



Patna Women's College Green Audit Report

By Competent Inspectorate and Consultants Pvt Ltd



	Green /	Audit Report	
Report Number:	CIC/GAR/002	Date of Issue	3 rd July 2023
Name of the Universit	y/ Institute	Patna Women's College Bailey Rd, Veerchand Pate Patna, Bihar 800001	l Road Area,
Areas Covered Buildings/ Facilities)	(Departments/	The audit covered the 7 m up area of around 48,965.	ain buildings with a built- 51 Sqm
Audit Period		19 th to 21 st June 2023	
Name of Seni	or Auditor	Dr Ajaya Shankar Gupta	
		Dr. Rama Dasu Pittala	
Names of A	uditors	Dr. Ajaya Shankar Gupta	
Report Prep	ared by:		
		Reviewed and	Approved by
Dr Ajaya Shar	nkar Gupta	Hyd-72 Dr Rama Da	Afran asu Pittala



Contents

1.	Executive Summary: The major strengths are:	5 7
	Major areas for improvement are:	8
2.	Introduction: About PWC:	9 9
	Vision	10
	Mission Statement	10
	Core Values	10
	About CICPL:	11
3. 4. 5. 6. 7. 8. 9.	Audit Scope: References: List of Auditors: List of Auditees: Audit Plan, Opening and Closing Meetings: Areas Covered (Departments/ Buildings/ Facilities). NBC Code Section 11 Clause wise Observations. Clause 3 APPROACH TO SUSTAINABILITY	11 13 13 13 13 14 15 15
	Clause 4 APPLICABILITY OF THIS PART	19
	Clause 5 IMPLEMENTATION OF THIS PART	19
	Clause 6 SITING, FORM AND DESIGN	20
	Clause 7 EXTERNAL DEVELOPMENT AND LANDSCAPE	25
	Clause 8 ENVELOPE OPTIMIZATION	28
	Solar Panels Capacity	28
	Clause 9 MATERIALS	30
	Clause 10 WATER AND WASTE MANAGEMENT	32
	Clause 11 BUILDING SERVICES OPTIMIZATION	37
	Clause 12 CONSTRUCTIONAL PRACTICES	38
	Clause 13 COMMISSIONING, OPERATION, MAINTENANCE AND BUILDIN PERFORMANCE TRACKING:	∖G 40
	Statutory and Legal Compliances:	41
1(1 <i>*</i>	 Annexure 1: Linkage to 31 Points in NAAC's Self-Assessment Criteria as detailed below: Annexure 2: NCRs Report 	47 52



List of Tables

Table 1: NBC Part 11 Clauses Grouping	5
Table 2: Summary of Audit Findings	6
Table 3: EE Calculations	
Table 4: GHG Calculations	
Table 5: Waste Management	
Table 6: Water Balancing	

List of Photos

Photo 1: Opening Meeting on 19th June	14
Photo 2: Closing Meeting on 21st June	14
Photo 3: Attendance Sheet	14
Photo 4: Green Policy of PWC displayed in College Website	15
Photo 5: Ramps for Divyang's wheel chair	16
Photo 6: Beyond Campus Activities	18
Photo 7: Disaster Mgmt, Emergency Preparedness & Environmental Risk assessment	19
Photo 8: Measurement of Permeable Areas	22
Photo 9: Lighting Levels Measurement	23
Photo 10: Service Life Assessment	24
Photo 11: Noise Level Measurements	25
Photo 12: Pavement Area Measurement	26
Photo 13: Rainwater Harvesting Ponds	26
Photo 14: Solar Panels Visit	29
Photo 15: Composting Units	37

List of Figures

Figure 3-1: Building Plan	. 12
Figure 3-2: Existing Building Blocks	. 13
Figure 9-1 Guidelines to Architect, Designer and Civil Engineer	. 16
Figure 9-2: Fly Ash Bricks Bill	. 16
Figure 9-3: Landscape drawing	. 25
Figure 9-4: Calibration Certificates	. 27
Figure 9-6: O&M Manual	. 40
Figure 9-7: Building Approval/ Permission	. 42
Figure 9-8: Fire Safety Approval	. 43
Figure 9-9: E Waste MoU and PCB Authorisation of M/S KARO Sambhav Pvt Ltd	. 44
Figure 9-10: FOOD SAFETY BY FSSAI & CANTEEN LICENCES	. 45
Figure 9-11: Permission document for connecting to the grid from the Government/ Electricity autho	ority
and NET Metering Agreement	. 46



1. Executive Summary:

Patna Women's College (**PWC**) was audited during 19th to 21st June 2023 Covering Sustainability, Environment, Water, Waste and Energy Management in line with National Building Code 2016-Part 11 and as per directives of NAAC & NABCB. The auditors are Dr. Rama Dasu Pittala and Dr. Ajaya Shankar Gupta.

The audit covered their 7 main buildings with a build-up area of around 48,965.51 Sqm as detailed below:

Bldg. No.	Bldg. Name	B/u area each	No of floor	Total B/u area
01	Main Block (Arts Block)	2153.2sqm	G+3	8612.8sqm
02	Science Block	2263.2sqm	G+3	9052.8sqm
03	Home Science (M.C.A Block)	303sqm	G+4	1515sqm
04	B.C.A Block	364.7sqm	G+2	1094.1sqm
05	B.Ed	839.9 sqm	G+1	17878 sqm
06	Auditorium	2160sq m	G+3	8640 sq m
07	Canteen (Proposed)	724.27 sqm	G+2	2172.81 sq m

The audit criteria has 12 major clauses covering Sustainability, Environment, Water, Waste and Energy Management as shown in the table1:

Table 1: NBC Part 11 Clauses Grouping	
NBC Part 11 Clause No	Major Focus
3 APPROACH TO SUSTAINABILITY	Sustainability
4 APPLICABILITY OF THIS PART	Sustainability
5 IMPLEMENTATION OF THIS PART	Sustainability
6 SITING, FORM AND DESIGN	Environmental
7 EXTERNAL DEVELOPMENT AND LANDSCAPE	Environmental
8 ENVELOPE OPTIMIZATION	Environmental
9 MATERIALS	Sustainability
10 WATER AND WASTE MANAGEMENT	Water & Waste
11 BUILDING SERVICES OPTIMIZATION	Energy efficiency
12 CONSTRUCTIONAL PRACTICES	Sustainability
13 COMMISSIONING, OPERATION, MAINTENANCE AND BUILDING PERFORMANCE TRACKING	Energy efficiency
14 STATUTORY AND LEGAL COMPLIANCES	Regulatory

Also the check points cover many of the requirements (around 31 Points) in NAAC's Self-Assessment Criteria as detailed in Annexure 1.

During audit the Checklist approved by NABCB has been used which has 150 check points and the auditors marked as NA if any clause is not applicable and then checked their Records/ practices/ documents, physical verification etc against each check point. If the records/practice/ documents /



Physical verification are meeting major requirement listed as Compliant, if not the observations are classified as below:

Major Nonconformity

a nonconformity that shows a NBC - 11 clause or other requirement has not been implemented at all, or has been implemented in such a way that the requirements are not met at all.

Minor Nonconformity

a single instance, or small set of single instances, that show a requirement has not been met. At the Lead Auditor's discretion, a large number of related Minor Nonconformities may instead be filed as a single Major Nonconformity.

OFI:

Opportunity for Improvement is Not a non-Conformity. It is a cause for a potential non conformity and or for further improvement

The summary of audit findings is as below:

Table 2: Summary of Audit Findings

	PWC Audit Sum	mary (A	fter Follo	owUp or	n <mark>21</mark> st Jul	y)		
S. No.	NBC Part11 Clause	Total Check Points	Not Appl Points	Net Appl Points	Compliant points	OFIs	Minor NCs	Major NCs
1	3 APPROACH TO SUSTAINABILITY	19	1	18	16	2		
2	4 APPLICABILITY OF THIS PART	1		1	1			
3	5 IMPLEMENTATION OF THIS PART	1		1	1			
4	6 SITING, FORM AND DESIGN	11	1	10	9			1
5	7 EXTERNAL DEVELOPMENT AND LANDSCAPE	13	1	12	12		0	
6	8 ENVELOPE OPTIMIZATION	3		3	1	0		2
7	9 MATERIALS	6		6	4	2		
8	10 WATER AND WASTE MANAGEMENT	31	4	27	23	3	1	
9	11 BUILDING SERVICES OPTIMIZATION	28	11	17	10	7		
10	12 CONSTRUCTIONAL PRACTICES	16	2	14	12	2	0	
11	13 COMMISSIONING, OPERATION, MAINTENANCE AND BUILDING PERFORMANCE TRACKING	11	2	9	7	1	1	
12	Legal Compliances	10	4	6	6			0
	Total	150	26	124	102	17	2	3
						115.75		
						93.35		

By giving a weightage of 1 to compliant, 0.75 to OFI, 0.5 to Minor NC and 0 to Major NCs the total points against 124 applicable are 115.75 ie equal to 93.35%



Embodied Energy Calculated for Existing building as shown in --- shows that the average **EE Per Sqm is 2.689 GJ per Sq M** and the National average for Four-storied reinforced cement concrete (RCC) buildings is **4.3 to 3.1 GJ per SqM** (Fig. --- reference Table --- Embodied energy analysis of multi storied residential buildings in urban India S. Bardhan Dept. of Architecture, Jadavpur University, India), which indicates that the Old Buildings are also within the EE Standards.

Embodied GHG calculated is around **695.253 Kg CO2e per SqM** as shown in Figure --- which is within benchmark given in a study published in the Journal of Cleaner Production, the embodied carbon of residential buildings in India ranges from **250 to 750 Kg CO2e per SqM**.

THE MAJOR STRENGTHS ARE:

- PWC has a Green Policy dtd 01/07/2020 (<u>https://patnawomenscollege.in/wp-content/uploads/2022/04/7.1.5_Green-Policy_compressed.pdf</u>) indicating commitment and drive of Principal towards sustainability.
- PWC has developed SOP for Guidelines to Architect, Designer and Civil Contractors and Note on Existing Buildings, GA/GAD/01 which addresses the main clauses of NBC 11.
- The major effort taken by their Civil department to assess the Embodied Energy and GHG against old buildings
- EE Per Sqm is 2.689 GJ per Sq M and the National average for Four-storey reinforced cement concrete (RCC) buildings is 4.3 to 3.1 GJ per SqM (reference details given in report)
- They have prepared a list of materials with their Emboided Energy levels to assist in selection of materials for future construction
- Developed an SOPs "Procedure for Waste Management" and Water Management
- SOP General Terms and Guidelines to Contractors for Sustainable Construction Practices GA/GGC/01 addresses Design, Feasibility, digital models use, pre-construction pre-requisites, Construction Planning, Effective use of water, construction methodology for Heritage Buildings etc.
- They are using Flyash Bricks which is an eco-friendly approach
- Lighting Loads are reduced by having good Day Light Factor with sufficient Windows and Building Orientation. Day Light Factor is +2.5
- Total installed capacity of Solar Power in the campus is 90 KW. Wheeling to Grid with Net Metering System is installed.
- The presence of greenery and well-planned landscaping on the campus provides several benefits, including the reduction of cooling requirements. Additionally, the campus design incorporates large windows that facilitate natural ventilation.
- PWCs SOP on Disaster Management and Emergency Preparedness Plan (GA/DMP/01 dtd 1st May 2023) addresses Disaster Risk Mitigation during Construction and during operation.
- The commendable efforts of PWC in supporting beyond campus activities through the Shristi Club and ECO Task Force should be acknowledged. These two student bodies have been actively engaged in raising environmental awareness and undertaking cleaning initiatives in various locations, including the Ganga Ghat, slum areas, and villages.



MAJOR AREAS FOR IMPROVEMENT ARE:

- Water consumption data is on approximation, to have more authentic/ accurate data Flow meters may be installed to measure actual water consumption. Also you may use Block wise Flowmeters to monitor consumption and also to know sudden leakages if any.
- Rain Water Collection from Main Building to Ponds is provided. No Harvesting Pits made as Ground Water Table is at very low depth due to adjacent location to Ganga river (4KM)
- Water Sensors fixed in main building and auditorium. Water Sensors are used, but water comes in Full tap, Nozles
 / Atomizers may be used.
- No STP system available Waste water is discharged to Patna Muncipal Corporation Drain, but PWC shall get an exemption from Patna Municipality or construct a STP of suitable capacity.
- Solar Panels cleaning may be carried out at least twice a week to increase energy generation. There is scope for increasing the installed capacity of Solar Power Plants.
- Check the locally available / Sustainable building materials for use in future construction.
- As some buildings are over 75 years old, they may assessed for RLA Assessment/ Structural stability assessment.
- Fire Extinguisher to be installed at Store, where Paints, and Flammable cartons are stored.
- PWC shall explore using Higher Capacity Composting units
- Lab chemical is neutralized before discharging with NaOH. Image shown below. This practice is OK for small labs, but for big labs they shall establish Neutralization Pits where all the water from lab is collected and discharged after neutralization.
- Balance ACs to be replaced with 5 Star rated in phased manner
- Benchmarks for the energy consumption, water utilization, waste generation, reuse of waste generated during construction and operation phase to be developed and regular monitoring to be done.
- PWC may do analysis/ potability tests of Drinking Water Quality from Approved Labs and Ambient Air Quality monitoring may be done once in a year.
- Separate meters may be fixed for Lighting, Acs, Pumps, Lifts, Lighting, Fans etc for measuring and monitoring



2. Introduction:

Patna Women's College has enlisted the services of Competent Inspectorate and Consultants Pvt Ltd (CICPL) to carry out a Green Audit of their campus. This initiative aligns with the NAAC advisory (Ref. No. -F. No. 14-29/2022 dated 26.05.2022), which mandates the requirement of Green Audits/Certification for educational institutions. These audits must be performed by Inspection Bodies approved by NABCB (National Accreditation Board for Certification Bodies) in accordance with ISO17020 standards.

CICPL has followed the prescribed methodology outlined in NABCB's policy (Ref. No.: NABCB/P-001/09/2022/V.1) for conducting Green Audits. This methodology incorporates the relevant clauses of the National Building Code, 2016, Part-11, as applicable to the audit process. CICPL obtained approval from NABCB to carry out the audit, ensuring compliance with the necessary standards.

The Green Audit was conducted by CICPL after the final approval and accreditation from NABCB.

ABOUT PWC:

PATNA WOMEN'S **COLLEGE** was founded in 1940 and was the first institution of higher learning opened to cater to the educational needs of women in Bihar. Bishop B.J. Sullivan S.J., Bishop of Patna (Founder) and Mother M. Josephine A.C. Superior General of the Apostolic Carmel named it Patna Women's College and presented it as a gift to the Women of Bihar, thereby placing at their disposal an opportunity for higher education. The College is run by the Catholic Religious Sisters of the Apostolic Carmel, an indigenous educational body founded in 1870.

Thousands of motivated and empowered women have passed through the portals of this college and have entered various fields of life, many making a mark in our country and abroad.

The college has come a long way from the time the pioneers envisioned and undertook the difficult task of establishing a women's college at a time when only a few truly enlightened and far-sighted persons were prepared to support this infant project in a place where higher education for women was frowned upon, if not rejected outright.

In the year 1952, a Special Status was given by the Government of Bihar and it became a 'Constituent College' of Patna University. On 25.07.2007, the Government of Bihar, officially declared Patna Women's College as a 'Religious Minority College'.

The College whose hallmark has always been Quality and Excellence, has been accredited by NAAC with 'A' grade for three consecutive cycles with CGPA 3.51/4 in 2010 and CGPA 3.58/4 in 2015. The college also has been accorded as 'College with Potential for Excellence (CPE)' status from UGC in three phases in 2004, 2010 and 2015. The University Grants Commission (UGC) has conferred Autonomous status to Patna Women's College in January, 2018 which was further notified by the Parent University (Patna University) in July, 2018.

Choice Based Credit System (CBCS) and Semester System have been introduced in July 2018. This is the only college in the state to have taken this initiative for UG courses.



The college provides holistic education through UGC approved 26 undergraduate degree programmes in all the major streams of Humanities, Sciences, Commerce & Management, Education, 9 Post Graduate degree programmes and 4 Post Graduate Diploma programmes.

VISION

Rooted in the life, vision, and teachings of Jesus Christ and inspired by Mother Veronica, the foundress of the Apostolic Carmel, Patna Women's College strives to become a center of academic excellence in higher education, social responsibility, and empowerment of women.

MISSION STATEMENT

Patna Women's College, the first college for women in Bihar, is committed to the holistic development of women so as to make an effective contribution to the creation of a better society.

To this end, we strive

- To become a center of excellence in higher education for women in an atmosphere of autonomy.
- To excel in teaching-learning, research, and consultancy.
- To provide education that promotes capacity building and holistic development of a person.
- To offer subjects for competency building and motivate/animate a workforce imbued with human values.
- To promote patriotism, communal harmony and cultural integration to maintain a free and peaceful atmosphere on the campus.
- To train the students in creative arts, social service, critical thinking, and leadership in order to make an effective contribution to the creation of a new and value based society.
- To create women leaders and to make them agents of social change.
- To develop skill oriented and value based courses, for the all-round development of individuals.
- To promote academic exchange and academia-industry interface.
- To form young women who are 'always wise' and who will dare to 'go ahead and conquer knowledge' through, competence, commitment, delicate conscience, and compassion.

CORE VALUES

The Core Values of our Institution are:

- Faith in God
- Honesty /Moral Uprightness
- Love and Forgiveness towards all
- Social Responsibility/empowerment of the Marginalized



- Respect for Life and Creation
- Pursuit of Excellence
- Promotion of peace, harmony and brotherhood

ABOUT CICPL:

Competent Inspectorate and Consultants Pvt Ltd is formed in 2022 by converting Competent Inspectorate and Consultants LLP which was established in 2015 by merging Sun-Mann Engineers & Consultants (Serving Industry Since 2009) to provide highly competitive specialized Third-Party Inspection and Field Services to support companies in building and managing their assets, ensure quality and compliance, improve reliability, performance and avoid the occurrence of incidents

CICPL performs third party inspections, which include the examination of materials, products, installations, plants, processes, work procedures or services, and the determination of their conformity with requirements and the subsequent reporting of results of these activities to the clients.

3. Audit Scope:

Audit is Covering Sustainability, Environment, Water, Waste and Energy Management in line with National Building Code 2016-Part 11 and as per directives of NAAC & NABCB.

The audit covered their 7 main buildings with a build-up area of around 48,965.51 Sqm as detailed below:

Bldg. No.	Bldg. Name	B/u area each	No of floor	Total B/u area
01	Main Block (Arts Block)	2153.2sqm	G+3	8612.8sqm
02	Science Block	2263.2sqm	G+3	9052.8sqm
03	Home Science (M.C.A Block)	303sqm	G+4	1515sqm
04	B.C.A Block	364.7sqm	G+2	1094.1sqm
05	B.Ed	839.9 sqm	G+1	17878 sqm
06	Auditorium	2160sq m	G+3	8640 sq m
07	Canteen (Proposed)	724.27 sqm	G+2	2172.81 sq m

The physical area covered are as detailed below:







Figure 3-1: Building Plan



GREEN AUDIT REPORT: PATNA WOMEN'S COLLEGE



Figure 3-2: Existing Building Blocks

4. References:

- NABCB Policy on Green Audit by Inspection Bodies
- NAAC's advisory ref No.F.No.14-29/2022 Dated 26.05.2022
- National Building Code of India 2016 Vol 2 Part 11 Approach to Sustainability
- ISO 17020 Manual and SOPs of CICPL
- National Lighting Code 2010 edition

5. List of Auditors:

- 1. Dr. Rama Dasu Pittala
- 2. Dr. Ajaya Shankar Gupta Ainapur

6. List of Auditees:

- 1. Dr. Sister M. Rashmi A.C., Principal
- 2. Dr Sumeet Ranjan
- 3. Dr Urvashi Sinha
- 4. Mr Gautam Saurabh
- 5. Dr Ravi Kumar
- 6. Dr Piyush Kumar Rai
- 7. Rameez Amzad
- 8. Dr Vivek Raj
- 9. Dr Shoba Srivastava
- 10. Dr Neetu
- 11. Mr Rajeev Ranjan

7. Audit Plan, Opening and Closing Meetings:

Audit plan is attached as Annexure 1

Audit was performed during 19th to 21st June. Opening meeting and closing meeting photos, attendance sheet are given below.





8. Areas Covered (Departments/ Buildings/ Facilities)

The physical area covered during audit were as detailed below:

- Main Block
- Science Block including Labs
- Home Science
- M.C.A Block
- B.C.A Block
- B.Ed
- Auditorium
- New Construction area Canteen
- Harvesting Ponds
- Landscape areas
- Composting area
- Pavement area
- Sewage Pumping Area
- Solar Panels area
- DG Sets



9. NBC Code Section 11 Clause wise Observations

CLAUSE 3 APPROACH TO SUSTAINABILITY

The objective of this clause is to see overall commitment of management towards Sustainability and their approach /system of planning from concept, design, construction, commissioning, operation and maintenance, and also decommissioning and disposal at the end of useful life of structure. Also



focuses on Energy Efficient Design and Processes.

Green Policy displayed in https://patnawomenscollege.in/wp-content/uploads/2022/04/7.1.5_Green-Policy_compressed.pdf Addresses Commitment by Top Management. Also, PWC has developed a SOP for Guidelines to Architect, Designer and Civil Contractors and Note on Existing Buildings, GA/GAD/01 (refer Photo below) which addresses Site Assessment, Building Orientation, Material Selection, Thermal Massing etc. In this Clause 5 addresses Steel or any material obtained from recycling of construction waste needs to be handled properly. Material selection Sub Clause in Clause 5 addresses this. Fly Ash Bricks are being used. Bill of SHUBHAM ENTERPRISES SEEN. Panels used in Auditorium are made of Rice Straw.

Old Buildings are inline with Local Vernacular design. Guidelines to architect addresses about Building Orientation etc. Guidelines to architect addresses about Building Orientation etc. Day light Factor is around 2.7 as measured in Main Block



(Formerly Competent Inspectorate and Consultants LLP) CIN:U74995TG2022PTC161136

	MULENS COLLECT	Guidelines to Architect, Designer and Civil Contractors and Note on Existing Buildings	GA/GAD/01 Dtd. 20 th June 202: Rev No: 01
		Table of Contents	
F	Revision History		
1.	Purpose:		
2.	References:		
3.	Definitions:		
E	mbodied Energy		
C	Carbon Footprint		
4.	Responsibilities:		
5.	Process:		
S	ite Assessment		
E	uilding wise Area		
Ν	Naterial Selection		
E	Building Orientation		
E	xisting building serv	ice life plan:	
Т	hermal Massing		
F	Reduced Building Fo	otprint in Multi-Storeyed Building Designs.	
E	xternal Developm	ent and Landscape Design:	
F	Rainwater Harvesting		
F	Reduced Environmer	tal Impacts from Parking Facilities	



Figure 9-1 Guidelines to Architect, Designer and Figure 9-2: Fly Ash Bricks Bill Civil Engineer

Ramps for Divyang's wheel chair available. No facility for Divyang (blind) reading software, signages

as No Blind Students. There are 3 Colleges nearby PWC for Visually Handicapped students. So not provided. Assistance Provided to Blind Students if anyone comes by Didi at the reception.

EE Calculated as 2.689 Gj Per SqM which is within standard norm of 4.3 to 3.1. GHG calculated as 695.253 as against normal range of 250 to 750. Details given below:





	Ei	mbodied Er	nergy Calculati	on	[ireen Hous	e Gas Calculatic	on	
			0/	EE in						CO ₂ Emission/	
S.No.	Materials	Units	Qty	MJ/unit	EE	S.No.	Materials	Units	Qty	unit	GHG
1	Cement	kg	987146	3.05	3010795		1 Cement	kg	987146	0.95	937788.7
2	Concrete	m3	1200	0.21	252		2 Concrete	m³	1200	0.159	190.8
	Concrete		1200	0.21	232		3 Steel bars	kg	140000	5.457	763980
3	Steel bars	kg	140000	32.24	4513600		4 Granite	kg	25000	0.04	1000
4	Granite	kg	25000	0.105	2625		5 Tiles (Flooring)	m2	1672	18.33	30647.76
E	Tilos (Elegring)	m2	1672	10.62	17772.26		6 Marbles	kg	25000	0.436	10900
5	Thes (Flooring)	mz	1672	10.03	1///3.30		7 Mosaic	kg	5000	0.238	1190
6	Marbles	kg	25000	1.53	38250		8 Bricks	Number	152000	0.327	49704
7	Bricks	number	152000	2.9	440800		9 Glass	kg	2750	1.735	4771.25
,	Difetto	indifiact	152000	7.00	440000	1	0 Plastic Pipes	m	580	0.4	232
8	Glass	kg	2750	/.88	21670	1	1 Aluminum	kg	3250	0.622	2021.5
9	Aluminum	kg	3250	141.55	460037.5	1	2 Electricity	kWh	150	0.7898	118.47
10	Tilor	m2	1670	19.22	20647 76	1	3 Electric wires	kg	450	2.84	1278
10	Tiles	IIIZ	1072	10.55	50047.70	1	4 Lighting fixture	Set	180	35.65	6417
11	Plaster board	Sheet	500	15.1	7550	1	5 Plywood	kg	4200	0.61	2562
					8544000 62	1	6 Plaster board	Sheet	500	11.35	5675
				D OFT	254 2044250	1	7 Water	Liter	888430	0.42	373140.6
				Per SFI	251.2941359	1	8 Welding rods	kg	245	20.5	5022.5
					2688.847254	1	9 Gravel	kg	600000	0.00241	1446
				Giner SaM	2 689						2196895.58
				oj per oqivi	2,005					SFT	34000
			Norm 4.3 to	o 3.1							64.61457588
										Per SqM	695.253
Iable	3: EE Ca	Iculati	ons			Table	4: GHG Ca	alculatio	ons		

Estimated Water Consumption Per Day 1,51,500 for 5290 average attendance comes to 28.64 as against Standard of 18.5 ± 6.5 L/student/day for technical schools. Little higher than standard. Flowmeters may be installed to measure actual water consumption. Also you may use Block wise Flowmeters to monitor consumption and also to know sudden leakages if any. Water Sensors are used, but water comes in Full tap, Nozzles/ Atomisers may be used.

No STP system available Waste water is discharged to Patna Muncipal Corporation Drain, but PWC shall get an exemption from Patna Municipality or construct a STP of suitable capacity.

Shristi Club and ECO Task Force are the two student bodies working beyond campus on Environmental awareness and cleaning of Ganga Ghat, Slum Areas Villages. On 17th January,2023 students of Patna Women's College, under the aegis of Srishti Environment Club participated in the program "Swachta ki Patang sah Jagrukta" organized by Patna Municipal Corporation at Digha Patipul Ghat. The Department of Zoology and ECO Task Force of Patna Women's College organized A Five Days Dengue Prevention and Awareness Programme from 10.11.2022 to 18.11. 2022 to spread awareness regarding Dengue Prevention.





SOP for Environmental Risk Assessment Guidelines GA/ERA/01 dtd 1st May 2023 and SOP on Disaster Management and Emergency Preparedness Plan (GA/DMP/01 dtd 1st May 2023). SOP addresses 10 Potential emergencies like Medical emergency, Fire, Burns, Snake Bite, Chemical spill, Electrical Shock, Pandemic, Civil Unrest, Earthquake and Floods. Images of SOPs, Displays etc shown below.

Emergency Response Teams List not specific to building/ location, Separate ERT names may be provided for different locations/ buildings.



(Formerly Competent Inspectorate and Consultants LLP) CIN:U74995TG2022PTC161136

	Disaster Management and Emergency Preparedness Plan	GA/DMP/01 Dtd. 14 May 2023 Rev No: 00		Lirea: Use fire extinguist Burging Clothin Make the victim or a laboratory ec Small for a statement Apply Burget Severe burge Give the victim of Give the victim of Circumentiately	sher or 10 11e dou 11e dou 11e dou 11e dou 11e dou 11e dou	ound as on on an oldt com o drank a	t the e	inic may Critical w Rel must	the, the head fits with a o the sea				•
	Table of Contents			Chemicals in the Wash gently will dilute boric acid solutions for <u>acid</u>	e eves h pients solutro d burn	y of tup in for <u>al</u> B	water Kati b	feither urmy ar					
. Purpose				Acids: Wash prof	undly v								INCOMPOSING IN
The purpose of this So engaged during c	OPs is to ensure the safety and other working condition construction, operation and use of building.	as of the workers		with dilute Solution Bases: Wash thore dilute solution of the	on of S oughly Sodium	with ta n Acetat							
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Fire		4		nearest bospital.						-			
First aid for fire injuri	ies and burns:	4											
Snake bite		4											
Chemical Spill/Leak			1000	Patna									<u>e</u>
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CLAUSE 4 APPLICABILITY OF THIS PART

SOP for Guidelines to Architect, Designer and Civil Contractors and Note on Existing Buildings, GA/GAD/01 addresses that Existing building or part thereof is evaluated under the provisions of this Part of the Code and the Code will be applied to the development projects.

CLAUSE 5 IMPLEMENTATION OF THIS PART

As per SOP for Guidelines to Architect, Designer and Civil Contractors and Note on Existing Buildings, GA/GAD/01 choice of material, design methodology, construction technique/methodology, operation and maintenance related options, etc, is made, taking into account the provisions given in NBC Part11.



CLAUSE 6 SITING, FORM AND DESIGN

The objective of this clause is to see if - passive design strategies for every building as a means to reducing overall energy demand before pursuing active and mechanical means in an effort to not only save energy but also to minimize the overall negative impact on the environment (energy conservation, water conservation and reduced greenhouse gas emissions.)

Existing Buildings are assessed for Building Orientation as detailed in SOP Guidelines to Architect, Designer and Civil Contractors and note on Existing buildings GA/GAD/01 which indicates that:

- All blocks are faced towards south.
- The ventilation is provided on north and south facings of these all blocks.
- The lighting is coming through a north facing.
- In addition, the windows provided for the ventilation are in the path of sun.
- Further the building's contact surface area with sun is comparatively larger and direct throughout the day, which declines the utility of electrical energy.
- Also the buildings will provide sufficient natural shading when the sun is on opposite direction.
- The provision of windows on the direction of sun path achieving the desirable thermal and visual comfort to the occupants.
- All building envelopes are protected against thermal losses, drafts and degradation by natural elements such as wind, dust, sand, snow, rainwater, hail, etc.
- 25 percent of the regularly occupied areas of the building is achieving sufficient day lighting with a minimum day lighting factor of 2 percent.
- Solar passive techniques like Landscaping, optimum building orientation, surface to volume ratio etc in building to optimize building performance has been incorporated.
- As the institution is not falling in the area of climatic zone, no artificial heating systems are provided.

Image of SOP is shown below:



PATNA WOMENS COLLIGE AUTONOMOUS	Guidelines to Architect, Designer and Civil Contractors and Note on Existing Buildings		GA/GAD/01 Dtd. 1 st May 2023 Rev No: 00			
~						
S No	Emi Materials	Unit	Otv	FF in MI/Unit	FF	
9	Plaster board	Sheet	500	15.1	7550	
10	Fly ash Bricks	Number	21634	0.85	18388.9	
Building Orientation New Building Design:						
Designer and Are per requirements	chitect have to of Clause 6.2	o design 2.1 of NE	the bui 3C Part	lding form, ori 11 to ensure t	entation a hat	and shading as
 Designer and Architect have to design the building form, orientation and shading as per requirements of Clause 6.2.1 of NBC Part 11 to ensure that there is adequate provision for external shading of the facades during the peak summer season; there is adequate provision for vertical shading to prevent direct solar radiation and glare due to low altitude sun angles, specifically on the eastern and western facades; 						

Site Assessment Prior to Design is not available.

Pages 12, 13 of Document No.GA/GAD/01 Dt.01.05.2023 " Guidelines to Architect, Designer and Civil Contractors and Note on Existing Buildings" refers thermal massing and the choice and justification of the proposed wall material.

Against requirement of at least 30 percent of the open spaces shall be maintained as softscapes (permeable surface on ground), Permeable surface is 48% of the total area. Random measurements witnessed on 20th June 2023 using calibrated tape for the permeable area and found satisfactory





Photo 8: Measurement of Permeable Areas

Optimum Building Volume is not achieved. Room Heights is 13 and 11 respectively. These are Old Buildings (70 Years old, and 40 Years old).

Against the requirement of at least 25 percent of the regularly occupied areas of the building achieve sufficient day lighting with a minimum day lighting factor of 2 percent there, all the rooms (Except Auditorium) have above 2 DF. Measurements carried out on 20th June 2023 using calibrated Luxmeter and found that Day light factor is 2.7 for Class room no.118.





Life Cycle Assessment is given in Document No.GA/GAD/01 Dt.01.05.2023 " Guidelines to Architect, Designer and Civil Contractors and Note on Existing Buildings"



and will be employed for the newly constructed buildings.						
Existing buildir	a service	life plan:	0			
The service lit	fe of the bui	Idings has been a	calculated based on ISO 1	5686-1 and ISO 15686-		
2 standards T	hese stands	ards deal with se	rvice life planning and ad	dress the service life of		
a building or	a building	component Facto	rial approach known as i	the 'factors method' is		
used to deter	rming the	potential corvic	life of a building or	component based on		
Irrowladge ak	ant matari	la and building	technology. The convice l	life of structure of Well		
knowledge at	out materia	as and building	alow	the of structure as well		
as the compoi	iems presei	it in it is listed b	elow:			
Table <u>5 Design</u> s	ervice life o	of structure and o	lifferent components used	l in it		
	S.No	Description	Service Life (Years)			
	1	Structure	75			
	2	Bricks	150	_		
	3	Tiles	20			
	4	Granite	100			
	5	Wood	50			
	6	Plywood	35	_		
	7	HVAC	12	_		
TT (1 T C C	<u>8</u>	Electrical	25			
Hence the Life of	Building w	ill be 75 Years a	nd Components life is mi	n_um 12 years.		



CLAUSE 7 EXTERNAL DEVELOPMENT AND LANDSCAPE

This clause focusses on Landscape planning and design, because effective landscaping plays a vital role in preserving the natural capacity of a site for stormwater management, groundwater recharge, soil structure maintenance, and filtration, leading to the growth of soil organic matter and erosion prevention. Furthermore, it helps to regulate the microclimate by facilitating evaporation, transpiration, and the absorption and storage of carbon by trees and other vegetation.

Landscape plan is shown below. Landscape shading pattern of the buildings is found satisfactory.



Figure 9-3: Landscape drawing

Noise measurement records dated : 09/06/2023 verified. Noise measurements checked at Random on 20th June 2023 using calibrated Instrument. Found satisfactory.



Photo 11: Noise Level Measurements

Pervious paved area calculations verified. Random dimensions witnessed using calibrated tape on 20th June 2023. % of pervious paved area is more than 50%, Satisfactory. Verified records. Randomly witnessed measurement of Paved area including parking using a calibrated 30M Tape. More than 50%



of the paved area is pervious. Pedestrian Paths physically verified on 20th June 2023. Bicycles not allowed in side the campus, so no separate lanes were there for bicycles.



No excavation going on now. During early 2022 topsoil was removed while making foundation for new building No.24, and reused in landscaping.

Rain water being diverted to two Open Ponds within the Campus and stored for further use for gardening. Captured rain water being used for Gardening. Verified during site visit dt 20.06.2023



Photo 13: Rainwater Harvesting Ponds

Operation and Building Maintenance Document No.GA/OBM/01 R00 Verified. Requirements of CI 7.3.1 of NBC Part 11 regarding avoiding use of chemicals like chlorine, and bromine in water not addressed. NC raised







CLAUSE 8 ENVELOPE OPTIMIZATION

The interface between indoor and external climatic conditions is maintained by the building envelope, which has the potential to regulate the building's climatic response. It is essential that the building envelope be designed to significantly conserve energy. An effectively designed building envelope optimizes daylight, provides access to natural ventilation for fresh air, offers views to the exterior, and enables modulation of solar heat gain while also controlling or reducing noise.

PWC building being 80 years analysis of the envelop optimization, is not done. In their Guidelines GA/GAD/01 they addressed it saying that in the near further such kind of analysis will be performed and will be employed for the newly constructed buildings. But,for New building which is under construction, no Envelope Optimization study was made.

The renewable Energy Integrated in the envelope. Total installed capacity of Solar Power in the campus is 90 KW. There is further scope for increasing the solar Power generation capacity. Visited one Solar Power installation site.

S.No	Block	Solar Panel Number	Capacities
1	Science Block	54	17.5 KW
2	MCA Block	54	17.5 KW
3	B. ED Block (Old)	74	25 KW
4	B. ED Block (New)	30	10 KW
5	Streat light	64	20 KW
	Total:	276	90 KW

Solar Panels Capacity

Solar Panels cleaning may be carried ou tat least twice a week to increase energy generation. There is scope for increasing the installed capacity of Solar Power Plants.







CLAUSE 9 MATERIALS

The selection of building materials is crucial in sustainable design due to the far-reaching chain of events involved in producing a material, including extraction, processing, and transportation. Furthermore, these activities can have negative environmental impacts on the air, soil, and water, as well as harm natural habitats and deplete natural resources, not only during building construction but also in the long run.

Guidelines to Architect, Designer and Civil Contractors and Note on Existing Buildings has a clause addressing Material selection as shown below. Alternative materials to reduce energy given in Annexure 1 as shown below



Existing building service life plan:



Details of estimation of Building Materials service life is addressed in Guidelines to Architect, Designer and Civil Contractors and Note on Existing Buildings GA/GAD/01. The minimum life of components is

around 12 years and structure is 75 years. As some buildings are over 75 years old, they may assessed for RLA Assessment/ Structural stability assessment.

Recycled Plastic Ply Boards being used in Washrooms Partition to reduce use of plastics.

Construction Phase Material Storage and Handling

 The service life of 2 standards. The a building or a b used to determ knowledge about as the component 	of the bui se standa uilding g ine the t materia ats preser	Idings has been ards deal with se component Facto potential servic als and building at in it is listed b	calculated based on ISO 1: rvice life planning and ad orial approach, known as l e life of a building or technology. The service l elow:	5686-1 and ISO 15686- dress the service life of the 'factors method', is component, based on life of structure as well
Table <u>5 Design</u> serv	rice life c	of structure and	different components used	l in it
	S NO	Decerintion	Samica Life (Veare)	
	S.No	Description	Service Life (Years)	-
	<u>S.No</u> 1 2	Description Structure Bricks	Service Life (Years) 75 150	-
	1 2 3	Description Structure Bricks Tiles	Service Life (Years) 75 150 20	-
	1 2 3 4	Description Structure Bricks Tiles Granite	Service Life (Years) 75 150 20 100	-
	S.No 1 2 3 4 5	Description Structure Bricks Tiles Granite Wood	Service Life (Years) 75 150 20 100 50	
	1 2 3 4 5 6	Description Structure Bricks Tiles Granite Wood Plywood	Service Life (Years) 75 150 20 100 50 35	
	S.No 1 2 3 4 5 6 7	Description Structure Bricks Tiles Granite Wood Plywood HVAC	Service Life (Years) 75 150 20 100 50 35 12	

Construction material Storage area was visited on 20th June 2023. FIFO policy implementation verified, found satisfactory. Fire Extinguisher to be installed at Store, where Paints, and Flammable cartons are stored.



CLAUSE 10 WATER AND WASTE MANAGEMENT

With the increasing population, industrial activity and pollution, surface and groundwater resources have been overexploited and severely polluted during the past few decades. As a result, the country is faced with immense water scarcity. Significant liquid and solid waste generation is witnessed and recorded in the urban areas of the country. Sustainable approach to water and waste management requires planning and design of building functions to integrate issues of water and waste management system at the early stages of design.

No STP system available Waste water is discharged to Patna Municipal Corporation Drain, but PWC shall get an exemption from Patna Municipality or construct a STP of suitable capacity.

PWC has developed SOPs for Waste Management GA/PWM/01 and Water Management Plan GA/WMP/01.

The SOP for Waste Management addresses the responsibilities for Waste Management in the campus. PWC has formed an advisory committee which oversees the implementation of this SOP. The main responsibilities of this committee are as below:

- Reporting annually to the institute on progress against the environmental performance indicators.
- Monitoring and auditing the management systems for all waste, to ensure safety and legalcompliance.
- Provision of appropriate training for all personnel who have responsibilities for waste management.
- Ensuring that all contractors are advised that they must comply with the duty of care, that they must comply with the institute waste management policy.

Also they have addressed the responsibilities of HODs, Staffa and Students.

In detailed procedure they have addressed the Type of waste, Description of waste, Disposal Method and Responsibility as shown below:

Procedure

Below table describes different types of waste material generated in the campus premises and their associated method of disposal as per the regulatory requirements

S. No.	Type of waste	Description of waste	Disposal Method	Responsibility
1	Solid Waste	Dry waste- dry leaves, paper,	Collected in the waste	Supervisor
	Management	cardboard glass, tetra packs,	segregation area and handed	Housekeeping
	U U	chips wrappers, paper plates	over to Patna municipality	1.0
		etc.	vehicle	
		Colour Code of Bins: Red		
		Wet waste- food waste	A Vermicomposting unit is	
		generated in canteen and	installed to manage food	
		various food vendors inside	waste from the canteen and it	
		the campus.	is used to produce	
		Colour Code of Bins: Green	vermicompost for the plants	
			and trees.	
			Surplus waste is handed over	
			to Patna municipality	
		Plastic waste – Juice and cold	Generated plastic is	
		drinks PET bottles.	segregated and it will be	
			handed over to Patna	
			Municipality	
2	Liquid Waste	Canteen and Toilets	Through pipeline, it is	In-charge Civil



	Liquid Waste Management	Canteen and Toilets	Through pipeline, it is brought to Sump machine water is flushed and directed to treatment purpose in the Sewage treatment plant of Patna Municipal corporation. However in future there is provision to install a in campus Effluent Treatment Plant	In-charge Civil Maintanance
3	E-Waste Management	Comprise of Electronic devices, ranging from large household devices such as refrigerators, electric motors, voltage stabilizers, air conditioners, cell phones, television, LED's, Computer systems and other consumer electronics Lab instruments, circuits, desktops, laptops, printers, charging and network cables, Wi-fi devices, cartridges, sound systems, UPS, biometric machines, scientific instruments, etc.	Segregated and stored in a separate area in the campus. The same is dispatched through authorized vendors M/s KARO Sam bhav Pvt Ltd on a monthly basis.	Bursar and IT Incharge
	- 1			
4	Bio-medical Waste Management	In College we perform small routine practicals related to syllabus only Sanitary pads from Ladies Toilets	Culture media and cotton swabs are autoclaved before discarding	Lab Incharg
4 5	Bio-medical Waste Management Hazardous Waste Management	In College we perform small routine practicals related to syllabus only Sanitary pads from Ladies Toilets Used oil from Generators Chemistry Laboratory	Culture media and cotton swabs are autoclaved before discarding Handed over to the service agency . Diluted chemicals are discharged only after neutralization done and checking pH levels.	Lab Incharg Maintenance charge Lab Incharg
4 5 6	Bio-medical Waste Management Hazardous Waste Management Construction Waste	In College we perform small routine practicals related to syllabus only Sanitary pads from Ladies Toilets Used oil from Generators Chemistry Laboratory Generated during demolition and erection of the buildings includes- Aggregates, steel, bricks, dust, etc.	Culture media and cotton swabs are autoclaved before discarding Handed over to the service agency . Diluted chemicals are discharged only after neutralization done and checking pH levels. Steel is supplied to local scrap vendors Aggregates, bricks, dust are used as a fill material in the campus and surplus will be transferred to municipal dumping yards	Lab Incharg Maintenance charge Lab Incharg In-charge Ci Maintenance

Table 5: Waste Management



The construction and demolition waste management also addressed in above SOP. E Waste is given to M/S KARO Sambhav Pvt Ltd.MoU dated 21st Feb 2023 seen . Dry leaves given to PMC. Old wooden Furniture repairs generate some wooden dust, which is used for Vermi Composting.

PWC has addressed the water consumption details in their SOP for Water Management GA/WMP/01 as Per capita/ Specific consumption including recycled water as 10.08. Detailed water consumption estimates and Water Balance details are given in the said SOP as detailed below.

WOMEN'S COL AUTONOMOL	LEGE	Water Management	Plan	Dtd.	GA/WMP/01 21st June	1 2023
1940					Rev No: 01	1
ontents Revision His Purpose Reference Responsib Water con Rain water h Borewell /OJ Construction Waste water Maintenance	story illities servation arvesting pen well of tanks recyclin e of wate	a facilities available in the Institu g: recharge: and bunds: g bodies and distribution system i	tion: in the camp			2 3 3 3 3 3 3 3 3 3 4 4 5 5 5 7
water Balan	ce		•••••			/
WOMENS COLLECT		Water Management	Plan	Dtd	GA/WMP/(. 21 st June	01 ∋ 2023
The Balance		Water Management	Plan	Dtd	GA/WMP/(, 21 st June Rev No: (01 ≥ 2023 01
WUNDERSTEIN TOTAL STATE		Water Management	Plan	Dtd	GA/WMP/(. 21st June Rev No: (01 ≥ 2023 01
er Balance S. No.	Source	Water Management Table 5: Water Balancing	Plan Per day Qua Sou in I	Dtd.	GA/WMP/(21 st June Rev No: (Quantity Used in Litre	01 > 2023 01
er Balance	Source	Water Management	Plan Per day Qua Sou in I emic 2,10	Dtd.	GA/WMP/(21 st June Rev No: C Quantity Used in Litre	01 ≥ 2023 01
er Balance	Source Pumpin buildin Pumpin	Water Management	Plan Per day Qua Sou in I emic 2,10 h 13	Dtd.	GA/WMP/(21 st June Rev No: C Quantity Used in Litre	01 ≥ 2023 01
er Balance	Source Pumpin buildin Pumpin Total	Water Management Table 5: Water Balancing Table 5: Water Balancing O / Use Ig volume of water in acade Ig volume of water in Auditorium	Plan Per day Qua Sou in I emic 2,10 13 2,23	Dtd.	GA/WMP/(21 st June Rev No: C Quantity Used in Litre	01 ≥ 2023 01
er Balance	Source Pumpin buildim Pumpin Total Utilisa in table	Water Management Table 5: Water Balancing -/ Use ng volume of water in acade gs ng volume of water in Auditorium tion in blocks, canteen etc as deta - 4 including Hostel	Plan Per day Qua Sou in I emic 2,10 1 13 2,23 niled	Dtd.	GA/WMP/(21st June Rev No: C Quantity Used in Litre 2,10,000	01 > 2023 D1
er Balance 5. No. 1 2 2	Source Pumpii buildin Pumpii Total Utilisa in table Hostel	Water Management Table 5: Water Balancing A / Use Ing volume of water in acade ags Ing volume of water in Auditorium tion in blocks, canteen etc as deta a 4 including Hostel Utilization	Plan Per day Qua Sou in I Pmic 2,10 13 12 illed	Dtd.	GA/WMP/(21 st June Rev No: C Quantity Used in Litre 2,10,000 (22,000)	01 > 2023 D1
er Balance	Source Pumpii buildim Pumpii Total Utilisa in table Hostel Civil c	Water Management Table 5: Water Balancing Table 5: Water Balancing Table 5: Water Balancing of Use ng volume of water in acade ng volume of water in Auditorium tion in blocks, canteen etc as deta 4 including Hostel Utilization onstruction and Miscellaneous	Plan Per day Qua Sou in I emic 2,10 1 3 2,23 ailed	Dtd.	GA/WMP/(21st June Rev No: C Quantity Used in Litre 2,10,000 (22,000) (36,500)	01 > 2023 D1



Water Consumption calculated on Pump capacity and Hours of operation as given in GA/WMP/01. There is approximate estimate for different activities for different blocks in Table 4 of SOP on Water Management. As regards sourcing there is no shortage of water as the water table is at very low depth as located near Ganga.

Flowmeters may be installed to measure actual water consumption, Also you may use Block wise Flowmeters to mnitor consumption and also to know sudden leakages if any.

Construction stage water consumption purpose additional bore wells are drilled, but no monitoring of water consumption is done.

No Large scale Hot water consumption. Only in Hostel they are using one Solar Gyser and one Electric Gyser are used.

For water conservation Water Sensors are used in taps, but water comes in Full tap, Nozzles / Atomisers may be used.

Rain Water Collection from Main Building to Ponds is provided. No Harvesting Pits made as Ground Water Table is at very low depth due to adjacent location to Ganga river (4KM).

Campus waste water is pumped to Main Drain of Patna Muncipal sewage System, but PWC shall get an exemption from Patna Municipality or construct a STP of suitable capacity.

Solid Waste Management Plan includes to reduce the burden on municipal waste disposal facilities and thereby, reduce the need for transportation of wastes for this PWC has started Vermi Composting units in small scale are there (500 Kg Cap 5 Nos, Cycle time 4 to 5 months). PWC shall explore using Higher Capacity Composting units

Lab chemical is neutralized before discharging with NaOH. Image shown below. This practice is OK for small labs, but for big labs they shall establish Neutralisation Pits where all the water from lab is collected and discharged after neutralization.







CLAUSE 11 BUILDING SERVICES OPTIMIZATION

The main objective of this clause is optimization of electro-mechanical services towards achieving a sustainable building. Reduction in heating, cooling, and lighting loads through climate-responsive designs and conservation practices can enhance the energy efficiency of a building.

At PWC lighting Loads are reduced by having good Day Light Factor with sufficient Windows and Building Orientation. Day Light Factor is +2.5. Solar Power is used. Total installed capacity of Solar Power in the campus is 90 KW. Wheeling to Grid with Net Metering System is installed.

Greenery & Landscaping in campus helps in reducing cooling requirement. Natural Ventilation available with Large Windows. Natural vs Mechanical Ventilation To be assessed for New Buildings. All New ACS are 5 Star and old will be replace over the period .There are 197 5 Star Acs 25- 3 Star Acs. Balance ACs to be replaced with 5 Star rated in phased manner.

Slowly replace with Acs having R32 Gas than R410 gas. R32 is the superior refrigerant when compared to R410A. While neither refrigerant depletes the ozone layer, R32 has a lower GWP and is easier to recycle. R32 also has lower operating and maintenance costs and is nowadays more common than

R410A due to the phase out

LED Lamps used approx 90%. Sensor Lights are provide in Street Lighting, but not in Buildings. Sensor lights may be used in Corridors and in some Class rooms/ hostels

Bio-degradable solid waste generated within the building, such as kitchen waste, branches and leaves of trees, grass cuttings utilized through small Composting units of 500 Kg Cap 5 Nos. PWC shall explore using Higher Capacity Composting units



Bio Fuel Mixed Diesel/ Bio Disel may be used in Generators



CLAUSE 12 CONSTRUCTIONAL PRACTICES

The purpose of this clause is to ensure that sustainable construction is taken into account, which entails developing a design proposal that is not only functionally efficient but also includes meticulous planning to optimize the use of materials and construction technologies throughout the building process. To facilitate this, architectural design should be detailed in advance to enable planning of materials and technologies. Furthermore, feasibility reports should incorporate the necessary considerations for sustainable construction. It is also recommended to use digital models to develop construction methodologies, allowing for simulations of physical developments under working conditions on-site

SOP General Terms and Guidelines to Contractors for Sustainable Construction Practices GA/GGC/01

addresses Design, Feasibility, digital models use, pre-construction pre-requisites, Construction Planning, Effective use of water, construction methodology for Heritage Buildings etc. Construction methodology is reviewed from the point of view of its impact on the suitability to achieve quality, control of wastages, safety, resource optimization, energy conservation, water use, site contamination and pollution.

PWC developed the design proposal BOQ-PWC-MPB-01 BY STUDIO VASUDHA as shown below.

Development and regular monitoring of benchmarks are essential for assessing and managing environmental factors associated with energy consumption, water utilization, waste generation, and reuse of waste throughout the construction and operation phases.

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To ensure environmentally responsible practices,

the following benchmarks may be established and consistently monitored:

Energy Consumption Benchmarks: Clear targets should be set to measure and optimize energy usage. This includes evaluating energy efficiency, identifying opportunities for renewable energy integration, and implementing strategies to minimize overall consumption.

Water Utilisation Benchmarks: Measurable goals should be defined to assess and manage water usage. These benchmarks may include monitoring water consumption, implementing water-saving technologies, and promoting the use of recycled or rainwater for non-potable purposes.



Waste Generation Benchmarks: Specific metrics should be established to track and mitigate waste generated during construction and operation activities. This involves minimising waste generation, segregating and recycling materials whenever possible, and implementing waste management plans to ensure proper disposal or reuse.

The Environmental Risk Assessment GA/ERA/01 and Risk Register provide a framework for addressing reliability in the face of specific project-related risks.

They have not evolved construction methodology on digital models so the physical developments at site may be simulated under working conditions.

They are not dealing with social impacts during construction stage as it is an old campus.

PWC may do analysis/ potability tests of Drinking Water Quality from Approved Labs and also Ambient Air Quality monitoring may be done once in a year.

SOP on Disaster Management and Emergency Preparedness Plan (GA/DMP/01 dtd 1st May 2023) addresses Disaster Risk Mitigation during Construction and during operation.



CLAUSE 13 COMMISSIONING, OPERATION, MAINTENANCE AND BUILDING PERFORMANCE TRACKING:

PWC has guidelines covering commissioning and handing over, operation and maintenance and building performance tracking Doc No.GA/OBM/01 Rev00. It's found Satisfactory.

MOMENS C		OF	PERATIONA BUILDIN MAINTENA	L AND G R NCE	GA/OBM/01 td. 20 th June 2023	OP N	ERATIONAL AND BUILDING MAINTENANCE	GA/OBM/01 Dtd. 20 th June 2023
Revisio	on Histo	ory			Rev No: 01	Objectives Building Repair and Mainten facilities of a structure of buil hatticulture and landscaping currently acceptable standar	ance is the work undertaken to ke lding which include housekeeping, to keep the structure/building in g ds to sustain its utility and value.	sp, restore or improve the civil, E&M services, ood conditions and in
Issue No	Rev.	Date	Nature of Changes	Prepared by	Approved By	The objective of maintenance • To ensure safety of th	e is: - ne occupants or the public at large.	
01	01	20th June 2023	Solar Panel Capacity	Mr. Gautam Saurabh	(Dr. Sister M. Rashmi A.C)	To preserve building: Where so required to improved specificatio Maintenance Services The repair works are classifit	and services, in good operating an pupgrade, renovate, rehabilitate, o ins and standards. ed in under mentioned categories:	d habitable conditions.
				Mr. Rajeev Ranjan		 Immediate repair Annual repairs in Routine repairs 	cluding preventive maintenance	
						Modalities of Maintenance		
						The maintenance works are	undertaken through one of the follo	owing:
						Through Contracts, further cl	lassified as:	
						 Contracts for specific 	works	
						 Comprehensive Main 	ntenance	
						Through Contracts		
						The immediate repair, annua are generally carried out thro maintenance.	al repair, routine repair and Retrofit ough individual contracts or outsou	ting and Upgradation works rcing of comprehensive

There is participation of staff from operations, maintenance, engineering, training in O&M. Talked to Shyam Bihari who is working since 1980.

Old Acs being replaced with New Inverter type Acs which consume less power. Old Fans being replaced with new Fans which are energy efficient. But, Separate meters may be fixed for Lighting, Acs, Hotwater system, Pumps, Lifts, Lighting, Fans etc for measuring and monitoring

Verified Document: Water Management Plan GA/WMP/01 R00. Data for water consumption available. Data for electricity consumption available for 5 Years in Energy Audit Document, table 4.7 and Fig 4.8. Monthly Electricity Consumption Data available for each building, which has been verified, satisfactory. For Renewable energy generated on each Solar Plant, and for each Building total energy consumption, separate meters are available.



STATUTORY AND LEGAL COMPLIANCES:

As part of Green Audit CICPL also verified applicable Key Legal Compliances and their summary is given below:

Statutory/ Legal Requirement	Documents Verified	Conclusion
Building Approval/ Permission	Letter no 3202/PMC dt 1.8.2016 Image taken. Approved Drawings seen. Image taken is shown below	compliant
STP Approvals	NA as No STP, but advised to get exemption letter from Patna Muncipal Corporation or to establish New STP.	NA
Fire Safety Approval	Approval seen No 168/FS 17-2019 Image Taken	compliant
MOUs for E Waste, Bio waste etc	E Waste is given to M/S KARO Sambhav Pvt Ltd. MoU dated 21st Feb 2023 seen . Image	compliant
Food Safety by FSSAI	REGTN NO. 20419001000666 dtd 15/06/2019 valid till 14/06/2024 Image No 2.	compliant
Canteen Licences	No Trade Licence	Major NC
Permission document for connecting to the grid from the Government/ Electricity authority	Net Metering agreement no 55 dtd 01/12/2021 Image taken	compliant







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काण्यात् (163) का का 13 काण्यात् भा अग्रे का 13 मेणा मे मेणा मे परमा तो के कार्यनेपा परमा तो के कार्यनेपा माजा - प्रायोग परमा माजा - प्रायोग का कार्यनेपा माजा - प्रायोग का कार्यनेपा	о 86° (1) 9 µТ	
And the state	J46F+MX3, Kidwaipuri,Bihar Patna 800001 India Long:85.1246134 Lat:25.6116351	6/20/2023
معد المحمد ا	ealley Rd	Google
Figure 9-7: Fire Safe	ety Approval	



(Formerly Competent Inspectorate and Consultants LLP) CIN:U74995TG2022PTC161136





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Figure 9-9: FOOD SAFETY BY	FSSAI & CANTEEN LICENCES







10. Annexure 1: Linkage to 31 Points in NAAC's Self-Assessment Criteria as detailed below:

Green Audit covers these points

Metric	NAAC Requirement Metric	Weightage	Where addressed in NBC 11
No.			
Environ	nental Consciousness and Sustainability		
7.1.2	The Institution has facilities for alternate sources of energy and energy conservation	6	8.3 Renewable Energy Integration in Envelop
QnM	measures		8.3.1 Integration of Solar Thermal Technologies
	• 1. Solar energy		11.4 Passive Heating Techniques
	2. Biogas plant		11.10.1 Daylighting and Controls
	3. Wheeling to the Grid		11.16 Renewable Energy
	 4. Sensor-based energy conservation 		Solar Energy
	 5. Use of LED bulbs/ power efficient equipment 		Wind Energy
	 6. Wind mill or any other clean green energy Options: 		Bio-fuels
	A. Any 4 or more of the above		Waste heat utilization
	B. Any 3 of the above		
	C. Any 2 of the above		Pages
	D. Any 1of the above		
	E. None of the above		
	Upload the specific document as per description given below		
			Refer Third party Audit Report by NABCB Approved
Geo-tago	ed photographs of the facilities.		Inspection Body CICPL page Nos
Bills for	the purchase of equipment's for the facilities created under this metric.		. ,
Permiss	ion document for connecting to the grid from the Government/ Electricity authority		
Apart fro	om the above:		
Provide l	inks for any other relevant document to support the claim (if any)		



No.	NAAC Requirement Metric	Weightage	Where addressed in NBC 11
Environ	mental Consciousness and Sustainability		
7.1.3 QIM	Describe the facilities in the Institution for the management of the following types of degradable and non-degradable waste (within 500 words) Solid waste management Liquid waste management Biomedical waste management e-Waste management Waste recycling system Hazardous chemicals and radioactive waste management Provide web link to Relevant documents like agreements/MoUs with Government and other approved agencies Geo-tagged photographs of the facilities Any other relevant information	6	10 WATER AND WASTE MANAGEMENT 10.6 Planning and Design of Solid Waste Management System 10.6.1 Documentation of Nature of Waste and Quantification 10.6.2 Identification of Strategies for Solid Waste Management 10.6.3 Solid Waste System Planning 10.6.5 Provisions for Waste(s) Requiring Special Management - Biomedical waste - e- Waste - Management of radioactive waste 10. Zero anthropogenic waste design solution 10.1.2 Liquid Waste Management 10.1.3 Sustainable approach to water and waste management 3.7 Integrated Water Management water conserving fixtures, landscaping, rainwater harvesting, aquifer recharging and waste water recycling Pages
7.1.4 QnM	 Water conservation facilities available in the Institution: 1. Rain water harvesting 2. Borewell /Open well recharge 3. Construction of tanks and bunds 4. Waste water recycling 	5	 3.7 Integrated Water Management water conserving fixtures, landscaping, rainwater harvesting, aquifer recharging and waste water recycling 7.2 Rainwater Harvesting 7.3.1 Design and Post Occupancy Maintenance of Water

GREEN AUDIT REPORT: PATNA WOMEN'S COLLEGE



Metric No.	NAAC Requirement Metric	Weightage	Where addressed in NBC 11		
Environ	mental Consciousness and Sustainability				
	Options: A. Any 4 or more of the above B. Any 3 of the above C. Any 2 of the above D. Any 1of the above E. None of the above Upload the specific document as per description given below I Geo-tagged photographs of the facilities. I Bills for the purchase of equipment's for the facilities created under this metric. I Green audit reports on water conservation by recognised bodies		 7.3.2 Water Conservation and Irrigation Practices 7.4.1 Reduced Environmental Impacts from Parking Facilities 10.0 zero anthropogenic waste design solution 10.2.1 Planning and Design of Water Supply System 10.2.4 Strategies for Water Efficiency 10.2.5 Strategies for Water Conservation 10.3 Planning and Design of Waste Water System 10.4 Water and Waste Management During Construction? 		
			Pages:		
Apart fro	Apart from the above:				
Provide I	inks for any other relevant document to support the claim (if any)	1.			
7.1.5 QIM	 Green campus initiatives include Describer the Green campus initiative of the institution including Restricted entry of automobiles, Use of Bicycles/ Battery powered vehicles , Pedestrian Friendly pathways , Ban on use of Plastic, landscaping with trees and plants etc in 500 words Upload the specific document as per description given below Policy document on the green campus/plastic free campus. Geo-tagged photographs/videos of the facilities. Circulars and report of activities for the implementation of the initiatives document 	4	 7 EXTERNAL DEVELOPMENT AND LANDSCAPE 7.4.3 Landscape planning and design 7.4.3 Bicycle Lanes and Pedestrian Access 9.2.1.6 Plastics Use of plastics should be limited as far as possible or preference given to plastic products made with recycled content or renewable resources 11.2 Concept Development - solar passive techniques like Landscaping 		
	Provide Links for any other relevant document to support the claim (if any)		Pages:		

GREEN AUDIT REPORT: PATNA WOMEN'S COLLEGE



Metric No.	NAAC Requirement Metric	Weightage	Where addressed in NBC 11
Environ	nental Consciousness and Sustainability		
7.1.6 QnM	 Quality audits on environment and energy are regularly undertaken by the institution 7.1.6.1. The institutional environment and energy initiatives are confirmed through the following 1. Green audit / Environmental audit 2. Energy audit 3. Clean and green campus recognitions/awards 4. Beyond the campus environmental promotion and sustainability activities Options: A. All of the above B. Any 3 of the above C. Any 2 of the above E. None of the above Upload the specific document as per description given below Institutional data in the prescribed format (data template) Policy document on environment and energy usage Certificate from the auditing agency. Certificates of the awards received from recognized agency (if any). Report on environmental promotion and sustainability activities conducted beyond the campus with geo-tagged photographs with 	5	Total Green Audit addresses this 3 APPROACH TO SUSTAINABILITY: Sustainability 4 APPLICABILITY OF THIS PART : Sustainability 5 IMPLEMENTATION OF THIS PART : Sustainability 6 SITING, FORM AND DESIGN : Environmental 7 EXTERNAL DEVELOPMENT AND LANDSCAPE: Environmental 8 ENVELOPE OPTIMIZATION : Environmental 9 MATERIALS : Sustainability 10 WATER AND WASTE MANAGEMENT: Environmental 11 BUILDING SERVICES OPTIMIZATION : Energy Efficiency 12 CONSTRUCTIONAL PRACTICES : Sustainability 13 COMMISSIONING, OPERATION, MAINTENANCE AND BUILDING PERFORMANCE TRACKING: Energy Efficiency
caption and date. I Green audit/environmental audit report from recognized bodies Apart from the above: Provide Links for any other relevant document to support the claim (if any)		Refer Third party Audit Report by NABCB Approved Inspection Body CICPL Audit Report	



Metric No.	NAAC Requirement Metric	Weightage	Where addressed in NBC 11
Environ	nental Consciousness and Sustainability		
7.1.7 QIM	 The Institution has Differently-abled (Divyangjan) friendly, barrier free environment Write description covering the various components of barrier free environment in your institution in maximum of 500 words Ramps/lifts for easy access to classrooms Divyangjan friendly washrooms Signage including tactile path, lights, display boards and signposts Assistive technology and facilities for Divyangjan accessible website, screen-reading software, mechanized equipment Provision for enquiry and information: Human assistance, reader, scribe, soft copies of reading material, screen reading 	5	3.2 Elements of Sustainabilityc) needs of persons with disabilities and of different age groups,7.5.2 External Signage Design



11. Annexure 2: NCRs Report

PDF attached 10 Pages