



**Environment Audit Report
Bodoland University, Kokrajhar
(BTR), (Assam) 2021-22**



Environment Audit Report CONSULTATION



**Bodoland University,
Kokrajhar (BTR),
(Assam)**

PREPARED BY

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(2021-22)



**Environment Audit Report
Bodoland University, Kokrajhar
(BTR), (Assam) 2021-22**



CONTENT

Sr. No.	Items	Page No
I	Acknowledgement	3
II	Green Monitoring Committee	4
III	The Audit Team	5
IV	Executive Summary	6
Chapter-1	Introduction	8
1.1	About University	8
1.2	About Environment Auditing	12
1.3	Objective of Environment Audit	12
1.4	Target Areas of Environment Audit	12
1.5	Methodology Followed for Conducting Environment Audit	13
Chapter- 2	Water Consumption and Waste Water Sources	14
2.1	Details of Source Fresh Water and Uses Area	14
2.2	Bore well Power Measurement	16
2.3	Water Accounting and Metering System	18
2.4	Water Storage Capacity in University	19
2.5	Fresh Water Distribution Layout of University	21
2.6	Water Uses Area in University	23
2.7	Details of Water Cooler in University	24
2.8	Fresh Water Uses for Gardening	25
2.9	Waste Water Generation Sources	26



**Environment Audit Report
Bodoland University, Kokrajhar
(BTR), (Assam) 2021-22**



ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore (M.P.) takes this opportunity to appreciate & thank the management of **Bodoland University, Kokrajhar, Assam** for giving us an opportunity to conduct environment audit for the university.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation the course of study.




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Environment Audit Report
Bodoland University, Kokrajhar
(BTR), (Assam) 2021-22



Green Monitoring Committee


 OFFICE OF THE INTERNAL QUALITY ASSURANCE CELL
(IQAC)
BODOLAND UNIVERSITY
DEBARGAON, KOKRAJHAR, BTR, ASSAM-783370

Ref. BU/IQAC/2022/Letter/01 Dated 16/09/2022

OFFICE ORDER

As approved by the Honorable Vice-Chancellor dated 1/09/22, the Green Audit Committee, Bodoland University, is constituted with the following member's effect from the date of issue of the order till the further order.

S/N	Profile	Name
1.	Convener	Dr Hemen Sarma, Dept of Botany
2.	Members	Chairperson, Kokrajhar Municipal Corporation
3.		Prof. Haremba Bailung, Dept. of Physics
4.		Prof. Hilloljyoti Singha, Dept. of Zoology
5.		Prof. Sanjoy Basumatary, Dept of Chemistry
6.		Dr. Kushal Choudhury, Dept of Zoology
7.		Dr. Sanjib Barua, Dept of Botany
8.		Dr. Yutika Narzary, Dept of Botany
9.		Dr. Rebecca Daimary, Dept of Botany


(Prof. Sujit Deka)
Director
IQAC, Bodoland University
Kokrajhar, 783370

Director, IQAC
Bodoland University
Kokrajhar, 783370

File No. BU/IQAC/Essential/2022/01

Copy to –

1. P.S. to the Vice-Chancellor, Bodoland University for information
2. Members Concerned
3. Office File



**Environment Audit Report
Bodoland University, Kokrajhar
(BTR), (Assam) 2021-22**



The Audit Team

The study team constituted of the following senior technical executives from **Empirical Exergy Private Limited, Indore (M.P.)**

- + **Mr. Rajesh Kumar Singadiya** [Director & Accredited Energy Auditor AEA-0284]
- + **Mr. Rakesh Pathak**, [Director & Electrical Expert]
- + **Mr. Sachin Kumawat** [Sr. Project Engineer]
- + **Mrs. Laxmi Raikwar Singadiya** [Energy Engineer]
- + **Mr. Ajay Nahra** [Sr. Accountant]
- + **Mr. Charchit Pathak** [Mechanical Engineer]
- + **Mr. Aakash Kumawat** [Jr. Engineer]
- + **Mr. Mohan Choudhary** [Sr. Electrician]



EXECUTIVE SUMMARY

The executive summary of the environment audit report furnished in this section briefly gives the identified water conservation measures that can be implemented in a phased manner to water conservation and increase the productivity of the university

ENVIRONMENT AUDIT RECOMMENDATION

+ FRESH WATER MONITORING SYSTEM

- Installation of “Cloud based (IoT based) ground water extraction monitoring system” for bore well to quantify fresh water consumption per day in the university
- Install water flow meters (Mechanical or Electronics) on water distribution network for quantity per day water consumption.

+ WASTE WATER TREATMENT PLANT

There is requirement to install sewerage treatment plant (STP) for waste water generated from various activities in university. All waste water generated from drinking , washing & RO rejected are collected in separate tank and it should be treated in propose STP plant and above treated water used for gardening.

+ DRIP WATER IRRIGATION SYSTEM

- Use drip water irrigation system for trees and plants.

+ WATER SPRINKLER SYSTEM.

- There are good potential to install water sprinkler system for lawn area in university. It will be reduced water consumption of university



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Bodoland University, Kokrajhar
(BTR), (Assam) 2021-22**



✚ USE EFFICIENT WATER TAPS .

- Water saving taps either reduce water flow or automatically switch off to help save water. So, it is highly recommended to install efficient water taps in university to reduce water consumption

✚ USE EFFICIENT URINAL TAPS.

- Replacing these inefficient fixtures with water sense labelled flushing urinal can save between 0.5 to 04 liter per flush without sacrificing performance. Installing water saving flushing urinal will not only reduce water use in facilities but also save pumping energy on water bills.

✚ INSTALLATION OF WATER OVERFLOW SENSOR IN TANKS: -

It was observed that water overflow in overhead tanks after tank filling. So, it is recommended installation of water overflow sensor to avoid water overflow.



CHAPTER-1 INTRODUCTION

1.1 About University

Bodoland University was established by bodoland university act 2009, passed in the Assam legislative assembly. The present bodoland university is an up-gradation of the kokrajhar campus of Guwahati University to a full fledged state university as per the provision of the Act

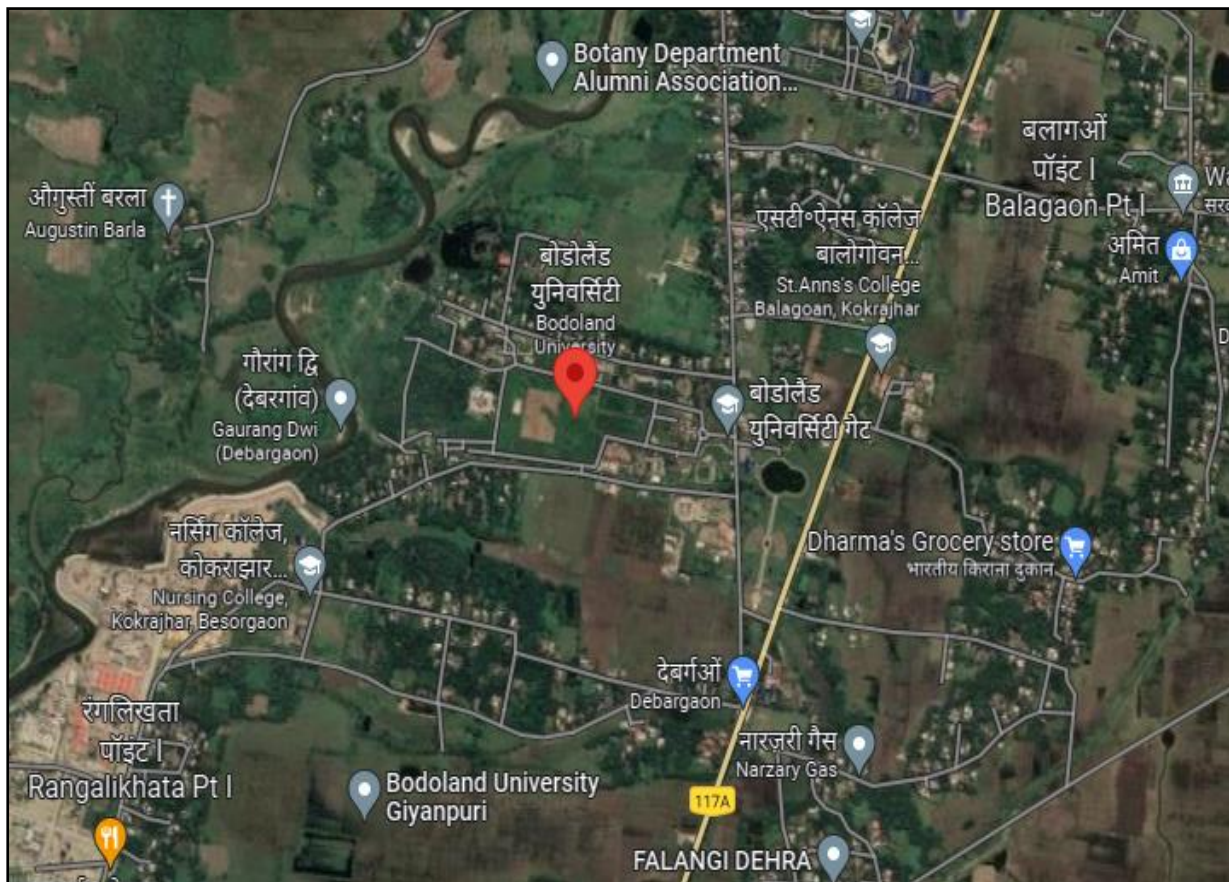


Figure 1.1: - Satellite Image of Bodoland University, Kokrajhar, Assam



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+ VISION:-

Bodoland university aspires to be a lead public university that can indoctrinate its student's moral values, scientific temper, socio-cultural, economic and political leadership qualities in order to meet the regional, national and global challenges.

+ MISSION:-

1. To impart value based education leading to holistic sustainable development.
2. To conduct need based location-specific research and development of the highest quality with a wide range of interests.
3. Keeping clear focus on the advancement of technology, effort to be made to increase efficiency of existing technology, optimize the use of natural resources and preserve the environment.
4. To ensure access of all sections of the society for higher education keeping in view the prevailing socio-economic deprivations.
5. To inculcate woman empowerment potential through education.
6. To protect, preserve and promote ethics and cultural heritage pertinent to the location in particular and country in general for furtherance of national integrity.
7. To provide up-to-date, relevant and need-based knowledge.
8. To promote flexible, effective governance.
9. To create linkage with concerned centre of advancement/excellence in country /abroad.
10. To produce high-calibre students who are expected to play leading roles in their chosen careers ensuring effective and sustainable social actions. The University should be a breeding ground of new generation of human resource who would be job-creators and not job-seekers.



**Environment Audit Report
Bodoland University, Kokrajhar
(BTR), (Assam) 2021-22**



Details are the total build-up area given

The Total build up area of the university in the given table. Total build-up area for all floors 57869 SQ.MT

Sr. no.	Building Name	Total Area Sq.mt.
1	Administrative	2000
2	Academic Science Building	860
3	Teaching Staff Quarter	240
4	Vice Chancellor Residence Complex	520
Technical Staff Quarter		
Sr.no.	Building Name	Total Area Sq.mt.
5	Grade IV	125
6	Grade III	152
7	Academic Art	957.8
8	Academic Art	957.8
9	New Science	289
10	Library	306
11	Assam Type	865
12	Bodo Study Centre	1007.5
13	New teaching Staff Quarter	240
14	Officers Quarter	331.36
15	Art building	938.5
16	SC Girls Hostel	348
17	ST Girls Hostel	348
18	Girls Hostel	468
19	Girls Hostel	468
20	ST Boys Hostel	468
21	General Boys Hostel	348
22	PSGU Office Building	120
23	Canteen Building	270
24	Auditorium Hall	1500
25	Technology Incubation Centre	510
26	Development Play Ground	40000
27	Chemistry Department	860
Haldibhari Complex		
Sr.no.	Building Name	Total Area Sq.mt.
28	Teaching Staff Quarter	240
29	Plant Tissue Culture lab	540
30	Dept. of Zoology	796
31	Dept. of Botany	796



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Bodoland University, Kokrajhar
(BTR), (Assam) 2021-22**



Layout of the University

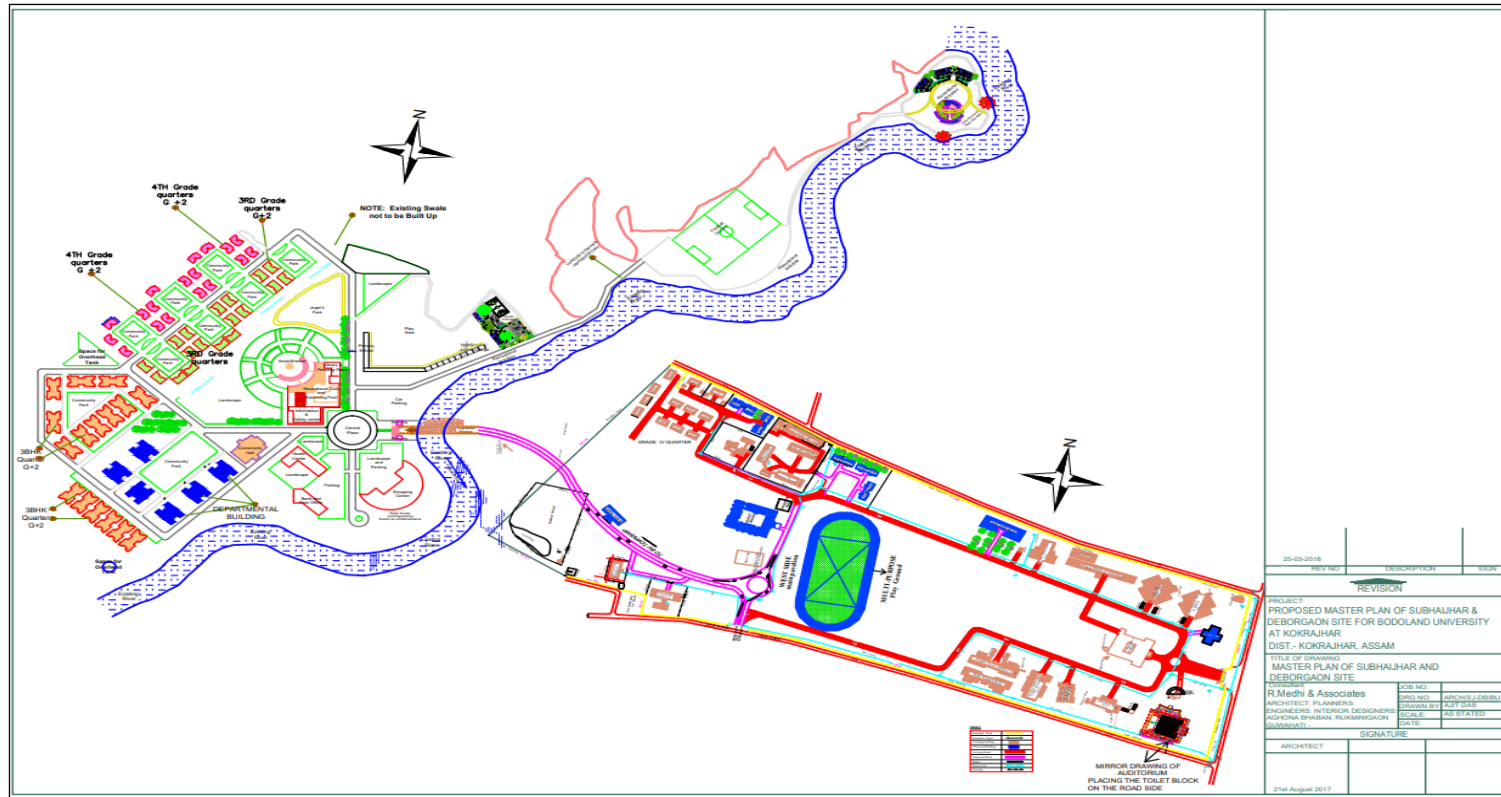


Figure: - 1.2 Layout of the Bodolend University



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1.2 About environment auditing

Environment audit can be a highly valuable tool for university in a wide range of ways to improve their energy, environment and economic performance. While reducing wastages and operating costs. Environment audit provide a basis for calculating the economic benefits of water conservation projects by establishing the current rates of water use and their associated cost.

1.3 Objectives of environment audit

The general objective of environment audit is to prepare a baseline report on water conservation measures to mitigate consumption, improve quality and sustainable practices.

The specific objectives are

- ✚ To monitor the water consumption and water conservation practices.
- ✚ To assess the quantity of water, usage, quantity of waste water generation and their reduction within the university

1.4 Target Areas of Environment audit

This indicator addresses water sources, water consumption, irrigation, storm water, appliances and fixtures aquifer depletion and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices.



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1.5 Methodology followed for conducting Environment audit

Step 1: Walk through survey

- ✚ Understanding of existing water sourcing, storage and distribution facility.
- ✚ Assessing the water demand and water consumption areas.
- ✚ Preparation of detailed water circuit diagram.

Step 2: Secondary Data Collection

- ✚ Analyse historic water use and waste water generation
- ✚ Field measurements for estimating current water use
- ✚ Metered & unmetered supplies.
- ✚ Understanding of “base” flow and usage trend at site
- ✚ Past water bills
- ✚ Wastewater treatment scheme & costs etc.

Step 3: Site Environment Audit Planning (based on site operations and practices)

- ✚ Preparation of water flow diagram to quantify water use at various locations
- ✚ Wastewater flow measurement and sampling plan

Step 4: Conduction of Detailed Environment Audit & Measurements

- ✚ Conduction of field measurements to quantify water/wastewater streams
- ✚ Power measurement of pumps/motors
- ✚ Preparation of water balance diagram
- ✚ Establishing water consumption pattern
- ✚ Detection of potential leaks & water losses in the system
- ✚ Assessment of productive and unproductive usage of water
- ✚ Determine key opportunities for water consumption reduction, reuse & recycle.

Step 5: Preparation of Environment Audit Report

- ✚ Documentation of collected & analysed water balancing and measurement details
- ✚ Projects and procedures to maximize water savings and minimize water losses.
- ✚ Opportunities for water conservation based on reduce/recycle/reuse and recharge option



CHAPTER- 2

WATER CONSUMPTION AND WASTE WATER SOURCES

2.1 Details of source of fresh water and use areas

The main source of freshwater is bore well for the university. The freshwater is mainly used for drinking, housekeeping, gardening, domestic activity and new construction project.

Details of the bore well are given in table 2.1

Sr. No.	Location	No. of Bore well	Capacity (HP)	Running Hour
1	Chemistry Department	1	1.5	3 Hours/ Day
2	Incubation Center	1	1.5	3 Hours/ Day
3	Central Library	1	1.5	3 Hours/ Day
4	Alongbar Science Building	1	1.5	3 Hours/ Day
5	Suniti Kr. Chatterjee Hall	1	1.5	3 Hours/ Day
6	Arts Building	1	1.5	3 Hours/ Day
7	Zoology Dept.	1	1.5	3 Hours/ Day
8	Br. Ambedkar Social Science Building	1	1.5	3 Hours/ Day
9	SC Girls Hostel	1	1.5	3 Hours/ Day
10	ST Girls Hostel	1	1.5	3 Hours/ Day
11	Genral Girls Hostel	1	1.5	3 Hours/ Day
12	New Girls Hostel	3	1.5	3 Hours/ Day
13	Boys Hostel-01	1	1.5	3 Hours/ Day
14	Boys Hostel-02	1	1.5	3 Hours/ Day
15	Guest House	1	1.5	3 Hours/ Day
16	Animal House	1	1.5	3 Hours/ Day
17	Admin Block	1	1.5	3 Hours/ Day
18	Gurudev Kalichran Brahma Building	1	1.5	3 Hours/ Day
19	Quarter -01	1	1.5	3 Hours/ Day
20	Quarter -02	1	1.5	3 Hours/ Day
21	Quarter -03	1	1.5	3 Hours/ Day
22	Quarter -04	1	1.5	3 Hours/ Day
23	Quarter -05	1	1.5	3 Hours/ Day
24	Quarter -06	1	1.5	3 Hours/ Day
	Total	26		



Some Photographs of water sources like bore well

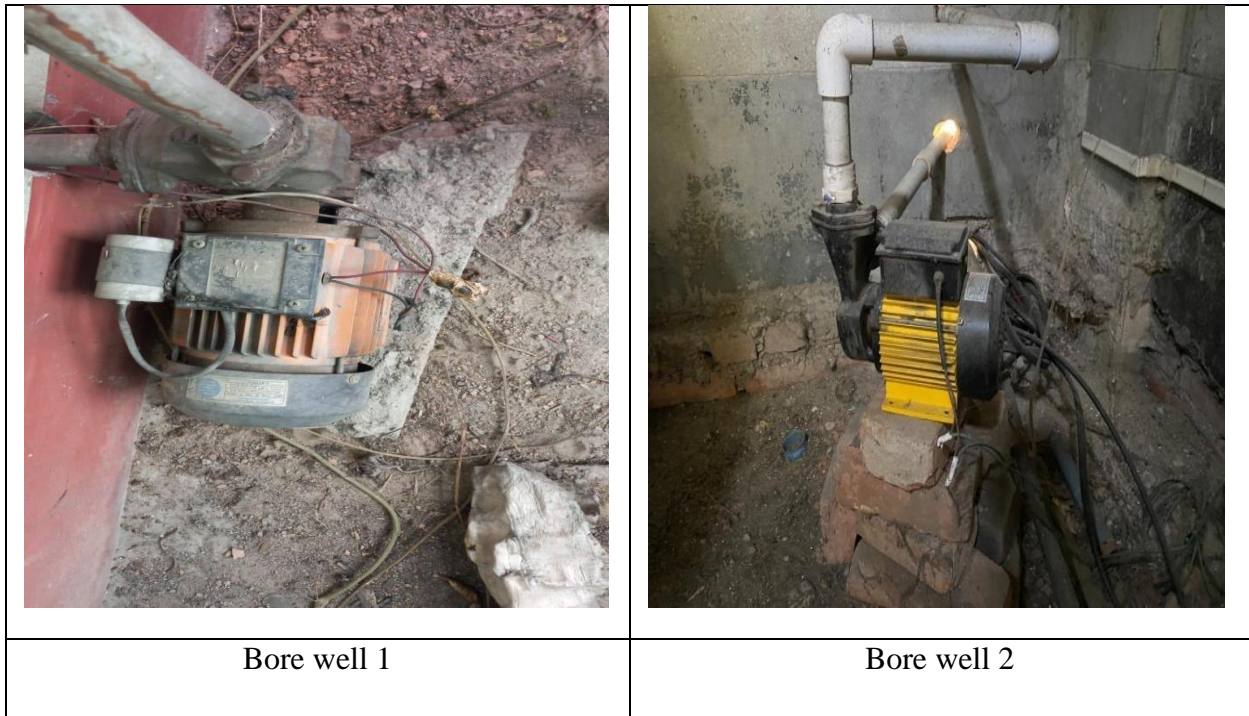


Figure:- 2.1 Bore well in university



Environment Audit Report
Bodoland University, Kokrajhar
(BTR), (Assam) 2021-22



2.2 Power measurement on bore wells

Sr. No	Fresh water sources	Location	Motor Power (HP)	Voltage (V)	Current (A)	PF	Input power (KW)	Working (Hr./day)
1	Bore well -01	Chemistry Dept.	1.5	231	2.7	0.86	0.5	3 Hours
2	Bore well -02	Incubation Center	1.5	233	3.2	0.88	0.7	3 Hours
3	Bore well -03	Central Library	1.5	231	2.8	0.87	0.6	3 Hours
4	Bore well -04	Alongbar Science Building	1.5	233	2.3	0.89	0.5	3 Hours
5	Bore well -05	Suniti Kr. Chatterjee Hall	1.5	231	2.8	0.85	0.5	3 Hours
6	Bore well -06	Arts Building	1.5	234	3.1	0.86	0.6	3 Hours
7	Bore well -07	Zoology Dept.	1.5	234	2.8	0.85	0.6	3 Hours
8	Bore well -08	Br. Ambedkar Social Science Building	1.5	234	2.7	0.86	0.5	3 Hours
9	Bore well -09	SC Girls Hostel	1.5	231	2.9	0.87	0.6	3 Hours
10	Bore well -10	ST Girls Hostel	1.5	232	3.1	0.86	0.6	3 Hours
11	Bore well -11	Genral Girls Hostel	1.5	233	2.9	0.85	0.6	3 Hours
12	Bore well -12	New Girls Hostel	1.5	230	2.7	0.87	0.5	3 Hours
13	Bore well -13	New Girls Hostel	1.5	231	3.3	0.86	0.7	3 Hours
14	Bore well -14	New Girls Hostel	1.5	233	2.7	0.85	0.5	3 Hours
15	Bore well -15	Boys Hostel-01	1.5	233	2.3	0.87	0.5	3 Hours
16	Bore well -16	Boys Hostel-02	1.5	234	2.5	0.87	0.5	3 Hours
17	Bore well -17	Guest House	1.5	231	2.9	0.88	0.6	3 Hours
18	Bore well -18	Animal House	1.5	231	2.8	0.89	0.6	3 Hours
19	Bore well -19	Admin Block	1.5	234	3.1	0.87	0.6	3 Hours
20	Bore well -20	Gurudev Kalichran Brahma Building	1.5	233	3.2	0.88	0.7	3 Hours
21	Bore well -21	Quarter-01	1.5	232	3.1	0.85	0.6	3 Hours
22	Bore well -22	Quarter-02	1.5	233	3.2	0.88	0.7	3 Hours

Sr. No	Fresh Water Sources	Location	Motor Power (HP)	Voltage (V)	Current (A)	PF	Input power (KW)	Working (Hr./day)
23	Bore well -23	Quarter-03	1.5	234	2.9	0.86	0.6	3 Hours
24	Bore well -24	Quarter-04	1.5	231	2.8	0.86	0.6	3 Hours
25	Bore well -25	Quarter-05	1.5	230	3.1	0.88	0.6	3 Hours
26	Bore well -26	Quarter-06	1.5	232	2.9	0.87	0.6	3 Hours

Photograph of bore well power measurement

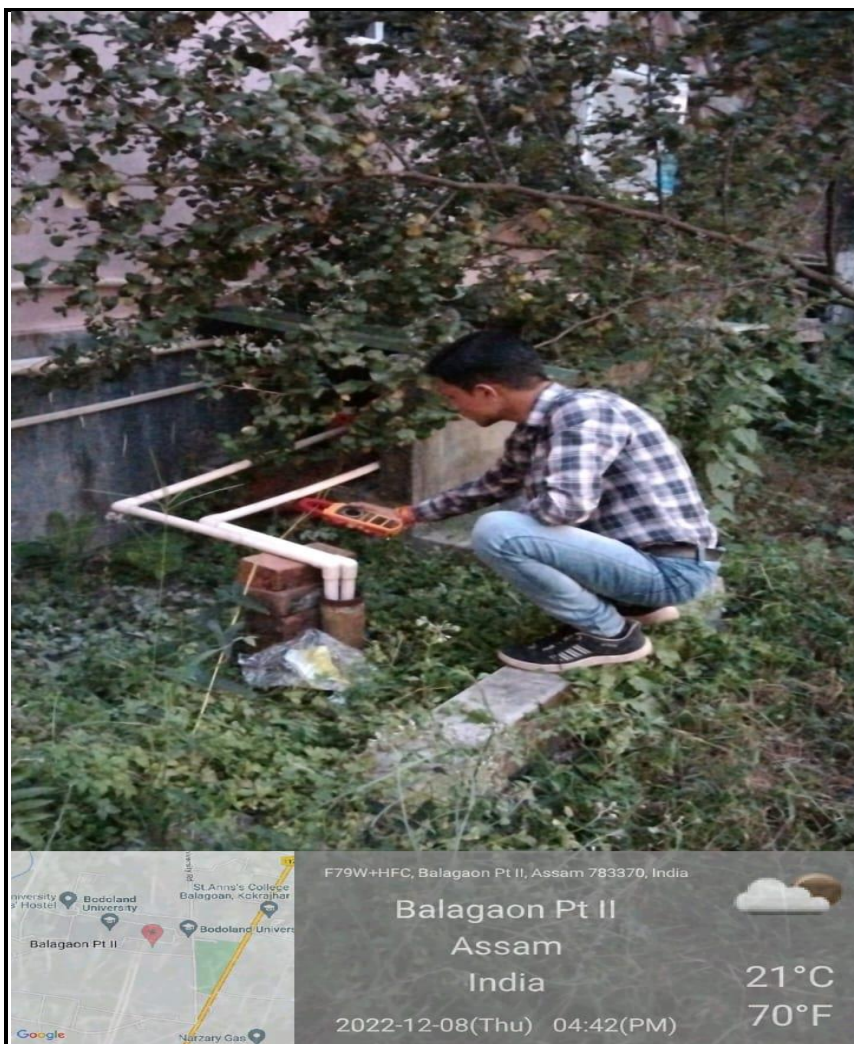


Figure :- 2.2 Power measurement of bore well

2.3 Water Accounting & metering system

It was observed that there is requirement of water flow meters on bore well quantify per day ground water extraction from different locations.



Figure: - 2.3 Requirement of water meter on bore well

Observation.

Environment audit team observe that there are required water meter on bore well system. So it is recommended to install water meter on bore wells to quantify of fresh water per day in university campus.



**Environment Audit Report
Bodoland University, Kokrajhar
(BTR), (Assam) 2021-22**



2.4 Water storage capacity in university

There are followings tanks available in university for water storage like PVC tanks. Details of the tanks is given in table.

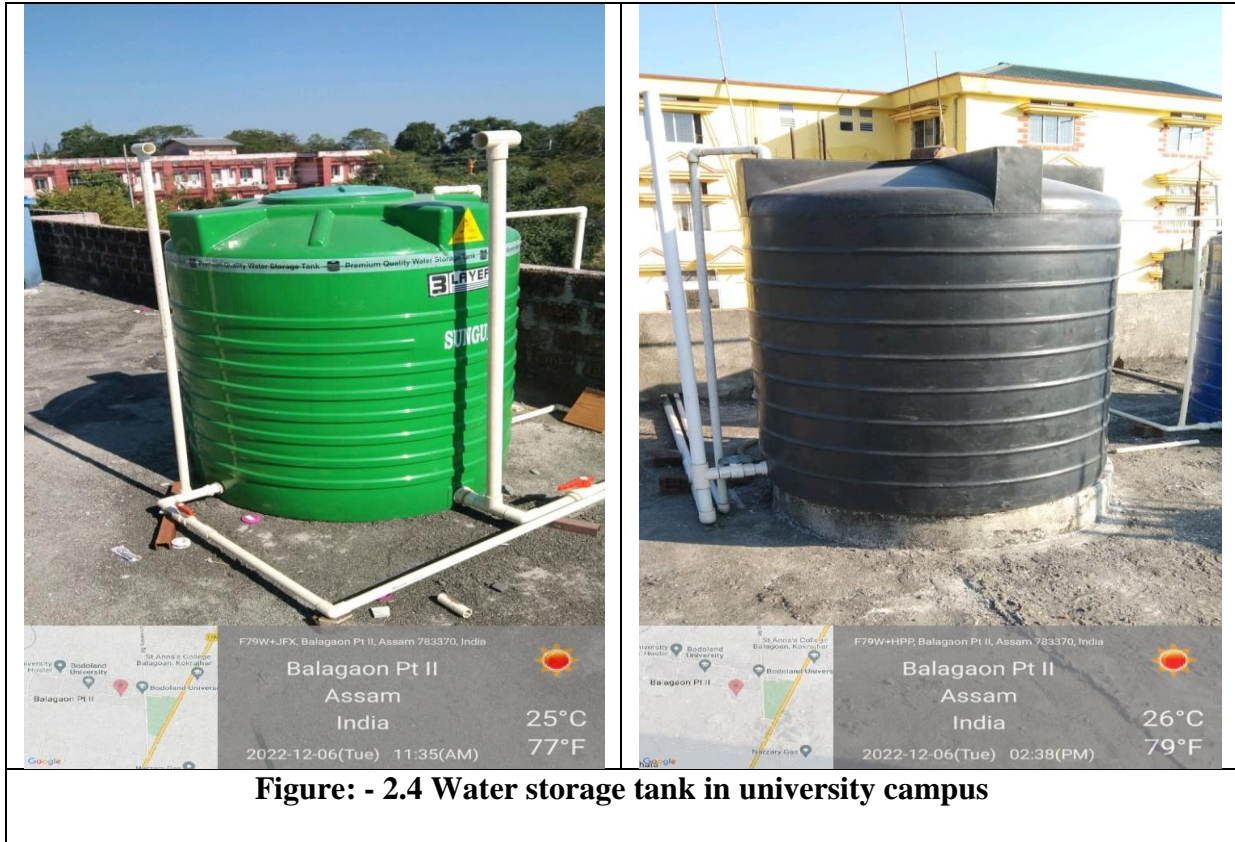
Sr. No.	Location	No. of Tanks	Tank Capacity (Liter)	Type of Tank
1	Chemistry Dept.	2	2000	Syntax
2	Incubation Centre	3	1000	Syntax
3	Central Library	1	500	Syntax
4		1	2000	Syntax
5	Alongbar Science Building	2	1500	Syntax
6		2	1000	Syntax
7		1	2000	Syntax
8	Arts Building	3	2000	Syntax
9	Suniti Kr. Chatterjee Hall	2	2000	Syntax
10	Dept. of Zoology	1	1000	Syntax
11	Br. Ambedkar Social Science Building	3	1000	Syntax
12	Old Arts Building	5	1000	Syntax
13	Admin Building	3	2000	Syntax
14	SC Girls Hostel	4	2000	Syntax
15	ST Girls Hostel	3	2000	Syntax
16	Genral Girs Hostel	3	1000	Syntax
17	New Girls Hostel	5	2000	Syntax
18	Guest House	6	1000	Syntax
19	Boys Hostel 01	5	1000	Syntax
20	ST Boys Hostel 02	2	1000	Syntax
22	Animal House	1	1000	Syntax
22	Quarter-01	1	2000	Syntax
23	Quarter-02	1	2000	Syntax
24	Quarter-03	1	2000	Syntax
25	Quarter-04	1	2000	Syntax
26	Quarter-05	1	2000	Syntax
27	Quarter-06	1	2000	Syntax
28	VC Loudge	1	2000	Syntax
	Total	65	43000	



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Photographs of water storage tanks.



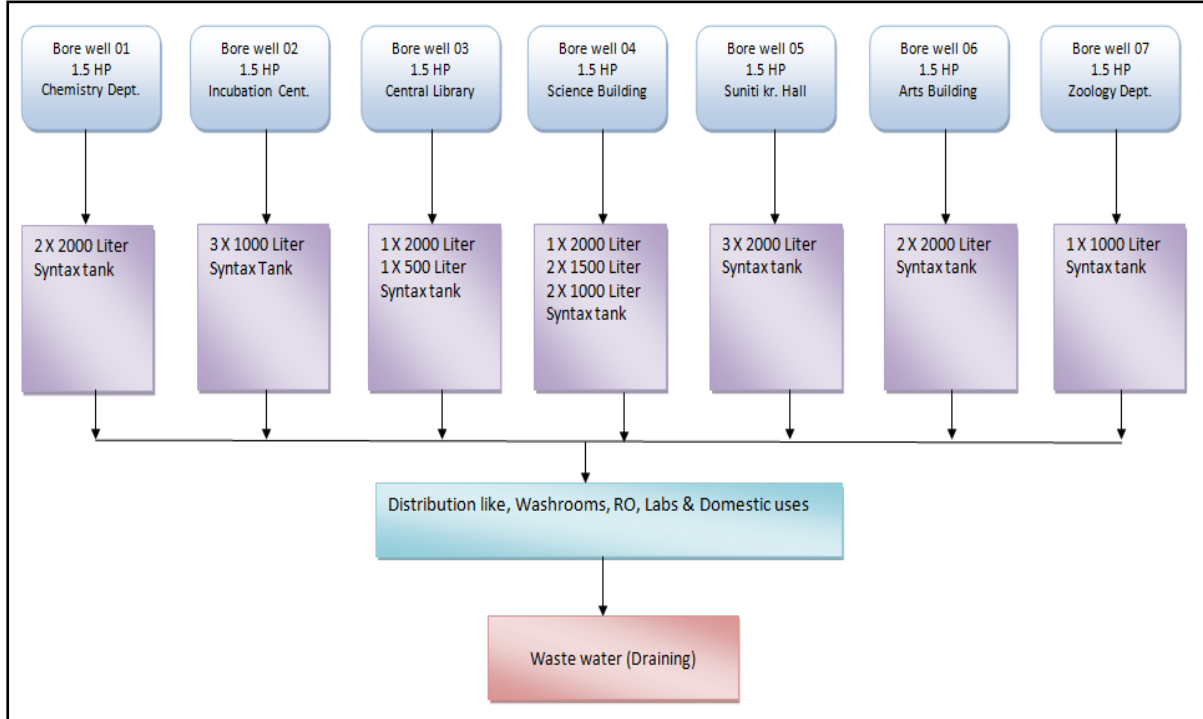


Environment Audit Report Bodoland University, Kokrajhar (BTR), (Assam) 2021-22

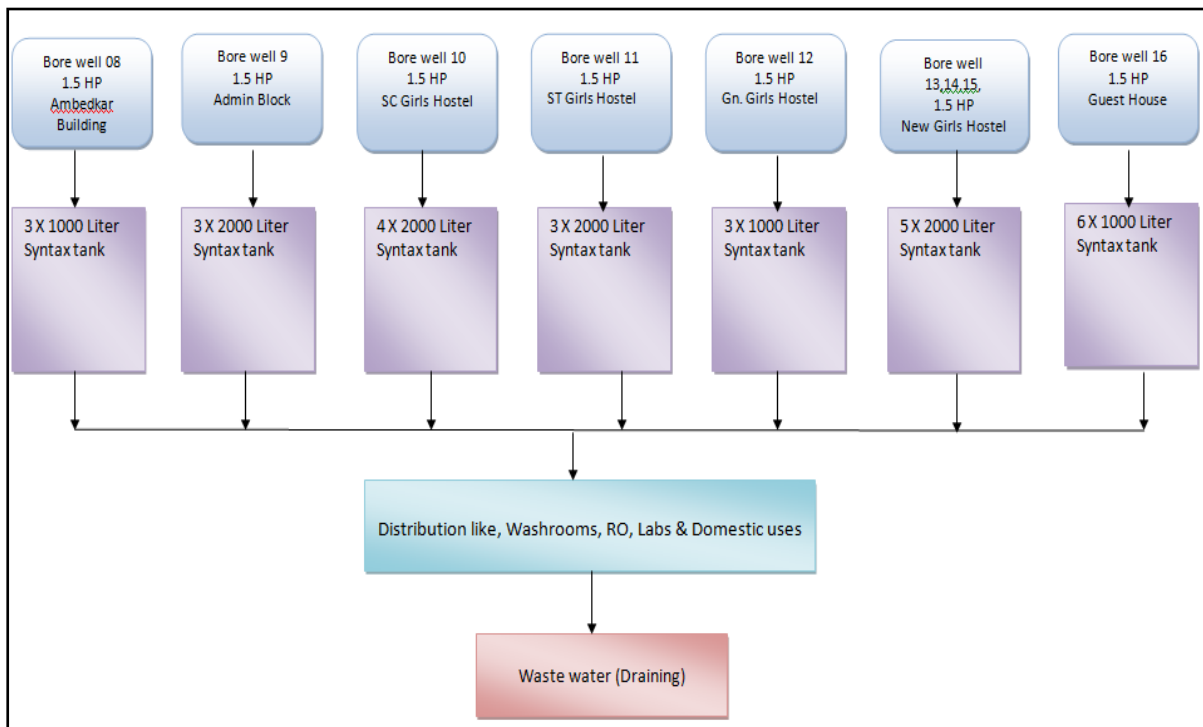


2.5 Fresh Water Distribution layout of university

Flow Diagram 01



Flow Diagram 02





Flow Diagram 03

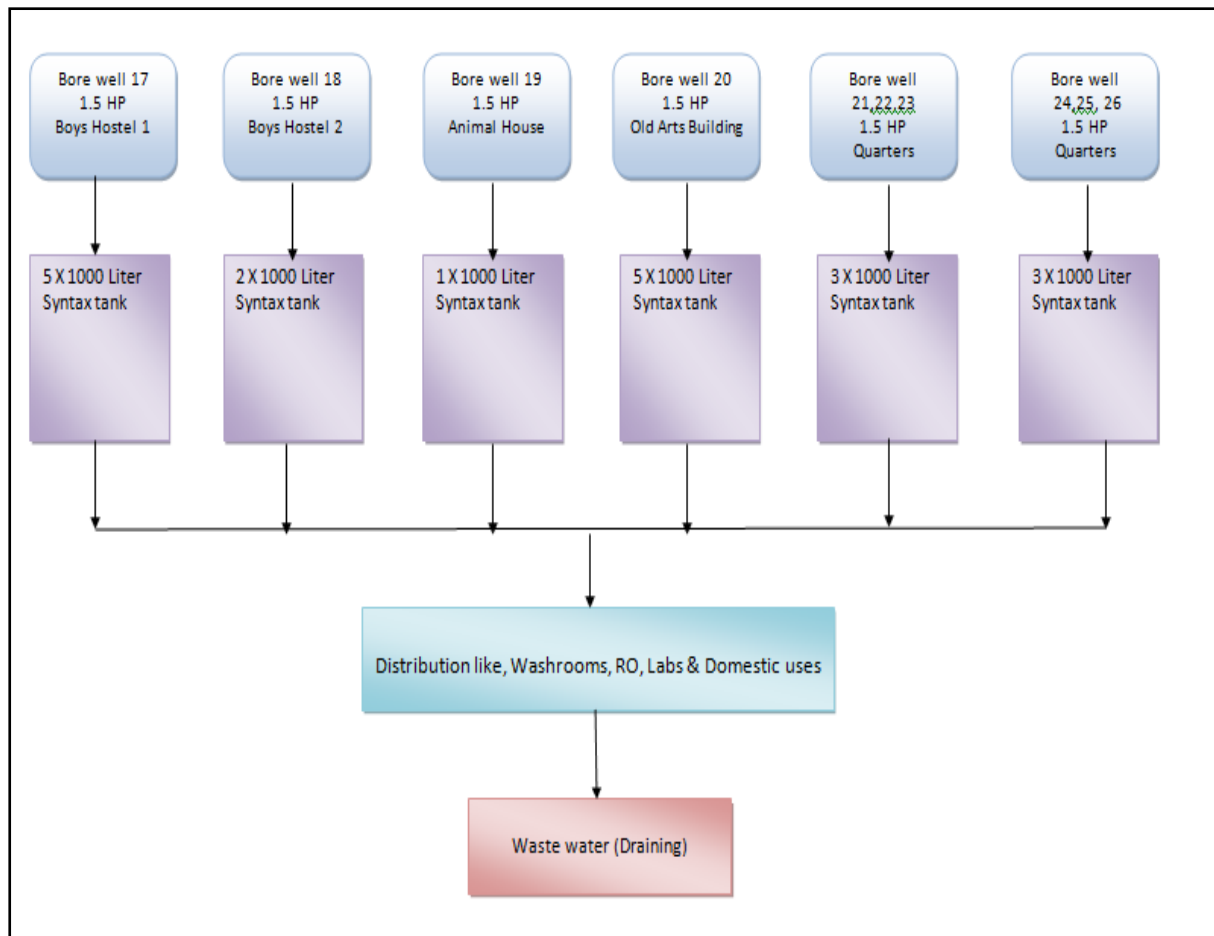


Figure:- 2.5 Flow Diagrams of water distribution in university

2.6 Water use areas in university

Water is preliminary used for drinking, domestic, gardening and lab activity. Environment audit team visited various departments and buildings to determine appliances. The details of washroom, toilet and taps are given in table

Details of washroom and uses taps in various areas

Sr. No.	Location	Toilets	Taps	Washbasin	Urinals
1	Dhnsree Hall	8	8	8	12
2	Library Building	10	10	4	2
3	Alongbar Science Building	27	27	11	8
4	New Arts Building	8	8	12	6
5	Suniti Kr. Chatterjee Hall	17	17	12	4
6	Zoology Dept.	1	1	1	0
7	Br Ambedkar Social Science Building	13	13	14	18
8	Gurudev Kalichran Brahma Building	16	16	12	12
9	Admin Building	14	14	20	6
	Total	114	114	94	68

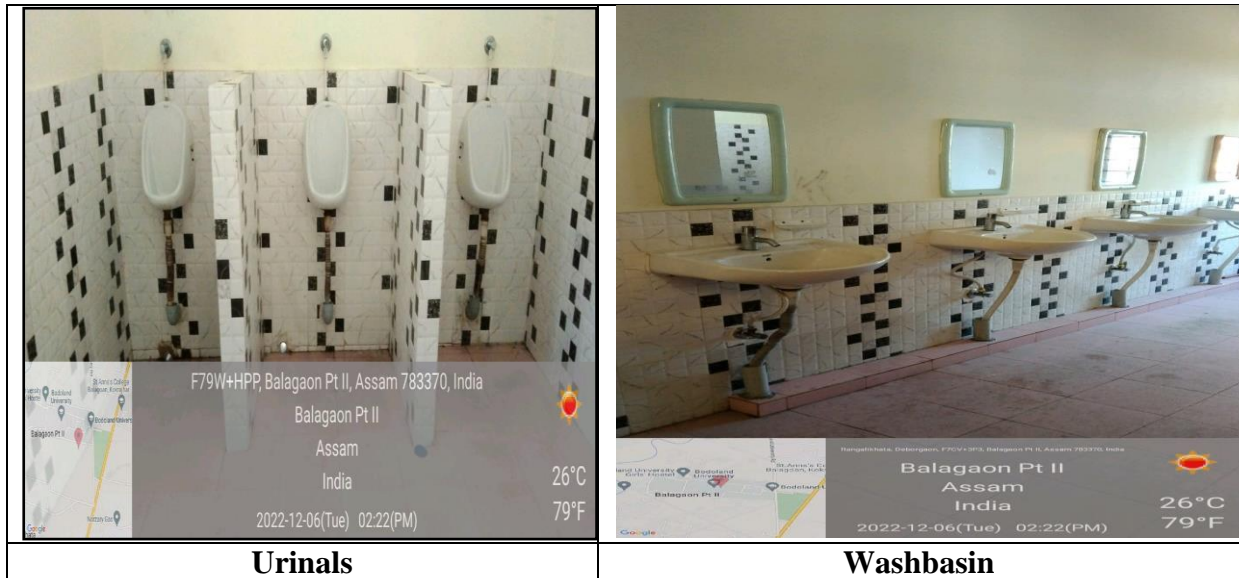


Figure: - 2.6 Urinals & washbasins in university

2.7 Details of water cooler & RO in university

Details of water cooler & RO in university

Sr. No.	Location	RO (No's)	Water Cooler (No's)
1	Dhnsree Hall	1	0
2	Library Building	1	0
3	Alongbar Science Building	3	2
4	New Arts Building	2	1
5	Suniti Kr. Chatterjee Hall	1	0
6	Zoology Dept.	1	0
7	Br Ambedkar Social Science Building	2	0
8	Gurudev Kalichran Brahma Building	2	0
9	Admin Building	1	1
	Total	14	4

Some photographs of RO & water cooler in university



Figure: - 2.7 Drinking water sources of university



Environment Audit Report Bodoland University, Kokrajhar (BTR), (Assam) 2021-22



2.8 Fresh water uses for gardening

The one of major contribution from fresh water consumption is watering for other plants in university. There is good potential for water saving by adopt “Automatic Watering 360 adjustable misting nozzle irrigation dripper’s system” for plants. Adjustable drip irrigation tools to provide different amounts of water depending on the water requirements of different plants. The drip speed can be set as for indoor and outdoor plants.



Figure: - 2.8 Water uses for gardening in university



Proposed Adjustable Misting Nozzle Irrigation Drippers Proposed water timer

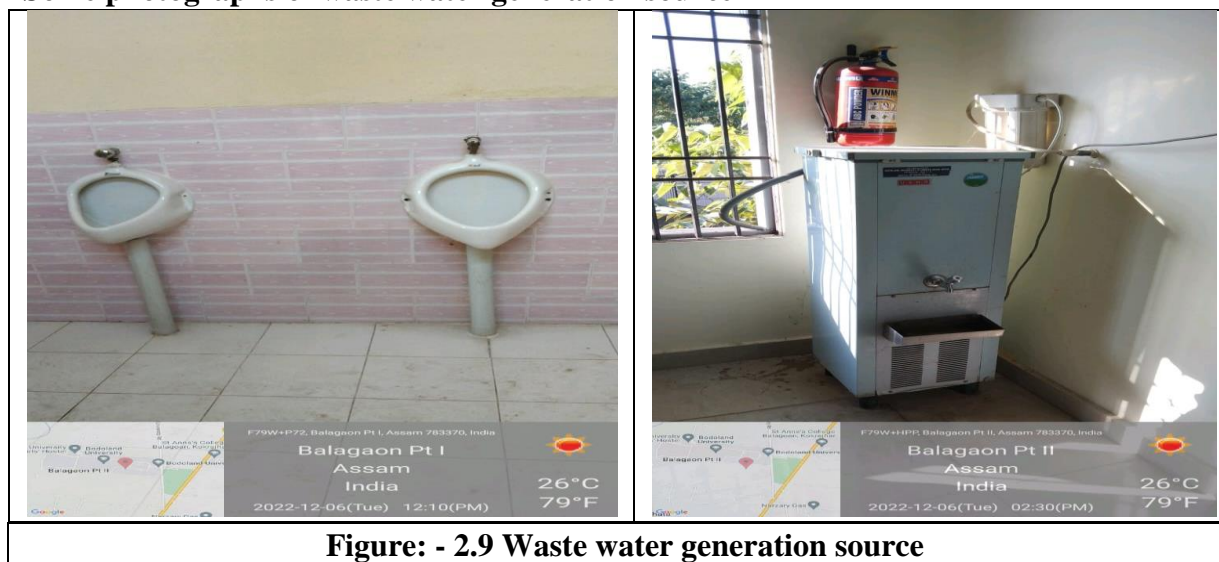
2.9 Waste water generation sources

At present waste water generated from various departments canteen, & other activity like washrooms, hand wash and RO rejected etc.

Details of wastewater generation sources with location in below table

Sr. No.	Location	Type of water used	Water consuming activities
1	Dhanshree Hall	Fresh water	Labs ,Drinking and other uses
2	Library Building	Fresh water	Drinking and other uses
3	Alongbar Science Building	Fresh water	Labs, Drinking and other uses
5	New Arts Building	Fresh water	Drinking and other uses
6	Suniti Kr. Chatterjee Hall	Fresh water	Drinking and other uses
7	Zoology Dept.	Fresh water	Labs, Drinking and other uses
8	Br Ambedkar Social Science Building	Fresh water	Drinking and other uses
9	Gurudev Kalichran Brahma Building	Fresh water	Drinking and other uses
10	Admin Building	Fresh water	Drinking and other uses
11	Canteen & Others	Fresh water	Drinking and Domestic & other uses

Some photographs of waste water generation source



There are different types of waste water generation source like washrooms, lab, RO rejected and others



**Environment Audit Report
Bodoland University, Kokrajhar
(BTR), (Assam) 2021-22**



END OF THE REPORT

THANKS