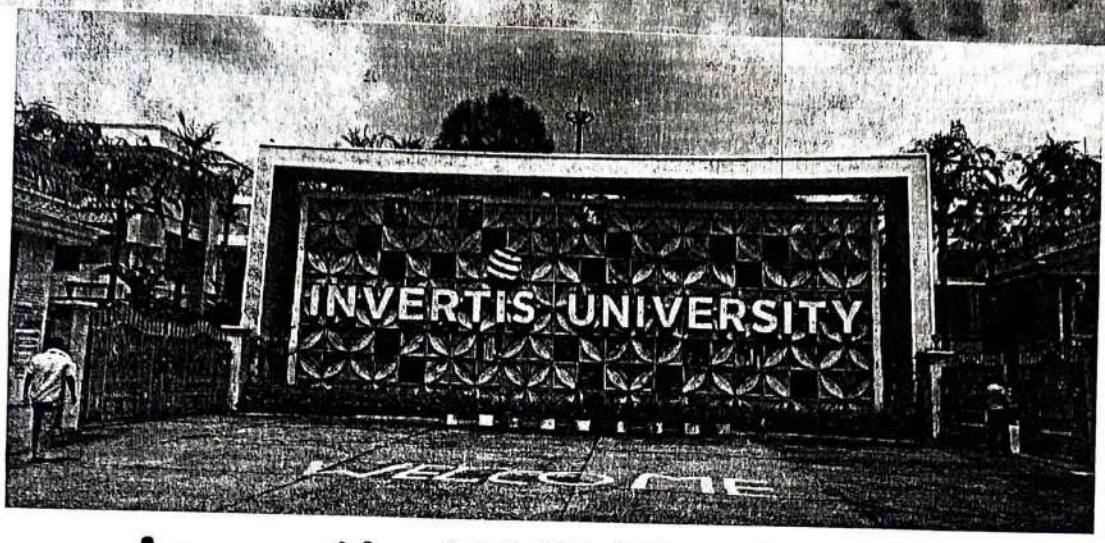
WATER AUDIT



Invertis UNIVERSITY

INVERTIS VILLAGE, BAREILLY–LUCKNOW NATIONAL HIGHWAY,
NH-24, BAREILLY, UTTAR PRADESH - 243123

Conducted By:

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1. Water Use Study

During audit, it has been seen that a no work for conservation of water has been taken. However, It has been observed that annual water used in university is near the limits as per National Building code in vogue. After going through detailed use pattern it has been found that NBC-2016 standard use pattern are not only met but there is significant reduction of water use to the extent of 24.81 % as per available data. This can be further reduced with complying with recommendations of water audit findings.

There are no water bills for the premise and it is extracting ground water. The following points need attention and required to address. The saving targets should be fixed for next 12 months and practice of recording and reviewing of water use on day-to-day basis for pointing out any sudden variation.

- There is no metering system in the premises. Water meters to be installed immediately to account the pattern of water requirement.
- All plumbing fixtures should be regulated from valves for reduction of flow. After end of life with water efficient fixtures as per plan and the plumbing fixtures in frequently used area should be replaced on priority.
- All cisterns be replaced with dual mechanism low flow cisterns so that water can be used efficiently as per requirement as and when these become due for replacement.
- Awareness programs should be conducted and these should be organized for staff as well as students through seminars and workshops with increased frequency for reduction of water foot print.
- Rain Water harvesting pits system should be provided to recharge the ground water and to avoid runoff water during raining season. However, few pits are there to collect water from the rain.

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- **Water Meters should be provided for individual uses for monitoring of different water use in order of priority.**
  - **a.** Canteen
  - **b.** Individual Hostels
  - **c.** Mess
  - **d.** Individual Blocks
  - **e.** Chemistry Lab and other Lab.
  - **f.** Water from for Horticulture use.
- **Water Meters should be provided for individual bore wells for monitoring of different water extraction source to capture track on ground water extracted.**
- Water conservation target over the present consumption should be fixed by top management and action for meeting these reductions be initiated.
- There should be stickers and bills for water conservation pasted in university premises.
- Students should also be involved along with all stake holders for water conservation.
- STP/ETP and rainwater harvesting pits should be provided to make premises zero discharge and use same water for horticulture.

Note: Facility does not have any metering system or log book system to quantify the water requirement of the premises. Audit team adopted technique of discuss with concern persons and management, running hours, design flow values etc to quantify the water requirement of the premises.

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2. Auditing for Water Management

Water is a natural resource; all living matters depend on water. While freely available in many natural environments, in human settlements potable (drinkable) water is less readily available. We need to use water wisely to ensure that drinkable water is available for all, now and in the future.

A small drip from a leaky tap can waste more than 180 liters of water to a day; that is a lot of water to waste - enough to flush the toilet eight times! 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. Water auditing is conducted for the evaluation of facilities of raw water intake and determining the facilities for water treatment and reuse. The concerned auditor investigates the relevant method that can be adopted and implemented to balance the demand and supply of water. It is therefore essential that any environmentally responsible institution examine its water use practices.

Water Audit

There is little awareness of management of university campus towards sustainability. Management of university should spearhead the movement of sustainable practices in running of university and also facilitating dissemination of these practices to all students studying in this campus. It is through support of management and active involvement of other stake holders and staff members that this university has many accolades to be a matter of pride for all concerned.

In all matters of resource use, there is effective implementation of 3R's. Reduction of resource use, Recycling of resources and also re-use. It is for attaining objectives of sustainability.

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Introduction to water management

Why conserve water:

Water is the most precious of all resources, to sustain it, is to preserve life. However, the careless attitude towards the misuse of fresh water linked with its growing scarcity caused by population growth and climate change, suggests that rational use of water and the adoption of conservation measures are urgently needed.

To sustain this valuable resource, it is imperative to first understand how and where water is used in university buildings and compare this consumption with benchmarks. This would enable the sector to realize the water saving potential that exists and help in devising effective strategies to achieve it.

For years freshwater supplies have been assumed to be an inexhaustible resource, strongly depending on its regenerative capacity offered by the naturally occurring water cycle. Our planet contains a finite quantity of water, where 97.5% of the supply can be found within the oceans in the form of saltwater and only 2.5% is fresh.

Most of this freshwater is difficult to access, in the form of ice within the Polar Regions and mountains or groundwater. Only 0.01% of all water on Earth is useable by ecosystems and humans

There are also a number of human-induced factors which are affecting the quality and quantity of global freshwater resources.

- Increase in demand due to population growth leading to over exploitation of water sources.
- Degeneration of water quality due to human activities such as deforestation, urban growth, industrial and agricultural practices.
- Change in rainfall patterns due to global warming and climate change.

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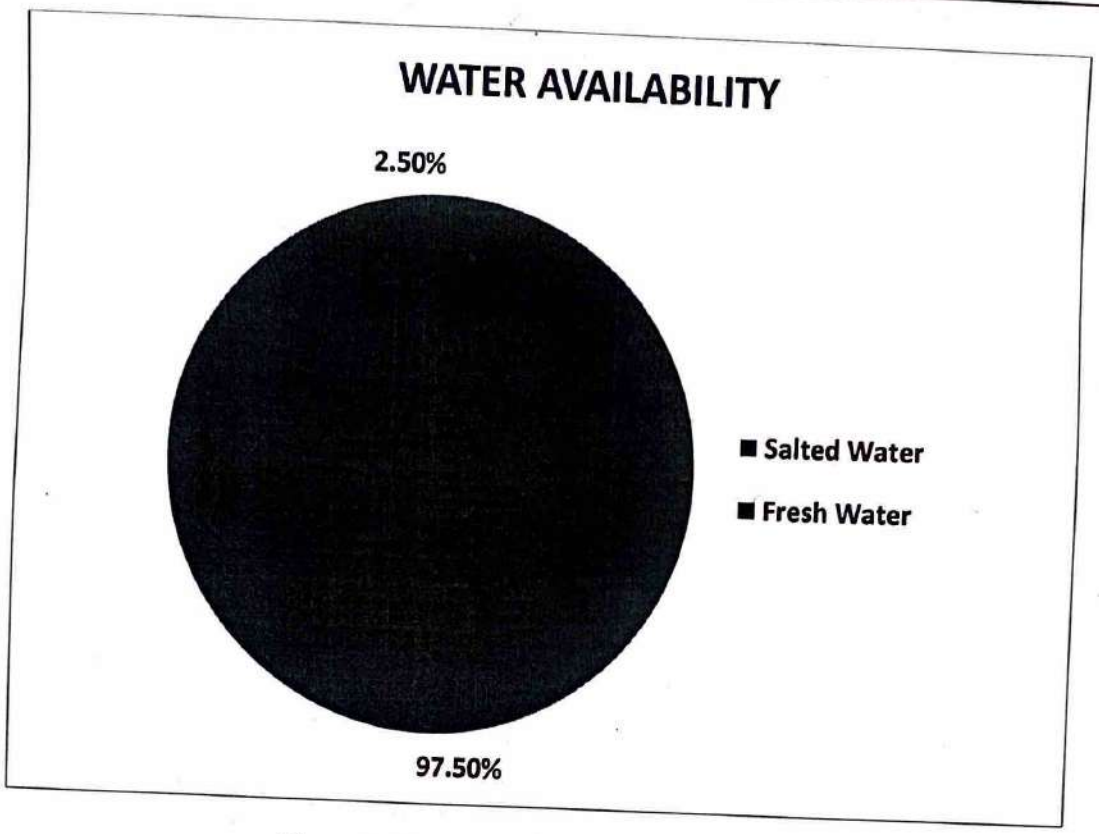

Figure 1: Fresh Water in Percentage

Why consider water conservation in university buildings?

- Environmental conservation: Reducing dependence on mains water supply can reduce the strain on an increasingly scarce resource.
- Future legislation: The government is currently reviewing its policy for setting targets for water consumption. It is only a matter of time before mandatory regulations are introduced.
- Social responsibility: University's have a role to play and can lead by example.
- Reduced water bills: Efficient use of water within university buildings will lead to reduced water bills as well as low energy bills.

Hence, all new and existing university buildings/university campus should attempt to close the loop within the water cycle.

- Precipitation falling on sites should in theory re-charge aquifers and natural waterways.

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- Water entering a university building should be used efficiently, in order not to diminish its source, and returned to the natural environment in a state that enhances aquatic habitat.
- If contamination occurs, the building should provide the necessary treatment to remove pollutants. To achieve the above objectives, it is essential to understand where and how much water is used within the university buildings.

The maximum conservation opportunities lie in these areas. Special attention should be given in Hostel and there should be regular water leak audits conducted and report should be documented.

As presently data for extraction of water is not available, it is recommended that all input source of water should be metered and the consumption pattern should be reviewed daily/weekly and monthly and any significant deviation in consumption should be immediately addressed. It has been estimated from estimated flow and running hours of pumps as per details provided.

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3. Premises and Turf Area

University has total area of 59351 sq mtr which is spread in various blocks like:

Table 1: Total Spread Area – Invertis University

No.	Specifications	Area (Sq. Mtr)
1	Technical Block New	4328
2	Technical Block Old	4953
3	Canteen (New)	472
4	Laboratory	4475
5	Auditorium	1725
6	Himalaya	1361
7	Kaveri	1361
8	Shivalik	1815
9	Himgiri	2618
10	Godavari	2378
11	Annapurna	1010
12	Workshop	1862
13	Computer Room	2200
14	Office	1740
15	Library	1197
16	Girls Hostel	4486
17	Director House	1808
18	Engineering Block	14714
19	Staff Quarters	113
20	Petrol Pump	-
21	Diesel Tank	-
22	Generator Platform	-
23	T.F Platform	-
24	New Girls Hostel	1180
25	Pharmacy Block	3245.66
26	Canteen New	310
27	Total Area	59351.66

Table 2: Turf Area - Invertis University

Description	Area -Sq. Mts	Water requirement per day per sq.mts.	No. of Days	Annual Water requirement
Total Area in sq mtrs	**11870**	**5**	**250**	**14837**

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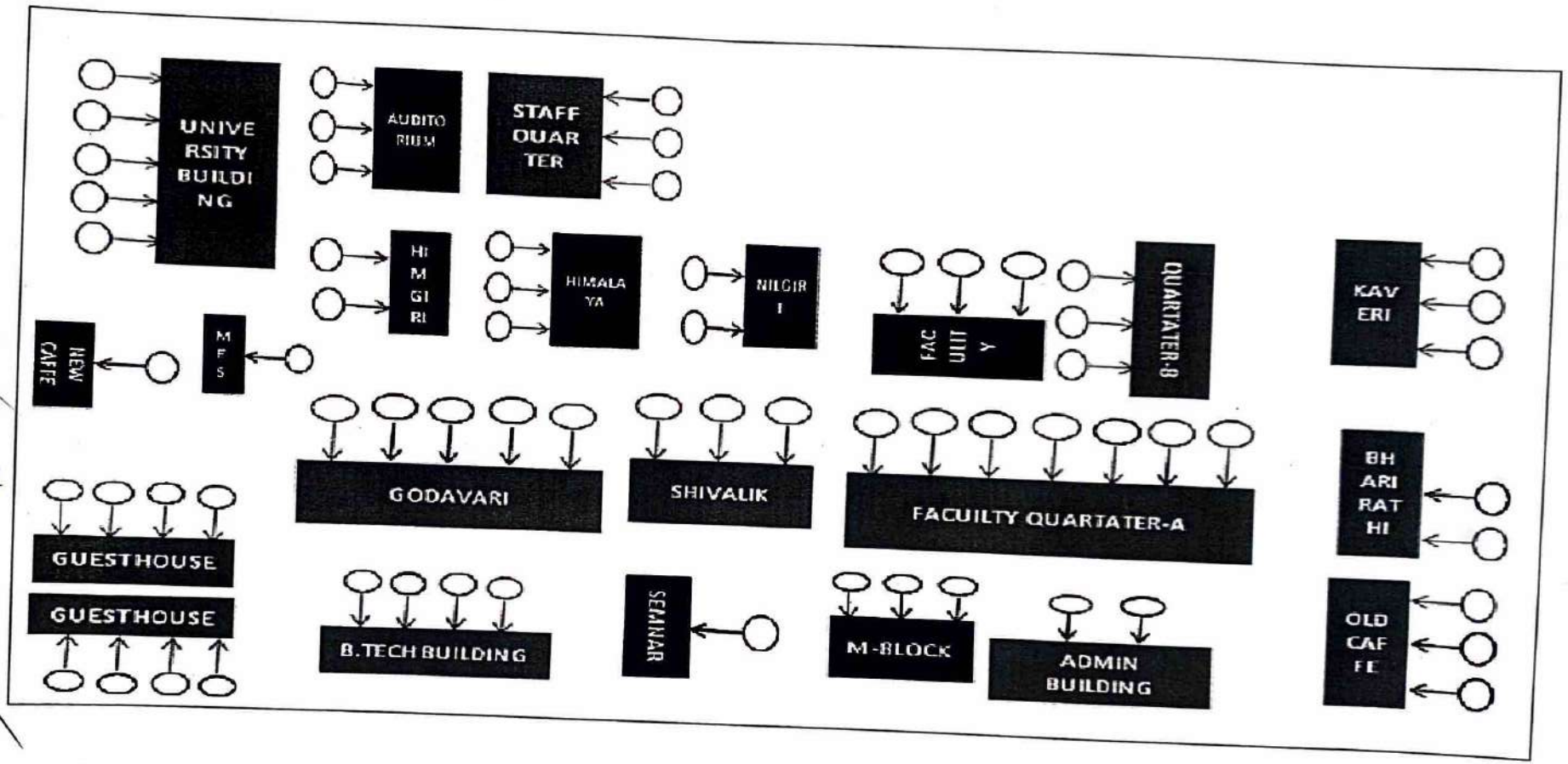
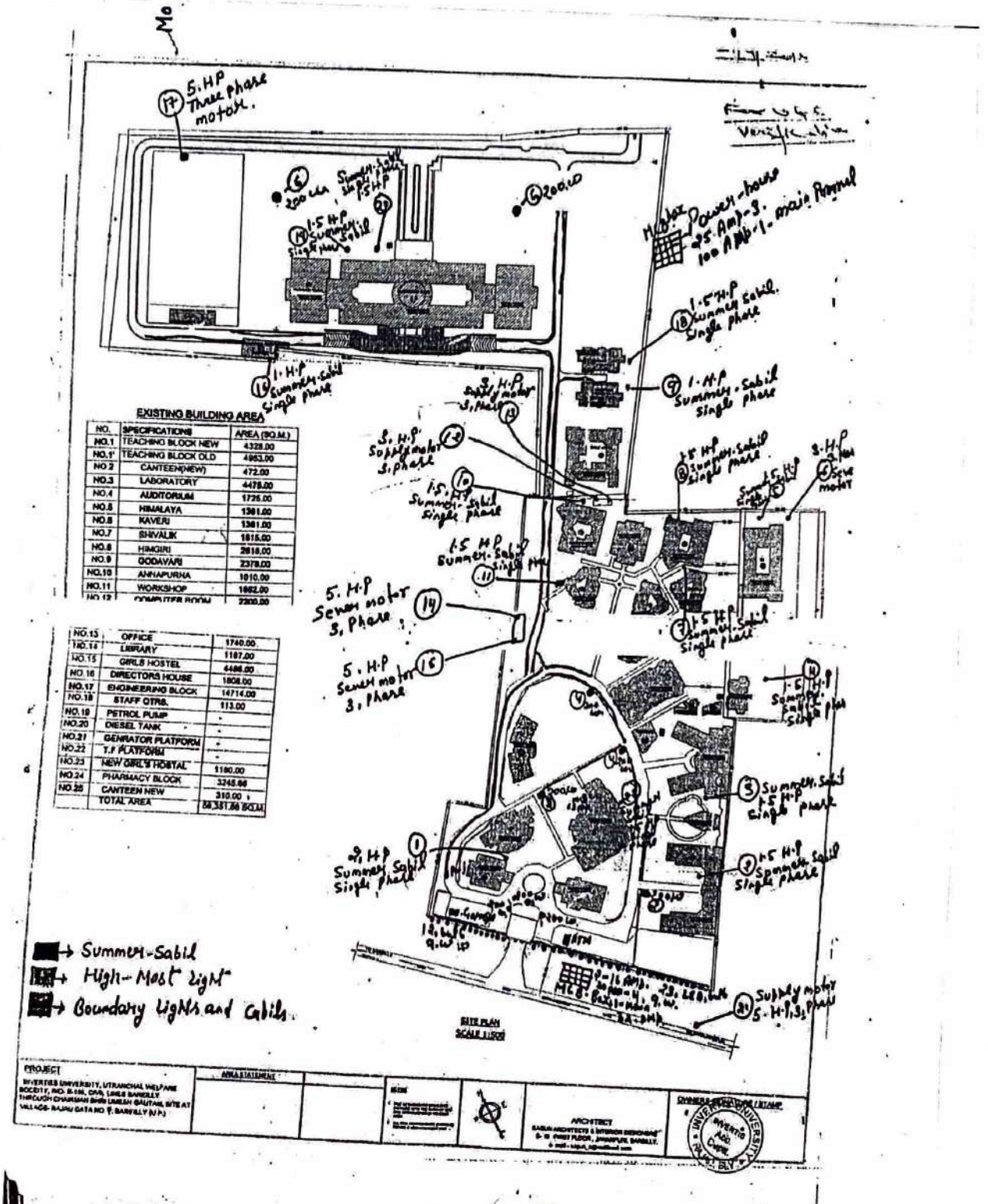
3.1 Water Flow Diagram



3.2 Facility Layout



EXISTING BUILDING AREA

NO.	SPECIFICATIONS	AREA (SQ.M.)
NO.1	TEACHING BLOCK NEW	4328.00
NO.1'	TEACHING BLOCK OLD	4963.00
NO.2	CANTEEN(NEW)	472.00
NO.3	LABORATORY	4478.00
NO.4	AUDITORIUM	1735.00
NO.5	HIMALAYA	1361.00
NO.6	KAVERI	1361.00
NO.7	SHIVALIK	1815.00
NO.8	HIMGIRI	2618.00
NO.9	GODAVARI	2378.00
NO.10	ANNAPURNA	1910.00
NO.11	WORKSHOP	1662.00
NO.12	COMPUTER ROOM	2300.00
NO.13	OFFICE	1740.00
NO.14	LIBRARY	1197.00
NO.15	GIRLS HOSTEL	6486.00
NO.16	DIRECTORS HOUSE	1808.00
NO.17	ENGINEERING BLOCK	14714.00
NO.18	STAFF QTRS.	113.00
NO.19	PETROL PUMP	-
NO.20	DIESEL TANK	-
NO.21	GENRATOR PLATFORM	-
NO.22	T.F PLATFORM	-
NO.23	NEW GIRL'S HOSTAL	1190.00
NO.24	PHARMACY BLOCK	3245.00
NO.25	CANTEEN NEW	310.00
	TOTAL AREA	58,381.00 SQ.M.

PROJECT
INVERTIS UNIVERSITY, UTRANCHAL WELFARE SOCIETY, NO. B-108, CAN, LINES BAREILLY THROUGH CHAIRMAN SHRI UMESH GAUTAM, SITE AT VILL+POS- RAJHU GATA NO 7, BAREILLY (U.P.)

AREA STATEMENT

ARCHITECT
BABLIN ARCHITECTS & INTERIOR DESIGNERS
S-10 FIRST FLOOR, JANAKPURI, BAREILLY.

OWNER'S SIGNATURE / STAMP
INVERTIS EDUCATIONAL CAMPUS

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4. Water Usage Pattern in Campus

Table 3: Water Usage Pattern in Campus

Sl. No.	Name of building	Capacity of Motors (HP)	Estimated flow -LPS	No. of Pumps	No. of Days	No. of Hours	Water drawal-kL
1	Admin office	2	1.2	1	300	3	3888
2	M-Block	1.5	1.2	1	200	3	2592
3	B-Tech building	1.5	1.2	1	200	3	2592
4	Seminar building	1.5	1.2	1	200	3	2592
5	faculty quarter A	1.5	1.2	1	200	3	2592
6	faculty quarter B	1.5	1.2	1	200	3	2592
7	Nilgiri hostel	1.5	1.2	1	200	3	2592
8	Shivalik hostel	1.5	1.2	1	250	4	4320
9	himgiri hostel	1.5	1.2	1	250	3	3240
10	Bhagirathi hostel main tank	3	2.4	2	250	10	43200
11	Bhagirathi hostel	1.5	1.2	2	250	4	8640
12	university building	1.5	1.2	2	250	5	10800
13	caffee	5	6	1	150	10	32400
		1	1	1	250	3	2700
Total Water Drawn from Pumps							125388

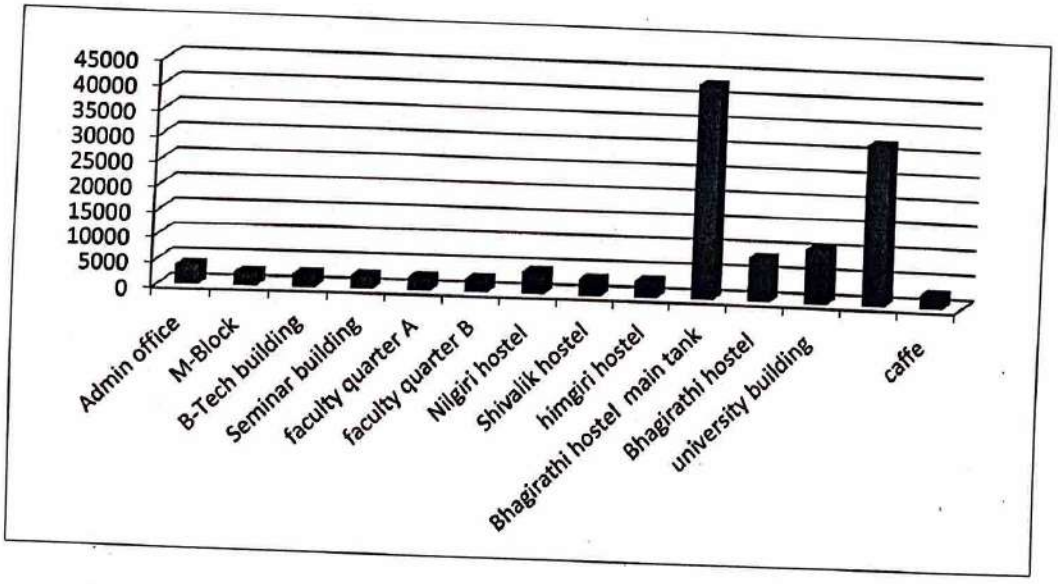

Figure 2: The consumption trend at various Locations

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5. Water Tank Capacity and Pumps Details

Premises have various water tanks ranging from 500 kL to 5000 kL. Details are shown below:

Table 4: Water Tank Capacity & Pumps Details

Sl. No.	Name of building	No. of water tank	capacity of water tank (Ltr)	Total Tank Capacity	sources of water	capacity of motors (HP)	Phase	No. of motor
1	Admin office	2	1000	2000	submersible pump	2, H.P	single phase	1
2	M-Block	3	5000 ltr./ 3000 ltr./ 1000 ltr.	9000	submersible pump	1.5 H.P	single phase	1
3	B-Tech building	4	500 ltr. / 500 ltr. / 500 ltr. /1000 ltr.	2500	submersible pump	1.5 H.P	single phase	1
4	Seminar building	1	1000	1000	submersible pump	1.5 H.P	single phase	1
5	faculty quarter A	8	1000	1000	submersible pump	1.5 H.P	single phase	1
6	faculty quarter B	8	1000	8000	submersible pump	1.5 H.P	single phase	1
7	Nilgiri hostel	2	5000	10000	summer sabil / sever motor	1.5 H.P / 3 H.P	single phase / Three phase	2
8	Shivalik hostel	3	5000 ltr. / 2000 ltr. / 2000 ltr.	9000	summer sabil	1.5 H.P	single phase	1
9	Himalaya hostel	3	2000	6000				
10	himgiri hostel	2	1000	2000	summer sabil	1.5 H.P	single phase	1
11	Bhagirathi hostel main tank	2	5000	10000	summer sabil / supply motor	3 H.P / 3 H.P / 1.5 HP / 3 H.P		4
12	Bhagirathi hostel				summer sabil	1.5 hp / 1.5 hp		2
13	godavari	6	1000	6000				
14	kaveri	3	2000	6000				
16	mess	1	5000	5000				
17	old cafe	2	1000	2000				
18	guest house right side	4	1000	4000				

Sl. No.	Name of building	No. of water tank	capacity of water tank (Ltr)	Total Tank Capacity	sources of water	capacity of motors (HP)	Phase	No. of motor
19	guest house left side	4	1000	4000				
20	university building	6	2000 ltr./2000 ltr./5000 ltr./5000 ltr./500 ltr. /500 ltr.	15000	summer sabil / sever motor	1.5 H.P / 1.5 H.P/ 5 H.P	single phase	3
21	cafe	1	500	500	summer sabil	1. H.P	single phase	1
22	auditorium	3	1000	3000				
23	staff quarter	3	500	1500				

Table 5: Pump Flow Data estimated

Sl. No.	Name of building	Capacity of Motors (HP)	Estimated flow -LPS	No. of Pumps	No. of Days	No. of Hours	Water drawal-kL
1	Admin office	2	1.2	1	300	3	3888
2	M-Block	1.5	1.2	1	200	3	2592
3	B-Tech building	1.5	1.2	1	200	3	2592
4	Seminar building	1.5	1.2	1	200	3	2592
5	faculty quarter A	1.5	1.2	1	200	3	2592
6	faculty quarter B	1.5	1.2	1	200	3	2592
7	Nilgiri hostel	1.5	1.2	1	250	4	4320
8	Shivalik hostel	1.5	1.2	1	250	3	3240
9	himgiri hostel	1.5	1.2	1	250	3	3240
10	Bhagirathi hostel main tank	3	2.4	2	250	10	43200
11	Bhagirathi hostel	1.5	1.2	2	250	4	8640
12	university building	1.5	1.2	2	250	5	10800
		5	6	1	150	10	32400
13	Cafe	1	1	1	250	3	2700
Total Water Drawn from Pumps							125388

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Break up of Water consumption	kL
Annual Water drawn from Bore wells	1,25,388
Water from Municipality	Nil

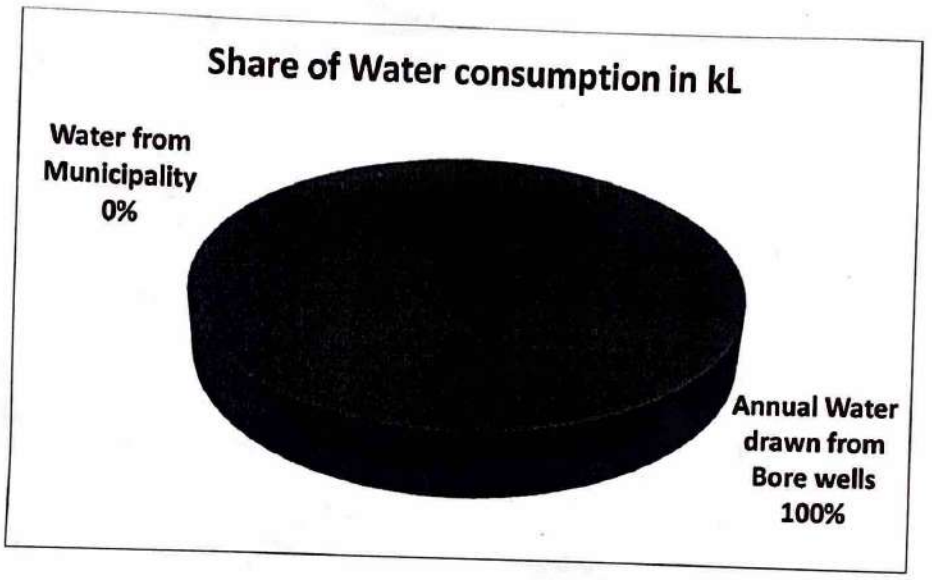

Figure 3: Share of Water consumption in kL

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Table 6: Theoretical Water Consumption as per NBC-2016

Sr. No.	Description	No. of Hours stay	Nos.	No. of days	Requirement of water /Day (Ltr)	Annual Requirement-
1	Students-Day Time	8	4100	200	45	36900
2	Students in hostel	24	1200	250	145	43500
3	Teaching and Non-Teaching staff	8	290	250	45	3262.5
4	Sweeper, Mess Staff, Gardner	8	110	250	45	1237.5
5	Vendors staff	8	32	365	45	525.6
6	Visitors/Exams etc.-Average	2	20	225	45	202.5
7	Horticulture	-	11870(Area in Sq. Mtr)	250	5	14837.5
Total Annual Water Requirement-Theoretical (kL)						100466

It has been informed during audit that all water required for horticulture use is managed from ground water.

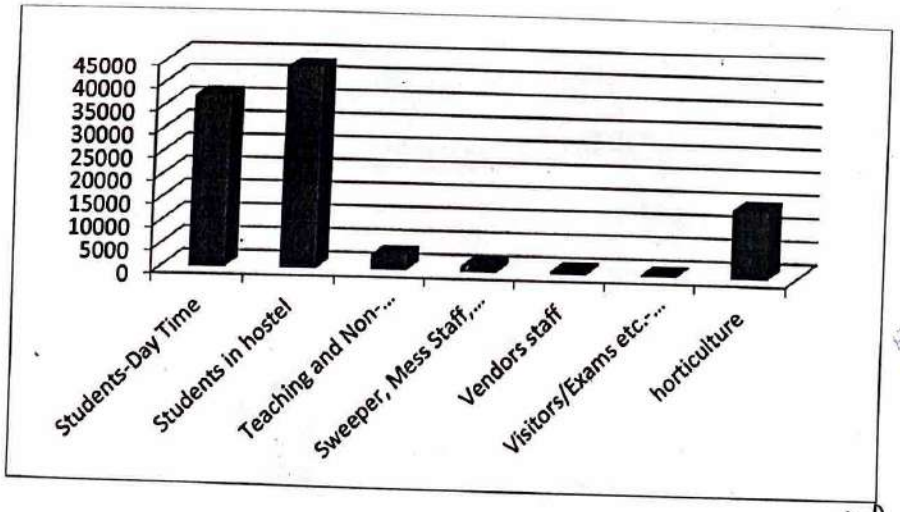

Figure 4: Annual Requirement of Water for Human use

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Table 7: Water Balance of Premises

Sr. No.	Description	Total Water drawn from Bore well-kL	From Municipality-kL	Total Water Consumption
1	Actual Water use	1,25,388	0	1,25,388
2	Theoretical Water Requirement			1,00,466
3	**Savings**			**24,922**

S.No.	Water use	Quantity-kL
1	Water for Horticulture use	45360
2	Water for human use	80028

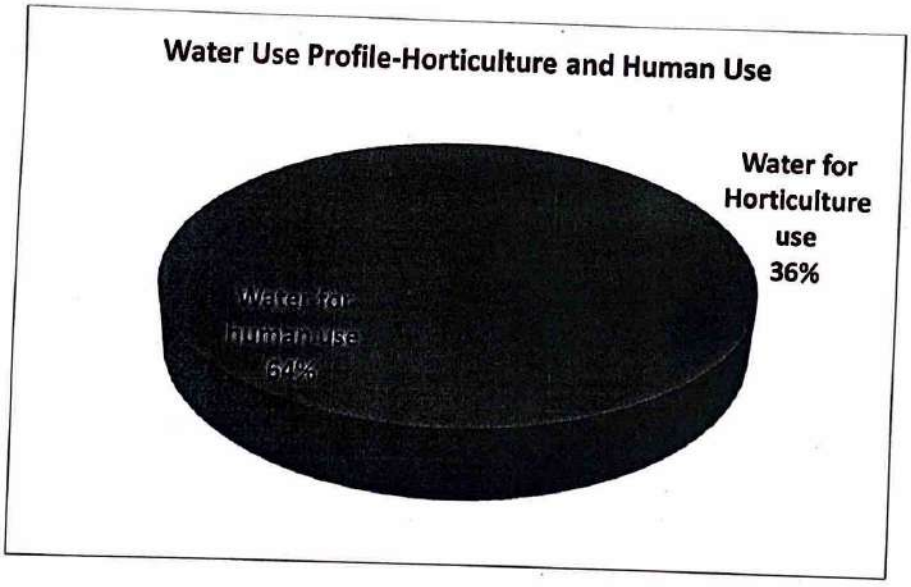

Figure 5: Water Use Profile-Horticulture and Human Use

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6.Water Saving Potential

Total Annual Water Requirement-Theoretical (kL) – 1,00,466 kL /yearly

Total Water Drawn from Pumps (kL) – 1,25,388 kL/yearly

Water Saving Potential – 24,922 kL/yearly

Water Saving Potential % = 24 % approximately

Note: Facility does not have any metering system or log book system to quantify the water requirement of the premises. Audit team adopted technique of discuss with concern persons and management, running hours, design flow values etc to quantify the water requirement of the premises.

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7. Detailed Observations

Sr. No.	Observation/Parameters	Yes/No	Recommendations
1	Is there any bench mark for water use	No	But Consumption of water for human consumption is higher than NBC Bench Mark and the water use is not managed effectively.
2	Is the water conservation opportunities identified	Yes	Low flow fixtures and Cisterns with double plug mechanism should be provided. Flow of pipes can be reduced by use of water flow reduction accessories.
3	Are there any signs, posters or stickers in university premises to encourage water efficiency and remind students to report leaks?	No	Suitable water conservation stickers and bills should be displayed conspicuously for creating awareness
4	Is there any water management team to review water use?	No	Establish a water management team and meet regularly to review use and identify water saving opportunities. Consider involving students, teachers, administrative staff and even parents, visitors and volunteers.
5	Have you installed meters in high water using areas?	No	Meters in high water using areas should be got installed and monitor regularly to know accurately where water is used and identify any problems
S.No.	Observation/Parameters	Yes/No	Recommendations
	Amenities		
1	Are the taps in hand basins are water efficient ?	No	Install flow regulators to reduce flow to at least 4.5L/min: If taps are used only for hand washing, consider a flow rate as low as 1.7L/min for super efficiency. Consumption is priestly reduced by closing of valves.

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h	Do cleaners hose down amenity areas?	No	If you must use a hose ensure it has a water efficient trigger nozzle.
3	Does University have single flush toilets?	Yes	Consider replacing single flush toilets with 6/3L or 4.5/3 L dual flush models, when these become due for normal replacement.
S.No.	**Observation/Parameters**	**Yes/No**	**Recommendations**
	Canteen, Mess, Hand Wash Area		
1	Are taps in kitchens water efficient?	No	If No, install 7.5L/min flow restrictors on kitchen/art room sinks . **Tip: Pre-rinse spray nozzles in kitchens can use less than 6L/minute and make it easier to rinse and clean dishes.**
2	Do staff leave taps running while they are cooking and cleaning?	No	Still , install stickers to remind staff to turn off taps. Consider installing sensor taps.
	DNA : Data not available		
	Outdoor areas		
1	Has appropriate staff completed the Water Conservation training	No	Ensure appropriate staff complete the Water conservation training.
2	Do campus sub-meter irrigation water supply?	No	Consider installing sub-meters to determine water use and identify any leaks, and monitor regularly.
3	Do you use an alternate water source to irrigate your landscape?	yes	Water rejected from RO is stored and used for irrigation purpose.
4	Do you have Water wise /Water efficient Plants in your garden?	No	A lot of green area has been planted for gardening

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S.No.	Observation/Parameters	Yes/No	Recommendations
	Training and Awareness		
1	Whether staff in general are aware about importance and need of water conservation	No	The awareness should be created amongst all maintenance and operation staff.
2	Whether there is a program for sensitizing students through workshop/seminars to educate them regarding scarcity of water and its conservation	No	There is no awareness program to create awareness amongst students through training
3	Whether there is a program in place to involve students in water conservation targets.	No	There should be regular active involvement of students, they being helpful in university as well as it shall be useful for them during their life time in future.

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8. Flow Rate of Fixtures Measured

Table 8: Water flow Measurement

Time taken for filling one litre of measure on sample basis					
Sno	Location	WC	Wash Basin	Taps	Total Set
1	Administrative Building	8.12	9.13	9.4	WC-8 / WB-7 / Taps - 8
2	M Block	3.4	3.14		WC-12 / WB-16/ Taps - 12
3	AUDITORIUM	9.97			WC-8 / WB-10/ Taps – 8
4	SEMINAR BUILDING	7.4	11.47		WC-8 / WB-11/ Taps – 8
5	B-TECH BUILDING	1.8	5.07		WC-9 / WB-8/ Taps – 17
6	NILGIRI HOSTEL	5.07	16.15		WC-39 / WB-39/ Taps – 158
7	HIMALAYA HOSTEL				WC-18/ WB-12/ Taps – 36
8	Shivalik		5.43	4.89	WC-12/ WB-16/ Taps – 44
9	Himgiri		7.75		WC-36 / WB-28/ Taps – 92
10	BHAGIRATHI HOSTEL		5.03		WC-48/ WB-32/ Taps – 136
11	GODAVARI HOSTEL			3.07	WC-40/ WB-28/ Taps – 116
12	KAVERI HOSTEL			3.76	WC-20/ WB-12/ Taps – 56
13	STAFF QUARTER			4.43	WC-12 WB-8/ Taps – 28
14	UNIVERSITY BUIDING	3.38	13.59		WC-20 WB-22/ Taps – 42
15	FACULTY QUARTER A/B	3.06	6.02		WC-12 WB-8/ Taps – 28
16	GUEST HOUSE				WC-48 / WB-48 / Taps – 144

It has been observed that flow in liters per minute of taps is very high and with provision of accessories it is required to be brought under 5 Liters and for further optimization it should be targeted to be reduced to 2 Liter per minute.

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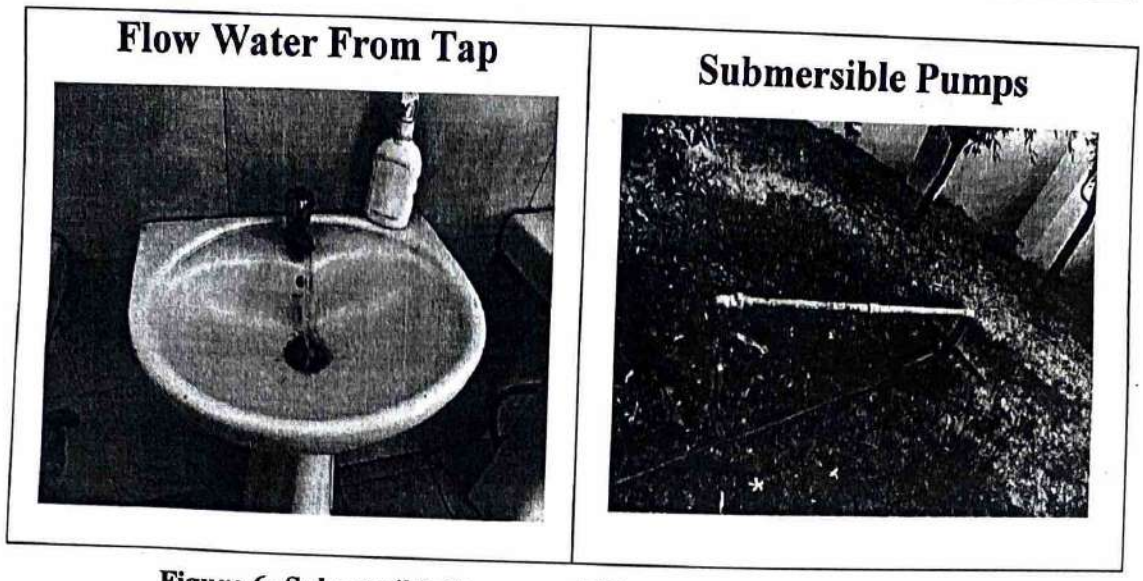

Figure 6: Submersible Pumps and Water Flow from Taps

Table 9: Location wise Tap/WC Installations

S. N	NAME OF BUILDING	WASH BASIN	WATER CLOSET	TAPS	BATHROOM	TAP
1	**ADMIN BUILDING**	3	3	3		
	KITCHEN	1		1		
	CHANCELLOR SIR'S OFFICE	1	1	1		
	EXECUTIVE DIRECTOR SIR'S OFFICE	1	1	1		
	VICE CHANCELLOR SIR'S OFFICE	1	1	1		
	ADVISOR ROOM	1	1	1		
2	**M-BLOCK**					
	KITCHEN	1		1		
	GIRLS WASHROOM STAFF	1	1	1		
	BOYS WASHROOM STAFF	1	1	1		
	GIRLS WASHROOM STUDENT	3	5	3		
	BOYS WASHROOM STUDENT	6	9	6		
3	**AUDITORIUM**					
	GREEN ROOM	3	3	3		
	GIRLS WASHROOM	2	2	2		
	BOYS WASHROOM	3	5	3		

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S. N	NAME OF BUILDING	WASH BASIN	WATER CLOSET	TAPS	BATHROOM	TAP
4	**SEMINAR BUILDING**					
	BOYS WASHROOM	4	6	4		
	GIRLS WASHROOM	4	5	4		
5	**B-TECH BUILDING**					
	BOYS WASHROOM	4	3	7		
	GIRLS WASHROOM	5	5	10		
6	**NILGIRI HOSTEL**					
	GROUND FLOOR	10	10	20	2	20
	FIRST FLOOR	10	10	20	2	20
	SECOND FLOOR	10	10	20	2	20
	TOP FLOOR	9	9	18	2	20
7	**HIMALAYA HOSTEL**					
	GROUND FLOOR	6	4	6	3	6
	FIRST FLOOR	6	4	6	3	6
	SECOND FLOOR	6	4	6	3	6
8	**SHIVALIK**					
	GROUND FLOOR	3	4	9	3	2
	FIRST FLOOR	3	4	9	3	2
	SECOND FLOOR	3	4	9	3	2
	TOP FLOOR	3	4	9	3	2
9	**HIMGIRI**					
	GROUND FLOOR	9	7	16	7	7
	FIRST FLOOR	9	7	16	7	7
	SECOND FLOOR	9	7	16	7	7
	TOP FLOOR	9	7	16	7	7
10	**BHAGIRATHI HOSTEL**					
	GROUND FLOOR	12	8	18	8	16
	FIRST FLOOR	12	8	18	8	16
	SECOND FLOOR	12	8	18	8	16
	TOP FLOOR	12	8	18	8	16
11	**GODAVARI HOSTEL**					
	GROUND FLOOR	10	7	17	6	12

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S. N	NAME OF BUILDING	WASH BASIN	WATER CLOSET	TAPS	BATHROOM	TAP
	FIRST FLOOR	10	7	17	6	12
	SECOND FLOOR	10	7	17	6	12
	TOP FLOOR	10	7	17	6	12
12	**KAVERI HOSTEL**					
	GROUND FLOOR	5	3	8	3	6
	FIRST FLOOR	5	3	8	3	6
	SECOND FLOOR	5	3	8	3	6
	TOP FLOOR	5	3	8	3	6
13	**STAFF QUARTER**					
	GROUND FLOOR	3	2	5	2	2
	FIRST FLOOR	3	2	5	2	2
	SECOND FLOOR	3	2	5	2	2
	TOP FLOOR	3	2	5	2	2
14	**UNIVERSITY BUIDING**					
	GIRLS WASHROOM STAFF	5	6	11		
	BOYS WASHROOM STAFF	5	2	7		
	GIRLS WASHROOM STUDENT	5	11	16		
	BOYS WASHROOM STUDENT	5	3	8		
15	**FACULTY QUARTER A/B**	16	16	32	16	32
16	**GUEST HOUSE**	32	32	32	24	48

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9. Observations And Recommendations

	Action steps for Water management – Design and Construction
A	Reduce water consumption through efficient fixtures.
1	Efficient plumbing design. Two stack system design for future to reduce energy consumption and pumped water energy.
2	Sub metering of water for separate uses
3	Efficient fixtures such as low flow taps, shower heads and toilets and **Water less urinals as per applicability in Gents Toilet.**
4	Efficient appliances for catering and other uses with specified water efficiency standards.
5	**Recycle** water using **Grey Water** systems. Being done–recycled water data be maintained. It is already in practice
6	**Rain water is captured in rain water harvesting pits- Maintenance of RWHS is required to be done periodically.**
7	Automatic shut off of Pump should be installed so that there is no wastage of water and Energy.
8	Log Book for running of Pump to be maintained
9	Check Leakage through internal audits-Weekly
	OPERATION & MAINTENANCE
1	As the building is operational, further reductions in water use can still be Made depending on how efficiently the building is run. Efficient fixtures and fittings reduce the amount of flow of water; however, it is equally important that water use is periodically assessed or audited to detect wastage caused either by the users or due to leakage. This will also help the building management in devising appropriate strategies for water conservation.
2	There is a potential for reduction and optimization of water simply and inexpensively by internally auditing water use and identifying appropriate water-saving measures
3	Install push button type individual manual urinal flushing system, Provide dual flushing systems and make users aware of the use of such installed systems.
4	Repair, replace leaking taps.

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10. Rain Water Harvesting system

The following Rain Water harvesting system pits have been installed.

As per the data furnished, there are 3 nos. Rain water harvesting pits have been provided. Presently only one harvesting pit is maintained properly and two of these are clogged and need to be cleaned.

There is requirement of regular maintenance of these pits to clear these of any silt deposit etc. so that capacity and quality of water fed to these pits is not reduced.

Note: Rain water harvesting pits are not to recharge ground water. However, It is being used to use water for gardening.

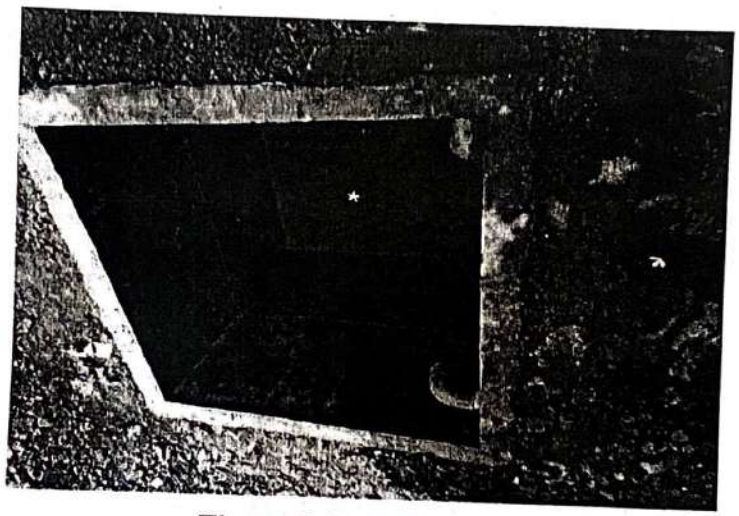

Figure 7: Rain Water Pit

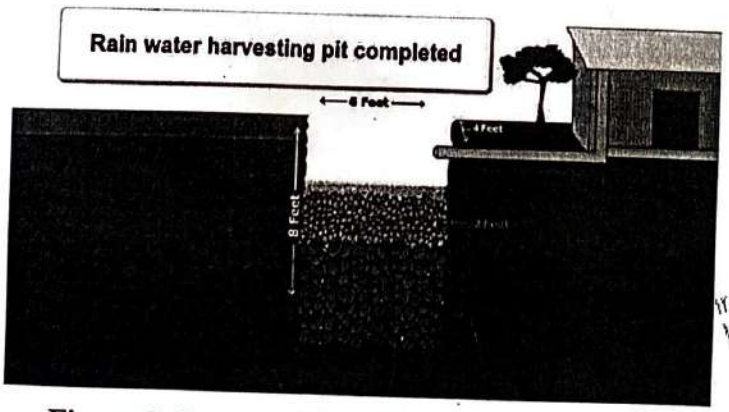

Figure 8: Proposed Rain Water Harvesting Pit

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