dimming lights when people are not around, and keeping blinds open to use natural light & reduce energy consumption.
- j) Raise awareness:
 - Encourage students to help in monitoring energy consumption & implement corrective actions
 - Integrate energy education into classroom learning.



4.2 Water Conservation:

- a) Provide information on water usage and savings to students/ staff through notices, screen savers in computer labs.
- b) Dry sweep or use a sponge broom when possible, instead of using a hose to clean floors, sidewalks, or other hard surfaces.
- c) Minimize/ reduce water usage by installing water saving faucets such as pressmatic taps, tap aerators, jet sprays etc.
- d) Grey water/ sewage recycling system can be installed for flushing toilets. This will reduce the fresh water footprint.
- e) Installation of waterless urinals can be considered to reduce water consumption.
- f) Water balance diagram can be prepared to quantify the water consumption by installing water meters at key points. Based on data gathered, appropriate measures can be taken to reduce the water consumption.
- g) Water conservation signages can be displayed in washrooms and drinking area.

4.3 Paper and other Solid Waste Reduction:

- a) Inventories of all solid waste generated in the premises must be maintained.
- b) Enhance recycling. This can be done by creating a group where students can recycle books, personal clothes and other material to needy students. This can be an initiative under green program.
- c) Standard Operating Procedures (SOP) for Solid and E-waste management and for recycling of waste should be prepared & practiced. The SOP's may include collection, segregation and reuse of different types of wastes, if any (e.g. biodegradable waste for composting). This will help in safe disposal of waste to recycle agencies.
- d) The college can introduce online app, which can be useful for conducting internal exams, assignment/ reports submission. This system can also be used for displaying important notices, timetables.
- e) Paper usage shall be monitored to understand the impact of digitization in the facility.
- f) Training as well as awareness programs should be organized on segregation of biodegradable waste and recycling of waste. Efforts should be taken to inform students about recycling options and signs should be posted on appropriate bins indicating what could be dumped in each bin.



4.4 Others:

- a) Environmental advisory committee could be formed. The discussions/ information sharing among different departments can generate lot of ideas and awareness on green issues.
- b) Since each student uses computer lab, the screen savers can be set up for creating environmental awareness. (Ergonomics, water conservation etc.). Short 30 second pop up can be displayed on computer screens when they are on standby mode. Or wallpapers informing students about environment conservation can be created.
- c) Maintain minutes of meetings of environmental committees; evaluate the effectiveness of various environmental programs conducted by the institutes. Set annual targets for Green Initiatives & monitor them closely. Create 'Green Champions'.
- d) Consider detailed energy audit (energy consumption, thermal emission, visual comfort) and water audit.
- e) Adopt environmentally responsible purchasing policy, and work towards creating and implementing a strategy to reduce environmental impact of its purchasing decision.

ANNEXURE 1 INDOOR GARDENING DETAILS

Indoor plants are commonly used for their aesthetics benefits but they also have vital role reducing airborne pollution. The right choice of plants can be an excellent way of improving indoor air quality and general health. Local landscape contractor can be contacted for supply and rotation of these plants.

Plants	VOC it removes	Indoor source of VOC's	Plant care
Aloe Vera	Formaldehyde, Trichloroethylene and Benzene	Chemical based cleaners and paints	Easy to grow with enough sunlight
Bamboo Plant	Formaldehyde, Trichloroethylene and Benzene	Paints, Plastics, Wood products etc.	Thrives under low light conditions as well as easy to maintain
Chinese Evergreen	Benzene	Paints	Low maintenance plant that prefers low light conditions.
English Ivy	Formaldehyde, Benzene, Air borne fecal matter particles	Wood, Paper products, Air borne fecal – matter particles from pests	Easy to maintain

Janet Craig	Formaldehyde, Benzene and Trichloroethylene	Paints, Plastics, Wood products etc.	Medium to low light tolerant plant. Requires little water for growth.
Golden Pothos or Devils lvy	Formaldehyde, Cleanses air	Exhaust fumes, carpeting materials, panelling and furniture products made with particle board	Extremely easy to maintain under low to bright light conditions. Fast growing and grows well under Fluorescent light.
Mass Cane	Formaldehyde, benzene and trichloroethylene	Paints, Plastics, Wood products etc.	Medium to low light tolerant plant. Requires little water for growth.
Snake plant	Formaldehyde and trichloroethylene	cooking fuels, wood products, facial tissues, personal care products and waxed papers	Drought resistant and Tolerates a variety Of light conditions. Hard to damage or kill.

Peace Lily	Formaldehyde, benzene and trichloroethylene	Paints, Plastics, Wood products etc.	Relatively easy to maintain. Survives in low light conditions.
Red-edged Dracaena	Formaldehyde and trichloroethylene	cooking fuels, wood products, facial tissues, personal care products and waxed papers	Drought resistant and Tolerates a variety of light conditions. Hard to damage or kill.
Spider Plant	Formaldehyde, benzene, carbon monoxide and xylene	cooking fuels, wood products, Printing	Easy to maintain under medium to bright light condition.
Parlor Palm	Purifies indoor air	-	Easy to maintain

ANNEXURE 2 GREEN AUDIT CHECKLIST

Good Daylight Design

Sr. No.	Design Feature	
1	Broad door opening	V
2	Clerestory/ High windows	V
3	Openings at the eastern and southern side	V
4	Rectangular building so that sunlight can reach all areas	V
5	Sunshade	-
6	Double or triple glazing on windows	-
7	Enough illumination	
8	Light coloured fabric curtain or blind for window covering	V
9	Operable/ openable windows	V
10	Ultraviolet (UV) filtering windows	_
11	Use of exterior louvers to control glare	_
12	Use of glass as facilitator of natural light	V
13	Use of insulated and tinted glass to filter heat gain	-

Ventilation

Sr. No.	Design Feature	
1	Downdraft cooling system (a downward flow of air)	_
2	Ceiling height	
3	Self-movement ventilators in the roof	_
4	Wide corridors	V
5	Operable windows	V
6	Use of exhaust fans	V



Temperature and Acoustic Control

Sr. No.	Design Feature	
1	Double roof	-
2	Earth air tunnel (cools air in summer and heat it in winter)	-
3	Green roof	-
4	Mud roof	-
5	Openings at the eastern and southern side	V
6	Roof with reflective tile/aluminium/asbestos	_
7	Sand stone cladding outside the walls	V
8	Special walls for temperature control (Thick/Double/cavity/fire/composite /green)	-
9	Use of cool roofing material (mineral wool, rock wool, vermiculite, foams, expanded polystyrene, extruded polystyrene etc.)	-
10	Use of daylight design (Building is constructed in such a way that diffused sunlight allows light but not the heat)	V
11	Use of insulation material (e.g. autoclaved aerated blocks, hollow blocks, Thermocrete or higher R- value material)	-
12	Use of water bodies/fountain	-
13	Climbing crooners fitted to window in sure	
14	Climbing creepers fitted to window in summer	-
15	Lime coating for cool roof	-
16	Retrofitting the existing roofs with cool roof technology White wash on the roof	-
		V
17	Use of landscaping as sound barrier	-



Water Efficiency & Wastewater Management

Sr. No.	Measures	
1	Aerators to water taps	V
2	Automatic toilet faucets	-
3	Drip irrigation (for plant watering system)	V
4	Dual flush toilet with cistern	V
5	Efficient plumbing system	V
6	Sewage treatment plant for sewage recycle	-
7	Rainwater harvesting	V
8	Regular maintenance for leakage free plumbing system	V
9.	Use of low flow/flow control water equipment or gadget	_
10	Water free urinals (No flush urinals/Zero flush urinals/Water	_
	less urinals/air based flushing system these save water used in toilet)	

Energy Efficiency and On-site Energy Generation Mechanism

Sr. No.	Measures	
1	Avoid excessive lighting	V
2	Computerized monitoring of electrical system	-
3	Integrated energy saving design for natural cooling/heating	$\overline{\mathbf{V}}$
4	On-site energy generation	V
5	Photocell occupancy sensor for automatic light control	-
6	Regular maintenance of electrical system	V
7	Use of day lighting system	V
8	Use of energy efficient equipment	M
9	Use of energy saving bulbs (Compact florescent light/LED lights)	
10	Solar panel	



Sustainable Material for Building and Interior

Strategy adopted	
Use of biodegradable material	
Use of locally sourced material	
Use of material with low embedded energy(i.e. stabilized earth	V
blocks, straw bales, stones, sand stone chips, fly ash)	
	V
Use of post-consumer recycled material	V
Use of salvaged (Discarded or refused) material	V
	V
Use of material which is simple to install without dangerous adhesive	<u> </u>
	Use of biodegradable material Use of locally sourced material Use of material with low embedded energy(i.e. stabilized earth blocks, straw bales, stones, sand stone chips, fly ash) Use of nontoxic recycled content material and furniture Use of post-consumer recycled material Use of salvaged (Discarded or refused) material Use of material which can recycled at end of useful life Use of material which is simple to install without dangerous



Waste Management

Sr. No.	Measures	
1	Sale of books to its user for minimal charges	_
2	Sale of books to store or other library	† -
3	Sale of weeded books to needy students	_
4	Send books and used papers to recycling organization	_
5	Avoid use of paper by going digital (Paper)	
6	Lessen the margins while printing	V
7	Printing on both sides of paper	V
8	Reuse of printed paper/ envelops	V
9	Segregation of dry and wet waste	<u> </u>
10	Setting up recycling area/ composting area	<u> </u>
11	Creation of specified junctions for collection of E-waste(E-waste)	
12	Donation of computers to NGO's to refurbish and give it to needy people	-
13	Hand over to organization or recycler who knows proper disposal system	-
14	Implementation of any recycling project or program	_
15	Purchase of electronic products from company's which have after sales service for the disposal of product with buyback policy	V
16	Installation of bins to collect garbage	V
17	Outsourcing recycling of garbage to agency	
18	Recreating in to new sustainable products	<u> </u>
19	Use of coloured bins with code to collect garbage	<u> </u>

Environmental Audit

Sr. No.	Type of audit	
1	Energy audit (includes energy consumption, thermal comfort, visual comfort)	-
2	Sound/ Noise audit (includes indoor noise level, outdoor noise level)	-
3	Water and waste audit (includes water quality, solid waste generation, solid waste disposal process)	-



Universal Access and Efficient Operation and Maintenance of Building

Sr. No.	Design feature	
1	Easy access to the main entrance of the building	V
2	Elevator	_
3	Preferred car park spaces for specially abled	_
4	Ramp/ stairs with handrails on at least one side	V
5	Restrooms (toilets) in common areas	V
6	Uniformity in floor level	V
7	Audio guidance for specially abled	_
8	Availability of wheel chair	V
9	Braille assistance for specially abled	-
10	Personalized services by staff for differently abled	V
11	Visual warning signage in common and exterior areas	_
12	Follow standard procedures for commissioning of	V
	electrical/plumbing system	
13	Purchase of standardized and quality material for repair	V
14	Regular maintenance of building	
15	Use of chemical free products for cleaning	V
16	User awareness program to minimize damage of property	V



Green Program

Sr. No.	Green program	
1	Buying recycled material	V
2	Creation of "Green Team" in the institution/library	-
3	Green education i.e. to become leader in environmental awareness	_
4	College conduct graduate program by library science/Any other department	V
5	Outreach relationships with local groups interested in	-
	environmental concern and satisfy their information needs	
6	Providing external membership to small and local libraries	
	(MOU with other colleges, -internal collegiate library loan)	-
7	Recycling beyond books i.e. paper, aluminum, plastic, e-waste	\checkmark
8	Reduce, Reuse and recycle of the products (At the time of disposal of library material)	\checkmark
9	Regular purchase of books/ magazines related to sustainability	\checkmark
10	Selection of material content of which informs and assesses green practices (green computing, energy conservation, organic gardening etc.)	V
11	Contribute library information on sustainability resources to a campus publication, blog or website	V
12	Creation of topical online resource guide (on sustainability etc.)	-
13	Disseminating expert advice about sustainability to other colleges to make their own college greener	-
14	E Publishing reviews of new green resources in the newsletter or news	-
15	Digitization	V
16	E-archiving	-
17	E-resources : E books, Online Journals, membership of consortium	V
18	Subscription to databases	-

