



WATER AUDIT REPORT

(April 2022 to March 2023)

FOR

KRISHNA VISHWA VIDYAPEETH

(DEEMED TO BE UNIVERSITY) KARAD
(Formerly known as KRISHNA INSTITUTE OF MEDICAL SCIENCES, "DEEMED TO BE UNIVERSITY", KARAD)



SUBMITTED TO

Krishna Vishwa Vidyapeeth
(Deemed to be University), Karad.

PREPARED BY

EASE Technology, Kolhapur

DATE

18th April, 2023

REGISTRAR
Krishna Vishwa Vidyapeeth
(Deemed to be University),
Karad



No. IG29-93229

अनुक्रमिक 146094962
Enrollment No.

इन्दिरा गांधी राष्ट्रीय मुक्त विश्वविद्यालय
INDIRA GANDHI NATIONAL OPEN UNIVERSITY

प्रमाणित किया जाता है कि *Murkute Pragadee Prakash*
This is to certify that

को निर्धारित पाठ्यक्रमों को पूरा करने और
after having passed the prescribed courses of study in the

June 2015

की परीक्षा उत्तीर्ण करने पर
examination is hereby awarded

Certificate in Water Harvesting and Management

प्रदान किया जाता है।

नई दिल्ली / New Delhi
Date / Dated August 7, 2015

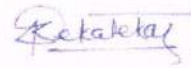


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कुलसचिव
Registrar





Water Audit Completion Certificate

Name of the Institute	Krishna Vishwa Vidyapeeth (Deemed to be University), Karad, Satara - 415539	
Details of facility Audited	Campus of the Krishna Vishwa Vidyapeeth including all the faculties, Hostels, Hospital, Lab and all allied Utilities.	
Date of Water Audit Survey	7 th & 8 th April, 2023	
Name of the Auditor	Ms. Pragatee P. Murkute	
Name of the Co-Auditor	Mr. Dhiraj A. Kekalekar	
Company	EASE Technology C-1, 250/B2, E Ward, Pancharatna Apartment, Nagala Park, Kolhapur, MH - 416003	
Signature of the Auditor	 	
Auditor	Ms. Pragatee P. Murkute	Mr. Dhiraj A. Kekalekar
Certification No.	IG29-93229 Dated 7 August 2015.	




REGISTRAR
Krishna Vishwa Vidyapeeth
(Deemed to be University),
Karad



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CHAPTER - 1 INTRODUCTION

Krishna Vishwa Vidyapeeth (Deemed to be University), (Herein referred as KVV(DU)) is located at Karad, Maharashtra. KVV(DU) is accredited by NAAC 'A⁺' grade and has been conferred with ISO 9001:2015 certification. The constituent faculties of the University include Medical, Dental, Physiotherapy, Nursing, Pharmacy and Allied Sciences offering undergraduate and postgraduate courses in the respective faculties. It also runs Ph.D. programs and Post-Doctoral Fellowships in various subjects.

The medical college is about 36 years old and is recognized by the National Medical Commission of India, Medical Council of Malaysia and is listed in the WHO's World Directory of Medical Schools. Medical Council of India recognizes MBBS and postgraduate degree/diploma courses in clinical and basic sciences.

It has state-of-the-art museums with large collection of specimens and models. National Accreditation Board has accredited the KIMS diagnostic laboratory for Testing and Calibration Laboratories (NABL). It's been conferred with ISO 9001:2015 and ISO 14001:2015 certification. The Lead Referral Laboratory is the first of its kind in Maharashtra state. The well-equipped NABL accredited Department of Molecular Biology and Genetics is a feather in the cap.

National Accreditation Board recognizes the teaching hospital KH&MRC (Krishna Hospital and Medical Research Centre) for Hospitals & Healthcare Providers (NABH).

The teaching hospital is 1125 bedded multispecialty tertiary care hospital with facilities for Critical Care, Endoscopic Surgeries, Dialysis, Cardiology, Cardio-vascular-thoracic-surgery, Oncology, Urology, Neurosurgery, Plastic surgery, Oral and Maxillofacial Surgery and a recognized Renal Transplant Unit. It has fully equipped major operation theaters, minor theaters, labour rooms, blood bank accredited by NABH, radio diagnosis and radiotherapy, computerized medical records, counseling services etc. There are separate intensive care units for Medical, Surgical, Coronary care, Pediatric, Neonatal (accredited by Neonatology Forum of India), Respiratory and Obstetrics. Neonatology Forum of India recognizes the neonatal ICU.

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The Radio-Diagnosis Department has facilities for MRI, Color Doppler, Mammography, DSA etc. It also actively participates in national healthcare programs and various extensions and outreach community programs initiated by the institute.

The University has been ranked 5th amongst the cleanest Higher Educational Institutions in the category of 'Technical Institutions - Universities (Residential)' in the year 2018. The University has also received certificate for 'Maintaining, Promoting and Encouraging the Culture of Swachhta in Higher Education Institutions in the country'.

The institute has also received recognitions as below:

1. Commendation Award (Green Institutional Mentor Award) – Letter dated 08th March 2020
2. Krishna Hospital and Medical Research Centre was ranked 1st as a Clean Hospital in “Swachh Sarvekshan 2020 & Swachh Sarvekshan 2021” among the Hospitals in Malkapur Nagarparishad, Tal. Karad, Dist. Satara.
3. Recognized Social Entrepreneurship, Swachhata & Rural Engagement Cell - Certificate dated 30th August 2020.
4. KVV(DU) is recognized as District Green Champion for Satara district for the academic year 2021-22 awarded by Mahatma Gandhi National Council of Rural Education, Ministry of Education, Govt. of India.
5. KVV(DU) is an Annual member of Indian Green Building Council (IGBC).
6. KVV(DU)'s Swachhta team has completed the activity-based program “Showcase! The Success of Sustainability” The program is organized by Mahatma Gandhi National Council of Rural Education, Hyderabad.
7. Krishna Vishwa Vidyapeeth (Deemed to be University), Karad has awarded by International Green University Award 2022 in Green School Conference 2022 held at SUNY Meritime College, New York on 24th September, 2022.
8. Krishna Vishwa Vidyapeeth (Deemed to be University), Karad has received Gold Rating in IGBC Green Building Standard as per Green Campus Rating System from Indian Green Building Council for 5 Years from the Date of Certification on 07th October, 2022.



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This report is prepared by Mrs. Pragatee R. Bhosale from EASE Technology Kolhapur. The survey was conducted on 7th & 8th April 2023. Report submitted to institute on 18th April 2023 and finalized after some revisions.

Location of KVV(DU) –

KVV(DU) is located at NH4, Pune - Bangalore Highway, Agashivnagar, Malkapur, Karad, Maharashtra.

Figure – 1 Google Image of KVV(DU)



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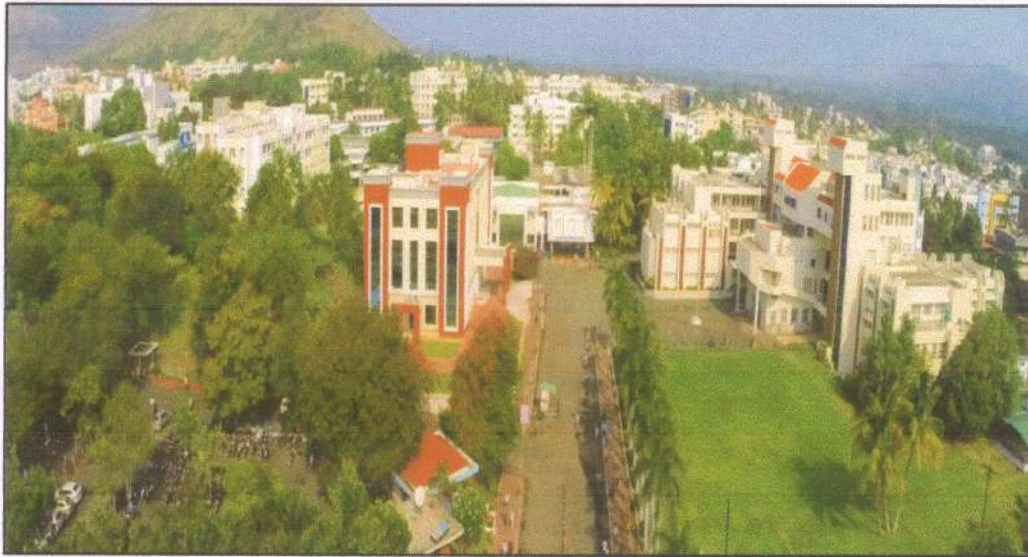
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Figure – 2 Photographs of KVV(DU)



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CHAPTER - 2 PROJECT SUMMARY

Particulars	Details
Name of Institute	Krishna Vishwa Vidyapeeth (Deemed to be University), KVV(DU), Karad.
Address	Near Dhebewadi phata, NH4, Pune - Bangalore Highway, Agashivnagar, Malkapur, Karad, Maharashtra
Latitude	17.26°09.34"N,
Longitude	74°17'63.25"E
Nearest City	Karad: 3 Km (NE)
Nearest River /Water Body	Krishna River: 1.89 km
Nearest Highway	NH 4: 0.2 Km
Nearest Railway Station	Karad : 8 Km
Nearest Air Port	Pune international Airport – 170 Km
Water Resources	1. Malkapur Nagar Parishad (M.N.P.) 2. Irrigation (Koyna river water) 3. Ground Water (Bore Well-for Emergency condition)
Water Permission	753.4 m3/day from Koyna river
Average Water Consumption per day by Institute	486 m3/day
Waste Water going to STP	410 m3/day
Total Water Recycle/Reuse	350 m3/day
Average annual rainfall	632 mm
Total rooftop and surface area	20930 Sq. Ft.
Proposed rooftop and surface area	1000 Sq. Ft.
Water Storage Tank	19 lac lit (Tanks with different capacities in various buildings of the campus)



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Brief About Water Auditing

Water auditing is a systematic & scientific examination of water accounts of the projects. It is an intelligent & critical examination by independent organization. It is a critical review of system of accounting.

A water audit determines the amount of water used in different sectors; amount of water lost from distribution system due to leakages. Comprehensive Water Audit can give a detailed profile of distribution system & water users, thereby facilitating easier & effective management of resources and improved reliability. It has proved to be an effective tool for understanding & assessment of performance level of the projects. Water auditing involves checking of sector-wise water use against project planning.

A water audit is an on-site survey and assessment of water-using hardware, fixtures, equipment, landscaping, and management practices to determine the efficiency of water use and to develop recommendations for improving water-use efficiency. In simple words, a water audit is a systematic review of a site that identifies the quantities and characteristics of all the water uses.

The site may vary from a public water utility, facility (institutional or commercial properties like malls, office, schools etc.) or a household. The overall objective of conducting a water audit is to identify opportunities to make system or building water use more efficient.

The National Water Policy – 2012 focuses on the need for publishing water accounts and water audit reports indicating leakages and pilferages. The policy recommends systems to evolve benchmarks for water uses for different purposes, i.e., water footprints, and water auditing to ensure efficient use of water.

National Water Mission (NWM) has been established by the Government of India with the objective of “conservation of water, minimizing wastage and ensuring its more equitable distribution both across and within States through integrated water resources development and management”.

The Government of India has also launched a Centrally Sponsored Scheme for Repair, Renovation and Restoration (RRR) of water bodies, which has multiple objectives like

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comprehensive improvement and restoration of water bodies thereby increasing tank storage capacity, improved water use efficiency and increased availability of drinking water.

Since water uses vary greatly from one type of business or institution to another and from site to site, therefore water audit is crucial to determine quantity, nature and quality of water consumption. Water audit for a water utility refers to tracking, assessing and validating all components of flow from the site of withdrawal or treatment through the water distribution system and into the consumer's properties. On the other hand, water audit of an office building would review direction and quantity of water used for domestic, cooling/heating, sanitary and landscaping processes. Whereas, a domestic water use audit examines the major areas in which a facility uses water, including human consumption, personal hygiene & sanitation, washing, cleaning, laundry, gardening etc.

Thus, even though the nature and scale of water use varies and differs according to the sites and systems, the underline principle is common, that is, water use audit determines where the water ends up and in what amount. The audit exercise provides decision making tools to the concerned people in the utility, institutions or households by identifying inefficient uses, problem areas wherein water conservation and remedial measures can be undertaken.

Water auditing is an ongoing process and rarely stays consistent in a site or system overtime. Therefore, in order to gauge progress from adopted water conservation and cutbacks, water audit should be performed on a regular basis. In addition, it provides convincing overview of the water use trends, effectiveness of conservation measures and potential cost and water savings. (Ref: i.) Department of Water Resources, River Development and Ganga Rejuvenation; Govt. of India, ii) Ministry of Water Resources; Govt. of India, iii) "Water Audit Guidance For Commercial Buildings". City Energy, May 2019. Retrieved 10 December 2019, iv) Guidelines for Improving Water Use Efficiency in Irrigation, Domestic & Industrial Sectors, Nov. 2014.)

Benefits of Water Audit

Water audit improves the knowledge and documentation of the distribution system, problem and risk areas and a better understanding of what is happening to the water after it leaves the source point.



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Leak detection programs help in minimizing leakages and tackling small problems before they become major ones. These programs lead to-

- a. Reduced water losses,
- b. Improved financial performance,
- c. Improved reliability of supply system,
- d. Enhanced knowledge of the distribution system,
- e. Efficient use of existing supplies,
- f. Better safeguard to public health and property,
- g. Improved public relations,
- h. Reduced legal liability, and
- i. Reduced disruption, thereby improving level of service to customers



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CHAPTER - 3 METHODOLOGY

The key components in the water audit methodology are as below -

1. Pre-Audit Information

- Preliminary literature review of concepts and methodologies related to water audit for utility, facilities and households.
- Walk through the entire building to understand the nature of water uses and the systems installed in the building.
- Discussion with the administrative officers, housekeeping and kitchen employees on the various water uses during the day and the source of water.
- Regular discussions with the administrative department including the electrician, housekeeping and canteen In charge were conducted throughout the exercise on current situation and the past trends in water consumption, current sources, supply amount, source metering, distribution, storage, wastewater generation etc.

2. Base-lining and benchmarking

The water audit for KVV(DU) included both primary and secondary data collection for various identified water uses. Primary data collection included the following components

- Development of questionnaire format for individual water use, mopping, gardening etc.
- Sample survey of KVV(DU) staff to estimate individual water consumption on sanitary and drinking purposes based on questionnaire format.
- For other water uses in kitchen, irrigation, mopping etc. primary data on time, patterns and frequency of water use was recorded over a varying period of time.
- Secondary data collection included compilation of average number of visitors visiting KVV(DU), along with their duration of stay.
- Collating records of water pumped to the overhead tanks, average borewell withdrawals etc. to estimate actual supply.

3. Conducting a water audit at the building level

- The data collection and processing for personal water use including drinking, flushing

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and face/ hand washing, mopping, irrigation, utensil washing etc. was done on the basis of actual consumption.

- One liter bottle and 10 liters bucket method were used to estimate the flow rate from various taps used for a variety of purposes. This was then calculated with the frequency of use to determine the actual water use.
- As part of the survey, staff members recorded the number of daily visits to, flushes in toilets and urinals, along with daily frequency of hand washing and average time of water flow from the taps.
- The data for all the above uses was calculated for varying time period for example personal water use survey was based on a weeklong observation by the KVV(DU) staff to calculate per capita use.

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CHAPTER - 4 WATER CONSUMPTION & WATER SOURCES

As a primary data collected by survey, we found

Sr. No.	Particulars	Details
1	Students staying at Hostels	1757 Nos.
2	Students at College	3493 Nos.
3	Teaching Staff	374 Nos.
4	Non-Teaching Staff	1961 Nos.
5	Visitors	3200 Nos.
	Total	10785 Nos.

Estimation of water requirement for drinking & domestic use as per (Source: NBC 2016, BIS)

Sr. No.	Particulars	Details	Water Consume limit	Total water in lit/day
1	Students staying at Hostels	1757 Nos.	135 lit/Day	237195.00
2	Students at College	3493 Nos.	45 lit/Day	157185.00
3	Teaching Staff	374 Nos.	45 lit/Day	16830.00
4	Non-Teaching Staff	1961 Nos.	45 lit/Day	88245.00
5	Visitors	3200 Nos.	15 lit/Day	48000.00
	Total	10785 Nos.		547455.00

Total expected Water consumption as per NBC 2016, BIS for KVV(DU) is – 547.455 m³/day.

This water requirement is fulfilled by Malkapur Nagar Parishad (M.N.P.), Irrigation (Koyna river water & Ground Water).



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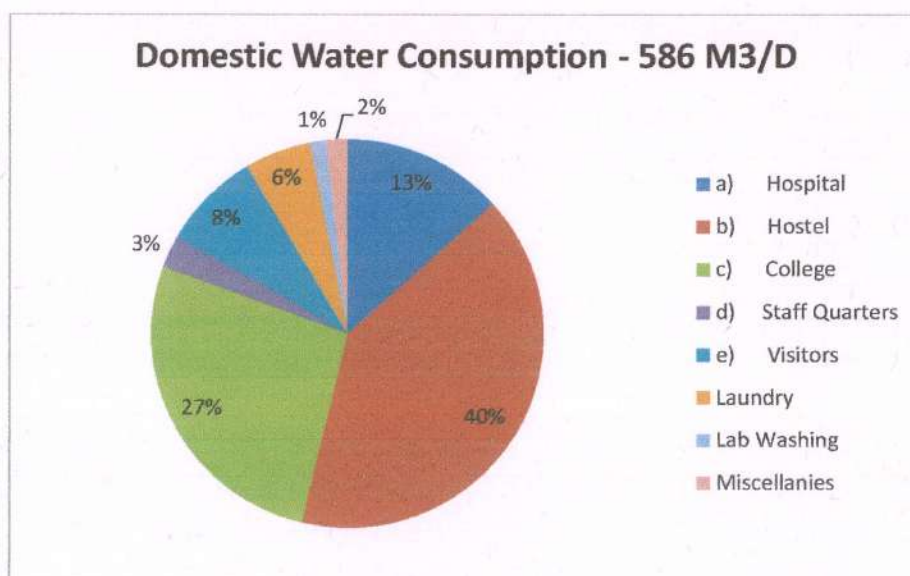
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Actual Water Uses -

Summary Water Consumption

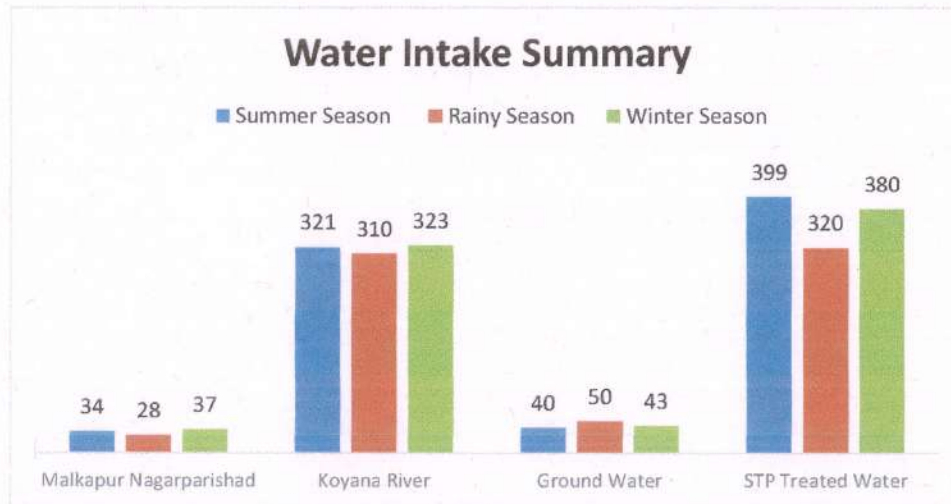
Sr. No.	Description	Water Consumption (M ³ /day)	Source (M ³ /day)/ Remark
1	Domestic		
	a) Hospital	78.00	Fresh Water From 1. Malkapur Nagar Parishad – 40 m ³ /Day 2. Koyna River (Irrigation) – 750 m ³ /Day 3. Ground Water – 50 m ³ /Day
	b) Hostel	237.00	
	c) College	157.00	
	d) Staff Quarters	16.00	
	e) Visitors	48.00	
2	Laundry	32.00	
3	Lab Washing	8.00	
4	Miscellanies	10.00	
	Total	586.00	Fresh Water
5	Gardening	399.00	Treated/ Recycle Water from
6	Flushing	31.00	STP Plant
	Total	1016.00	(Fresh Water & Treated Water From STP)





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Water Adequacy -

Total fresh water requirement for 365 Days shall be –

$$586 \text{ CMD} \times 365 \text{ Days} = 2138990 \text{ M}^3/\text{Year}$$

Source of water

Primary Source –

1. Koyana river (7, 50,000 Lit/Day) Gov. of Maharashtra Sangli path-bandhare vibhag, Sangli.
2. Malkapur Nagarparishad - 40000 Lit./day
3. There are seven submersible pumps of 750 lpm capacity and two pumps in spare for emergency.

Secondary / Alternate Source

1. Bore wells act as an alternate source in the case of supply failure from river water.
Presently the bore well water is being used for domestic use.

Hence total water requirement is **586.0 m³/day**; which is less than permitted quantity is; water requirement for drinking & domestic use as per (Source: NBC 2016, BIS). Actual Permission granted by irrigation dept. & Nagarparishad is much higher than actual water consumption in KVV(DU).



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Water Test Reports

WTP

Sr. No.	Design Parameters	Unit	Inlet Characteristics	Outlet Characteristics	Standard as per IS 10500:2012
1	pH	-	7.23	7.76	6.5-8.5
2	Conductivity	$\mu\text{S/cm}$	958	1095	Not Applicable
3	Total Alkalinity	mg/l	284	300	<200
4	Total Hardness	mg/l	336	24	<200
5	Calcium	mg/l	88	8	<75
6	Magnesium	mg/l	28.2	0.97	<30
7	Carbonate Alkalinity	mg/l	8	12	Not Applicable
8	Bicarbonate Alkalinity	mg/l	276	288	Not Applicable
9	Turbidity	NTU	0.2	0.1	<1
10	Total Coliform	/100 ml	Absent	Absent	Absent

STP

Sr. No.	Design Parameters	Unit	Inlet Characteristics	Outlet Characteristics	MPCB Standard
1	pH	-	7.36	7.45	5.5-9.0
2	C.O.D.	mg/l	156	16	<250
3	B.O.D. at 20 Deg C	mg/l	68	10	<100
4	Total Dissolve Solids	mg/l	590	530	<2100
5	Suspended Solids	mg/l	70	10	<100
6	Sulphates	mg/l	99	83	<1000
7	Chlorides	mg/l	125	110	<600
8	Oil & grease	mg/l	Nil	Nil	<10



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Water Treatment Plant

KVV(DU), Karad has its own fully automatic water treatment plant which supplies 24*7 water for all buildings in the Campus.

KVV(DU) have own irrigation water supply scheme from "Koyna River", have taken water lifting permission from "Sangli Patbandhare Vibhag, Sangli, Inward No – 6093 dated 07.09.1991 for water lifting capacity 7.50 lakh liters per day. The lifted water is stored in the storage tank which is then further treated by fully automatic water treatment plant, having capacity 75 m³/hr. The treated water is stored in storage tank which is lifted into overhead water tank for further supply for use.

Testing of water:

- The water shall be tested for biochemical and microbiological analysis.
- The reports of the same shall be maintained in Civil – Maintenance Department.
- Water testing is done by govt. approval lab every month.

Water treatment plant details

- Water Treatment Plant Capacity – 7500000 lit/Day
- Supplied by – WTE Infra, Pune
- Installation Year – 2016-2017

Photographs of Water Treatment Plant





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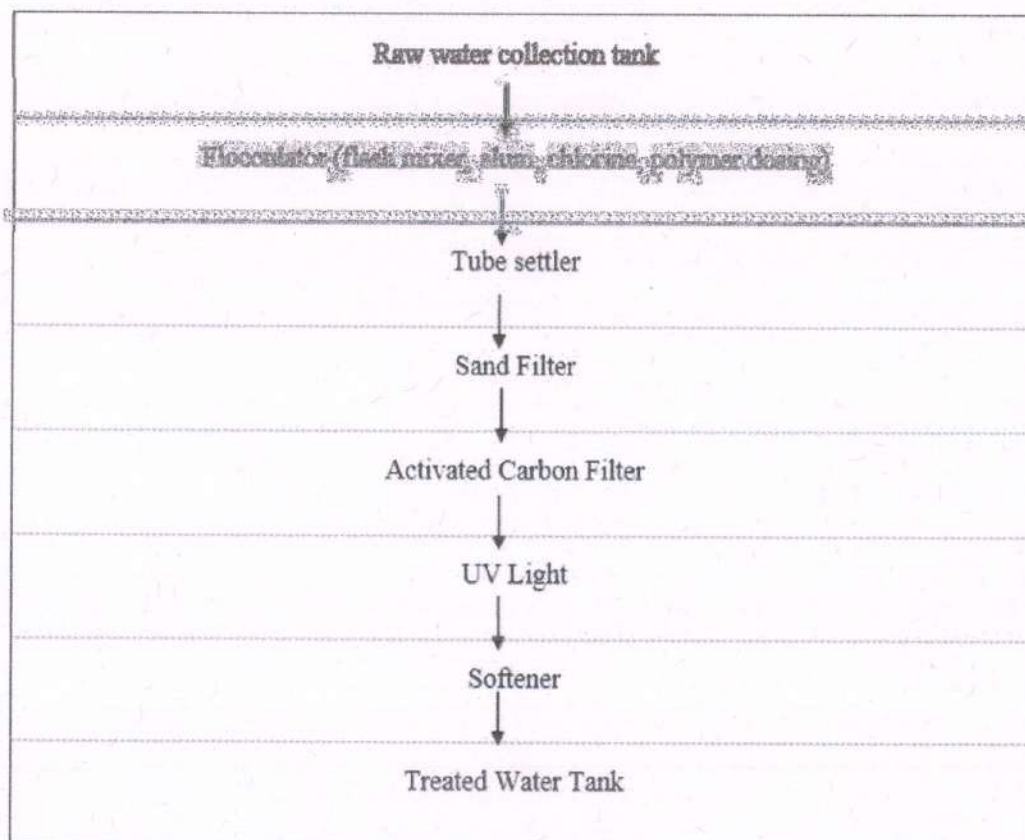
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Flow chart for water treatment:



Water Treatment Plant Schematic Diagram



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CHAPTER – 5 WASTE WATER GENERATION SOURCES & TREATMENT

Total effluent would be generated from the various operations & processes from KVV(DU) complex are presented in below tables.

1. Hospital

Sr. No.	Name of Building	Total Built Up Area	Plinth Area	Commode	Orrisa Pan W.C.	Bath	Handicap Toilet	Staff/ Toilet	Basin	Urinal
1	Ward No. 1 To 9	4000.00	1333.33	18	18	36	9	9	18	0
2	Ward No. 10,11	2040.00	1020.00	22	10	12	2	2	30	0
3	Ward No. 12	1312.00	1312.00	1	5	6	0	4	16	0
4	Ward No. 13 & O.T.	1312.00	0.00	6	0	0	0	6	10	0
	OT Extension	362.62	160	6	0	0	0	0	10	0
5	Ward No. 14,19	1533.00	766.50	2	4	6	0	2	4	0
6	Ward No. 15, 16,17,18	2230.00	557.50	12	8	12	4	4	12	0
	Extension of Ward 40 4 th floor	558.00	0.00	4	1	3	0	1	3	0
7	Ward No. 21 to 28 Extension 4 th floor	3793.40	948.35	24	16	24	8	8	24	0
	Extension of Ward 38,39 4 th floor	1173.00	50.00	8	2	6	0	2	6	0
8	Private Room Ward No31	1094.53	0.00	20	0	0	0	3	23	0
9	OPD	2376.92	1188.46	3	3	0	2	2	23	0
10	X-Ray	1073.00	536.50	4	2	0	0	2	8	0
11	Pharmacy No.1	185.00	185.00	0	1	0	0	1	1	0
12	Blood Bank	619.00	619.00	1	0	0	0	1	5	0
13	Cobalt Unit	1400.00	700.00	4	3	1	0	7	7	2
14	ICU Building	276.90	276.90	2	0	0	0	2	2	0
15	Administrative Office	635.86	317.93	4	1	0	0	5	2	2
16	Casualty Unit Casualty New	1533.00	138.00	1	0	0	0	1	1	0
17	X-Ray - 1st Floor Above Office	0.00	0.00	1	1	0	0	2	3	0



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Sr. No.	Name of Building	Total Built Up Area	Plinth Area	Commode	Orrisa Pan W.C.	Bath	Handicap Toilet	Staff/ Toilet	Basin	Urinal
18	Passage & Ramp	644.00	322.00	0	0	0	0	0	0	0
19	C.M. Store	361.00	361.00	1	0	0	0	1	1	0
20	Laundry & Workshop	578.00	289.00	1	4	0	0	4	5	6
21	Mortuary Store	48.00	48.00	0	0	0	0	0	0	0
22	Mortuary-2	72.00	72.00	0	0	0	0	0	0	0
23	Incinerator-I	56.00	56.00	0	0	0	0	0	0	0
24	Generator Shed Behind Medical College	52.00	52.00	0	0	0	0	0	0	0
25	Power House	1000.00	1000.00	2	1	0	0	3	3	2
26	Dharmashala	76.00	76.00	0	2	0	0	2	4	0
27	I.P.D.Record Room With Mazzanine	164.00	164.00	0	1	0	0	1	1	0
28	Ward 29/30/33/34/36/37	1534	767.00	9	0	9	1	9	9	0
29	Parking Building	2288	1000.00	10	0	0	0	10	10	5
Additional Sheds at Hospital										
1	C.M.Store scrap yard	200.00	200.00	1	0	0	0	0	1	0
2	Panel room and D.G.Shed behind new medical college	85.00	85.00	0	0	0	0	0	0	0
3	passage / ramp near new ward	80.00	80.00	0	0	0	0	0	0	0
4	civil /maintenance work shop extension	50.00	50.00	1	0	0	0	0	1	0
5	composter plant near BDS hostel	42.00	42.00	0	0	0	0	0	0	0
6	laundry room near NRI hostel	14.00	14.00	0	0	0	0	0	0	0
7	Labour rest/Tiffin room behind ward no.10	50.00	50.00	0	0	0	0	0	0	0



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Sr. No.	Name of Building	Total Built Up Area	Plinth Area	Commode	Orrisa Pan W.C.	Bath	Handicap Toilet	Staff/ Toilet	Basin	Urinal
8	compressor room for CATH lab	50.00	50.00	0	0	0	0	0	0	0
9	waiting room shed near Ward No. 1	50.00	50.00	0	0	0	0	0	0	0
10	waiting room shed near OPD	174.00	174.00	0	0	0	0	0	0	0
11	Transport work shop	74.00	74.00	0	0	0	0	0	0	0
12	ETP/STP Shed 1 No.	410.00	410.00	0	0	0	0	0	0	0
13	ETP sheds 2 No.	190.00	190.00	0	0	0	0	0	0	0
14	Canteen shops near Ward No. 16	70.00	70.00	0	0	0	0	0	0	0
15	WTP	500.00	500.00	0	0	0	0	0	0	0
16	Boiler Room	83.61	83.61	0	0	0	0	0	0	0
17	Oxygen Plant	35.39	35.39	0	0	0	0	0	0	0
18	Irrigation jack well	50.00	50.00	0	0	0	0	0	0	0

2. Hostel

Sr. No.	Name of Building	Total Built Up Area	Plinth Area	Commode	W.C.	Bath	Handicap Toilet	Staff/ Toilet	Basin	Urinal
1	Boy's Hostel (Total Beds-200) (Single 42+ Double-79)	3550.00	1183.33	9	26	28	1	1	20	22
2	Ladies Hostel (Total Beds-300), Rooms-100 senior	4065.00	1355.00	7	26	42	1	1	18	0
3	New Hostel Dental (Total Beds - 186), Rooms - 62	3108.65	621.00	20	17	55	1	1	35	0



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4	IHR Hostel New beds 132 rooms 48	1803.00	450.75	12	12	0	1	1	18	0
5	New Hostel Nursing (Total Beds-144), Rooms - 48 no.4	2556.00	639.00	10	38	64	1	1	57	0
6	New Hostel Boys cap- 112 rooms 56	2151.20	537.75	21	15	28	1	1	27	21
7	New Hostel Nursing no.5	3548.00	709.60	8	19	27	1	0	25	0
8	NRI Hostel 45 Rooms	1675.00	478.57	49	0	49	1	0	49	0
9	New Hostel building no.6	5080.63	1016.00	0	45	62	1	0	45	0
10	New Hostel Medical College	2000.00	500.00	34	0	0	1	1	34	
11	International Hostel Building	4592.74	1020.00	94	0	91	2	3	106	0
12	Nursing Hostel no.2	2000.00	633.00	5	16	21	1	0	7	0

3. Colleges

Sr. No.	Name of Building	Total Built Up Area	Plinth Area	Commode	W.C.	Bath	Handicap Toilet	Staff/ Toilet	Basin	Urinal
1	Krishna Institute of Medical Sciences	21832.00	3500.00	56	0	0	1	8	54	38
2	Krishna Institute of Allied Sciences	4706.00	1568.66	6	13	0	1	1	15	18
3	Krishna Institute of Nursing Science	5254.00	1751.00	6	10	5	1	1	15	8
4	Krishna College of Physiotherapy	5002.22	1300.00	33	8	0	5	9	24	0
5	Krishna Institute of Pharmacy	3007.14	960.00	22	4	0	4	2	20	12
6	School of Dental Science	11324.00	2831.00	13	46	20	2	0	40	30



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Sr. No.	Name of Building	Total Built Up Area	Plinth Area	Commode	W.C.	Bath	Handicap Toilet	Staff/Toilet	Basin	Urinal
7	Krishna Institute of Pharmacy	5942.86	1500.00	18	9	12	2	9	24	20

4. Other

Sr. No.	Name of Building	Total Built Up Area	Plinth Area	Commode	W.C.	Bath	Handicap Toilet	Staff/Toilet	Basin	Urinal
1	Central Library Building	2890.01	656.17	20	0	4	1	0	8	8
2	Badminton & Gym Hall	815.00	407.50	2	2	4	1	0	4	1
3	Guest House (Rooms-12)	515.00	257.00	10	1	1	0	10	11	0
4	Cafeteria	425.00	425.00	3	0	2	0	1	6	3
5	Swimming Pool Changing Room	500.00	250.00	9	0	9	0	1	11	5
6	Museum Building	256.00	256.00	1	0	0	0	1	1	0
7	University Building	2700.00	675.00	20	12	0	0	0	24	16
8	Auditorium Hall	680.74	680.74	0	0	0	0	0	0	0
9	New Lecture Hall above ward No. 13	450.00	0	0	0	0	0	0	0	0

5. Staff Quarters

Sr. No.	Name of Building	Total Built Up Area	Plinth Area	Commode	W.C.	Bath	Handicap Toilet	Staff/Toilet	Basin	Urinal
1	A-1 Type Residential Building 1-6	727.00	363.50	12	0	12	0	0	12	0
2	B-New Staff Quarter (1 to 40)	3913.04	978.25	80	0	80	0	0	80	0
3	D-1 (24 Blocks) (Rooms-3)	1884.00	942.00	24	0	24	0	0	24	0



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Summary

Sr. No.	Name of Building	Total Built Up Area	Plinth Area	Commode	W.C.	Bath	Handicap Toilet	Staff/Toilet	Basin	Urinal
1	ALL	145543.00	44970.29	772	402	755	55	153	1057	217

Details of Effluent Generation

Sr. No.	Description	Effluent Source	Effluent Generation	Treatment
1	Domestic			
	a) Hospital	772 Commodes + 402		500 KLPD X 2
	b) Hostel	WC + 755 Bathrooms +		Nos.
	c) College	55 Toilets for Handicap +		Sewage Treatment
	d) Other	153 Staff Toilet + 1057		Plant
	e) Staff quarter	Basins + 217 Urinals		
2	Laundry & Lab Washing			100 KLPD ETP

Sewage Treatment Plant

KVV(DU) has installed two Sewage Treatment Plants to treat the sewage water which generates in the hospital campus. The capacity of this plant is 500 KLD each. In this plant they have introduced the 'Moving bed bio-reactor (MBBR) technology' to treat the raw sewage water.

Testing of water:

- The water shall be tested for biochemical and microbiological analysis.
- The reports of the same shall be maintained in Civil – Maintenance Department.
- Water testing is done by MoEFCC approved lab every month.

Sewage Treatment Plant Details

- Sewage Treatment Plant Capacity – 500000 lit/Day X 2 Nos.
- Supplied by – WTE Infra, Pune
- Installation Year – Old STP - 2014 & New STP – 2018



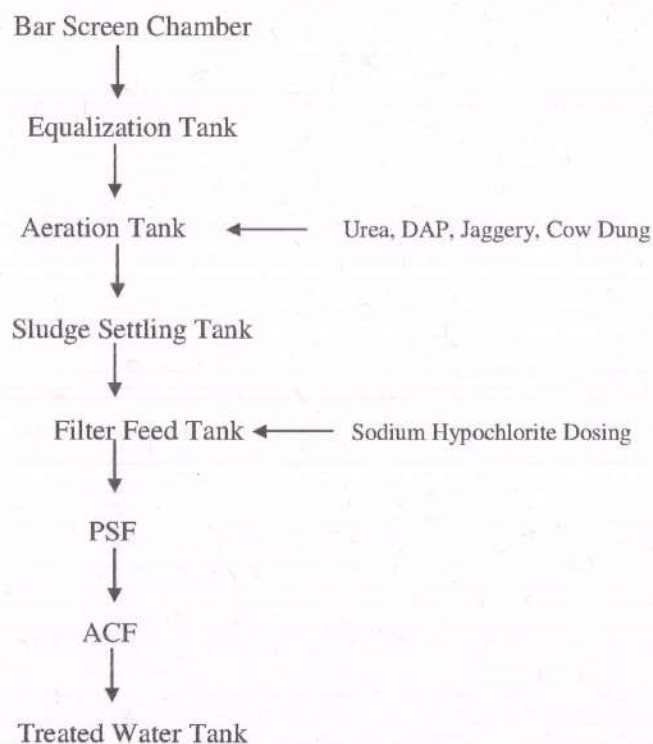
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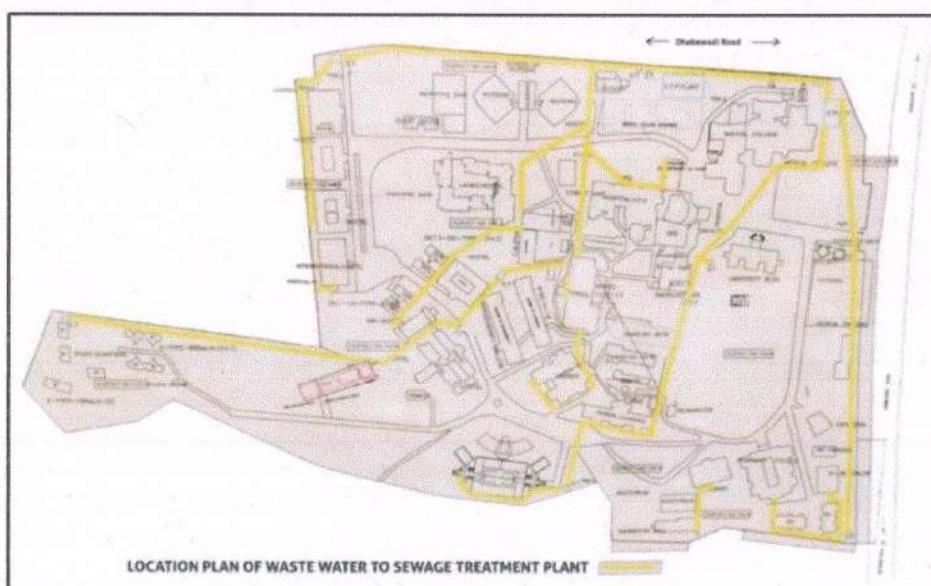
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Flow chart for Sewage treatment Plant



Sewage Collection Map with Flow Diagram of Sewage Treatment Plant (STP)



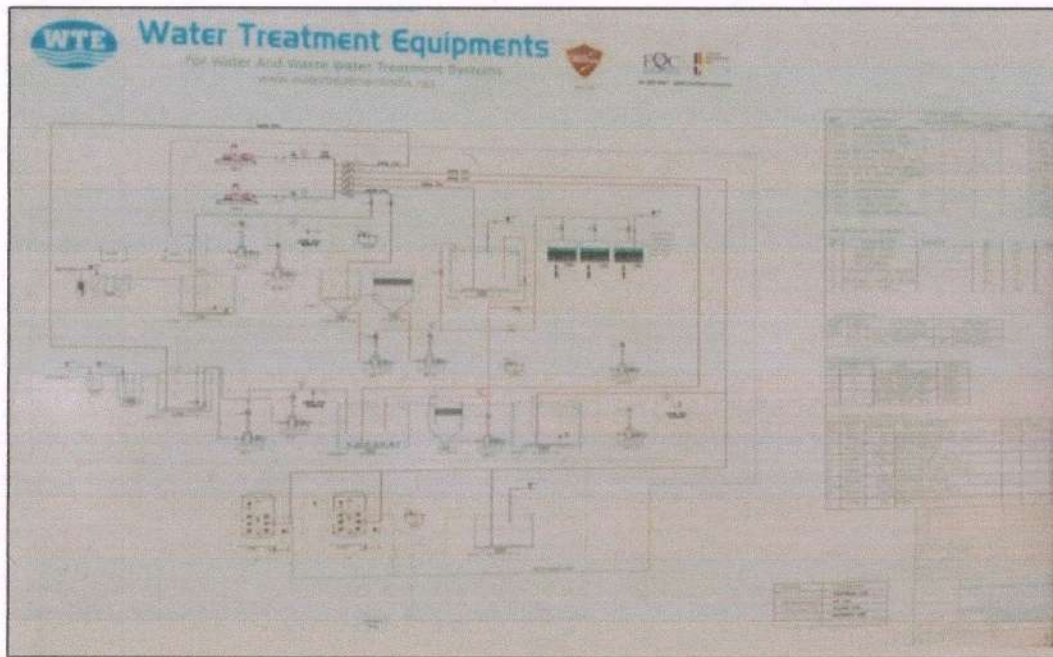


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Photographs of Sewage Treatment Plant (STP)



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CHAPTER - 6 ACTION PLAN FOR WATER CONSERVATION

Conservation of Ground Water Resources

Groundwater is an important component of hydrological cycle. It supports the springs in hilly regions and the river flow of all peninsular rivers during the non-monsoon period. For sustainability of ground water resources, it is necessary to arrest the ground water outflows by -

- (a) Construction of sub-surface dams
- (b) Watershed management.
- (c) Treatment of upstream areas for development of springs
- (d) Skimming of freshwater outflows in coastal areas and islands.

Rainwater Harvesting

Rainwater harvesting is one of the way to conserve the water and increase the ground water table. Here the collection and storage of rainwater at the surface or in sub-surface aquifers, before it is lost as surface runoff. Ground water augmentation through diversion of rainfall to sub-surface reservoirs, by various artificial recharge techniques, has special relevance in India where due to terrain conditions most of the rain water is lost as Flush floods and local streams remain dry for most part of the year.

The harvesting of rain water simply involves the collection of water from terrace surfaces on which rain falls and subsequently storing this water for increase of bore ground water level. The rain water collected can be stored for direct use or can be recharged into the underground aquifers. In scientific terms water harvesting (broadly) refers to collection and storage of rain water from the roof tops. This also restricts evaporation and seepage into building foundations.

A Rain Water Harvesting system consists of:

- i. Roof catchment
- ii. Rain / Storm water drains
- iii. Down pipes
- iv. Filter chamber



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- v. Water collecting n Pits / Sumps
- vi. Terrace water recharge for bore well in the campus.

RWH is a way to capture the rain runoff, store that water above ground or charge the underground aquifers and use it later. This happens naturally in open rural areas. But in congested, over-paved metropolitan cities, there is a need to devise methods to capture the rain water. The rain water that is collected on the surface / roof top is guided to bore wells or pits or new/ old/ abandoned wells through small diameter pipes to recharge the underground water which can be used later whenever required.

Some of the benefits of rainwater harvesting are as follows:

- i. Increases water availability.
- ii. Increase the water table level
- iii. Improves the quality of ground water through the dilution of fluoride, nitrate and salinity.
- iv. Is environmentally friendly

Rain water can be harvested to the extent of 65,000 liters per 100 sq. m. area per year from roof tops. The capacity of this project to collect and percolate the rain water from the terrace into the ground is 105.82 lakh lit/year. To increase ground water level for all bore well in the campus.

Rain Water Harvesting System

Ground water level in the KVV(DU) campus is monitored. Details of level is tabulated in following table –

Monitoring of Ground Water Level at Bore No. 5 - By Piezometer

Date	Water Level (above sensor)	Date	Water Level (above sensor)
08-Jun-2021	10.10 meter	05-Nov-2021	9.70 meter
10-Jun-2021	12.60 meter	10-Nov-2021	9.60 meter
15-Jun-2021	11.10 meter	15-Nov-2021	9.80 meter
20-Jun-2021	12.10 meter	20-Nov-2021	10.60 meter
25-Jun-2021	10.00 meter	25-Nov-2021	11.10 meter
30-Jun-2021	9.10 meter	30-Nov-2021	11.50 meter
01-Jul-2021	7.70 meter	01-Dec-2021	10.90 meter



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Date	Water Level (above sensor)	Date	Water Level (above sensor)
05-Jul-2021	6.70 meter	05-Dec-2021	10.50 meter
10-Jul-2021	6.20 meter	10-Dec-2021	10.40 meter
15-Jul-2021	10.40 meter	15-Dec-2021	10.20 meter
20-Jul-2021	10.90 meter	20-Dec-2021	9.90 meter
25-Jul-2021	11.10 meter	25-Dec-2021	10.10 meter
30-Jul-2021	19.60 meter	30-Dec-2021	10.40 meter
01-Aug-2021	19.30 meter	01-Jan-2022	10.30 meter
05-Aug-2021	16.40 meter	05-Jan-2022	9.80 meter
10-Aug-2021	12.90 meter	10-Jan-2022	7.50 meter
15-Aug-2021	11.10 meter	15-Jan-2022	7.00 meter
20-Aug-2021	11.70 meter	20-Jan-2022	8.20 meter
25-Aug-2021	9.30 meter	25-Jan-2022	8.00 meter
30-Aug-2021	8.40 meter	07-Jan-2022	8.10 meter
01-Sep-2021	11.00 meter	30-Jan-2022	8.30 meter
05-Sep-2021	11.40 meter	01-Feb-2022	8.20 meter
10-Sep-2021	11.90 meter	05-Feb-2022	8.10 meter
15-Sep-2021	12.10 meter	10-Feb-2022	7.60 meter
20-Sep-2021	11.80 meter	15-Feb-2022	7.10 meter
25-Sep-2021	10.90 meter	20-Feb-2022	8.00 meter
30-Sep-2021	11.60 meter	25-Feb-2022	6.10 meter
01-Oct-2021	12.30 meter	01-Mar-2022	6.30 meter
05-Oct-2021	12.20 meter	05-Mar-2022	8.10 meter
10-Oct-2021	12.10 meter	10-Mar-2022	5.00 meter
15-Oct-2021	11.80 meter	15-Mar-2022	4.80 meter
20-Oct-2021	12.60 meter	20-Mar-2022	5.00 meter
25-Oct-2021	11.10 meter	25-Mar-2022	8.50 meter
30-Oct-2021	10.80 meter	30-Mar-2022	9.70 meter
01-Nov-2021	10.00 meter		



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Date	Water Level (above sensor)	Date	Water Level (above sensor)
05-Apr-2022	11.10 meter	05-Oct-2022	12.30 meter
10-Apr-2022	11.60 meter	10-Oct-2022	12.80 meter
15-Apr-2022	10.16 meter	15-Oct-2022	12.40 meter
20-Apr-2022	11.20 meter	20-Oct-2022	13.90 meter
25-Apr-2022	9.60 meter	25-Oct-2022	13.10 meter
30-Apr-2022	9.40 meter	30-Oct-2022	13.80 meter
01-May-2022	8.70 meter	01-Nov-2022	12.40 meter
05-May-2022	7.70 meter	05-Nov-2022	11.70 meter
10-May-2022	7.20 meter	10-Nov-2022	10.60 meter
15-May-2022	9.40 meter	15-Nov-2022	10.80 meter
20-May-2022	9.90 meter	20-Nov-2022	10.30 meter
25-May-2022	10.10 meter	25-Nov-2022	12.10 meter
30-May-2022	10.50 meter	30-Nov-2022	12.50 meter
05-Jun-2022	10.90 meter	01-Dec-2022	11.90 meter
10-Jun-2022	10.60 meter	05-Dec-2022	11.50 meter
15-Jun-2022	10.40 meter	10-Dec-2022	11.40 meter
20-Jun-2022	10.30 meter	15-Dec-2022	11.60 meter
25-Jun-2022	10.00 meter	20-Dec-2022	10.90 meter
30-Jun-2022	9.80 meter	25-Dec-2022	10.50 meter
01-Jul-2022	8.50 meter	30-Dec-2022	10.40 meter
05-Jul-2022	9.70 meter	01-Jan-2023	9.10 meter
10-Jul-2022	10.20 meter	05-Jan-2023	9.70 meter
15-Jul-2022	10.40 meter	10-Jan-2023	8.90 meter
20-Jul-2022	10.90 meter	15-Jan-2023	8.50 meter
25-Jul-2022	11.10 meter	20-Jan-2023	8.20 meter
30-Jul-2022	12.60 meter	25-Jan-2023	8.00 meter
01-Aug-2022	14.30 meter	07-Jan-2023	8.10 meter
05-Aug-2022	16.40 meter	30-Jan-2023	8.30 meter



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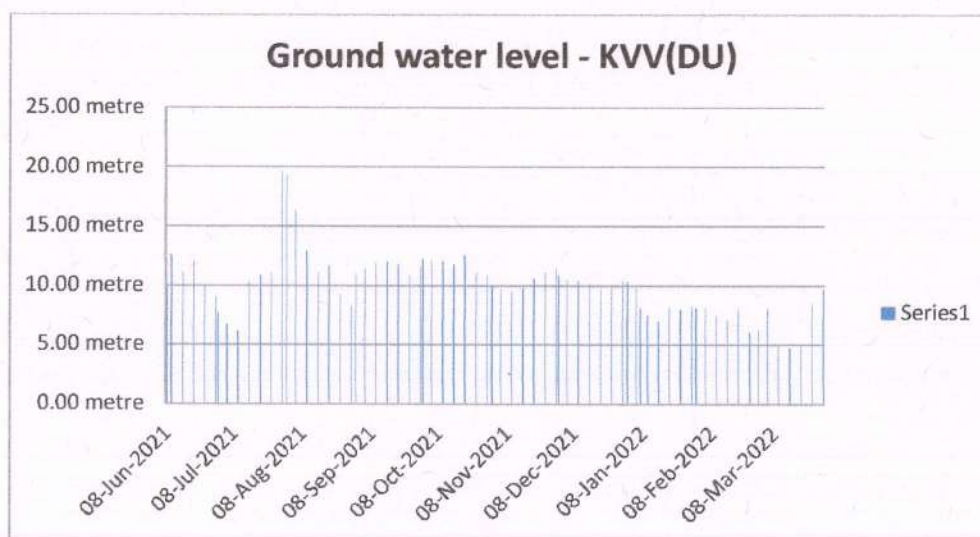
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Date	Water Level (above sensor)	Date	Water Level (above sensor)
10-Aug-2022	13.90 meter	01-Feb-2023	8.20 meter
15-Aug-2022	12.60 meter	05-Feb-2023	7.90 meter
20-Aug-2022	11.70 meter	10-Feb-2023	7.60 meter
25-Aug-2022	10.80 meter	15-Feb-2023	7.10 meter
30-Aug-2022	9.90 meter	20-Feb-2023	8.00 meter
01-Sep-2022	11.00 meter	25-Feb-2023	8.10 meter
05-Sep-2022	11.40 meter	01-Mar-2023	8.40 meter
10-Sep-2022	11.90 meter	05-Mar-2023	8.60 meter
15-Sep-2022	12.70 meter	10-Mar-2023	7.70 meter
20-Sep-2022	11.90 meter	15-Mar-2023	7.10 meter
25-Sep-2022	11.30 meter	20-Mar-2023	6.60 meter
30-Sep-2022	11.90 meter	25-Mar-2023	7.30 meter
01-Oct-2022	12.50 meter	30-Mar-2023	8.40 meter

Ground water level measured by the Piezometer in year 2021-2022





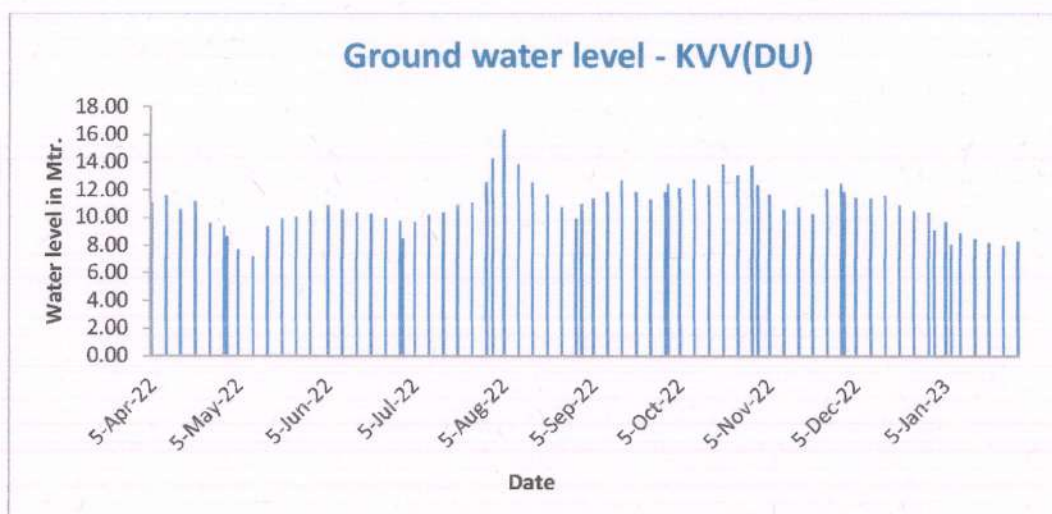
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Ground water level measured by the Piezometer in year 2022-23 -



Piezometer installed at Borewell No. 5



Piezometer





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RWH Recharge Pit



4/6/22

Ketakey



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CHAPTER - 7 WATER CONSERVATION SOLUTION

Sr. No	Building Name	Capacity (In Liters)	Daily Uses of Water	Reduction of Water Consumption	Recommendations for further water saving
			(In Liters)	(In Liters)	
1	I.H.R. Hostel(I)	20000	10000	500	1] Providing Auto Level Guard For Over Head Tank. 2] Providing Auto Flush Valves for WC & Basin. 3] Providing Dual Flush Tank for WC & Basin. 4] Separate Arrangement for WC & Urinal Flushing from STP Treated Water Regular Monitoring Tap & Pipeline Leakage.
		6800	3400	400	
2	Ladies Hostel (I)	11800	5500	300	
		17500	8500	400	
		11800	5500	300	
3	B.D.S. Hostel No.(III)	22600	12000	400	
		22600	12000	300	
4	B.Sc. Nursing Hostel(IV)	4000	2000	100	
5	B.Sc. Nursing Hostel(V)	25000	13000	500	
6	Ladies Hostel (VI)	34000	17000	450	
7	Guest House	6250	3500	100	
8	Hostel –VII / Guest House/N.R.I. Hostel	24000	12500	250	
9	Residency Hostel	55000	29000	600	
10	A Type Quarter	4000	2000	100	
11	D Type Quarter 1 To 24	27200	14000	350	
12	E Type Quarter	16000	8500	250	
13	New Staff Quarter	40000	21000	550	
14	B-1 1-20 & 21-40	40000	21000	200	
15	All O.P.D.	6800	3400	200	
16	Ward No. 7	10000	5500	250	
17	Ward No.8	10800	5000	100	
18	Ward No. 9	10800	6000	200	
19	Ward No. 11	14000	7500	250	



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Sr. No	Building Name	Capacity (In Liters)	Daily Uses of Water	Reduction of Water Consumption	Recommendations for further water saving
			(In Liters)	(In Liters)	
20	Ward No. 13	35000	18000	500	
21	C.S.R.	4000	2000	200	
22	Ward No. 18	14000	8000	250	
23	Ward No. 19	8000	5000	200	
24	Ward No. 28	21500	12000	300	
25	Ward No. 31	10,000	5500	200	
26	VIP ICU	1000	500	50	
27	Laundry	4000	4000	50	
28	University Office	8000	3500	200	
29	Krishna Institute of Pharmacy	8000	3500	200	
30	Krishna College of Physiotherapy	16000	7000	350	
31	School of Dental Science	44000	20000	550	
32	Krishna Institute of Nursing Science	30000	16000	400	
33	Library	2000	2000	100	
34	Badminton Hall	2000	1500	250	
35	Café House	3000	3000	50	
36	Krishna Institute of Medical Sciences	30000	18000	400	

Recommendations Executed From Last Year Report

1. Fixing the water meter in all water tank outlets.
2. Mend the leaks in taps and pipes.
3. Flushing system maintaining & proving dual Flush tank for WC.
4. Avoiding use of running water while hand-washing



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5. Waste treated water from STP used for Flushing system for urinal & WC & also for garden in all campus.
6. Water saved from leakage of pipeline.
7. Overhead tank auto filling for prevent of water tank over flow or using over flow stop valve in the overhead tanks to check over flow of water.
8. Providing Auto level guard for overhead tank.
9. Providing auto flush valves for WC & basin.
10. Separate arrangement for WC & urinal Flushing from STP Treated water
11. Regular monitoring tap & pipeline leakage.
12. Rain water can be harvested to the extent of 65,000 liters per 100 sq. m. area per year from roof tops. The capacity of this project to collect and percolate the rain water from the terrace into the ground is 105.82 lakh lit/year to increase ground water level for all bore well in the campus.
13. Avoiding over watering of lawns.
14. Setting sprinklers to water the lawn or garden only, not the street or sidewalk
15. Avoiding use of excess fertilizers for lawns in view of the fact that application of fertilizer increases the requirement of water in addition to polluting the groundwater.

Recommendations for Water Conservation

1. Auto Flush cock for basin.
2. Providing dual Flush tank for WC & basin.
3. Watering of lawn or garden during the coolest part of the day (early morning or late evening hours) when temperature and wind speed are the lowest. This reduces losses from evaporation.
4. Planting of native and/or drought tolerant grasses, ground covers, shrubs and trees. Once established, they do not need to be watered as frequently and they usually survive a dry period without much watering.



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Photographs -

Main Building



Tree Plantation



Recycled water for Gardening



Water reused for flushing



Ground water recharge pit



Borewell No. 2



Toilet Tank Bank



Faucets





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Annexure I

KVV(DU) - Water Supply Map



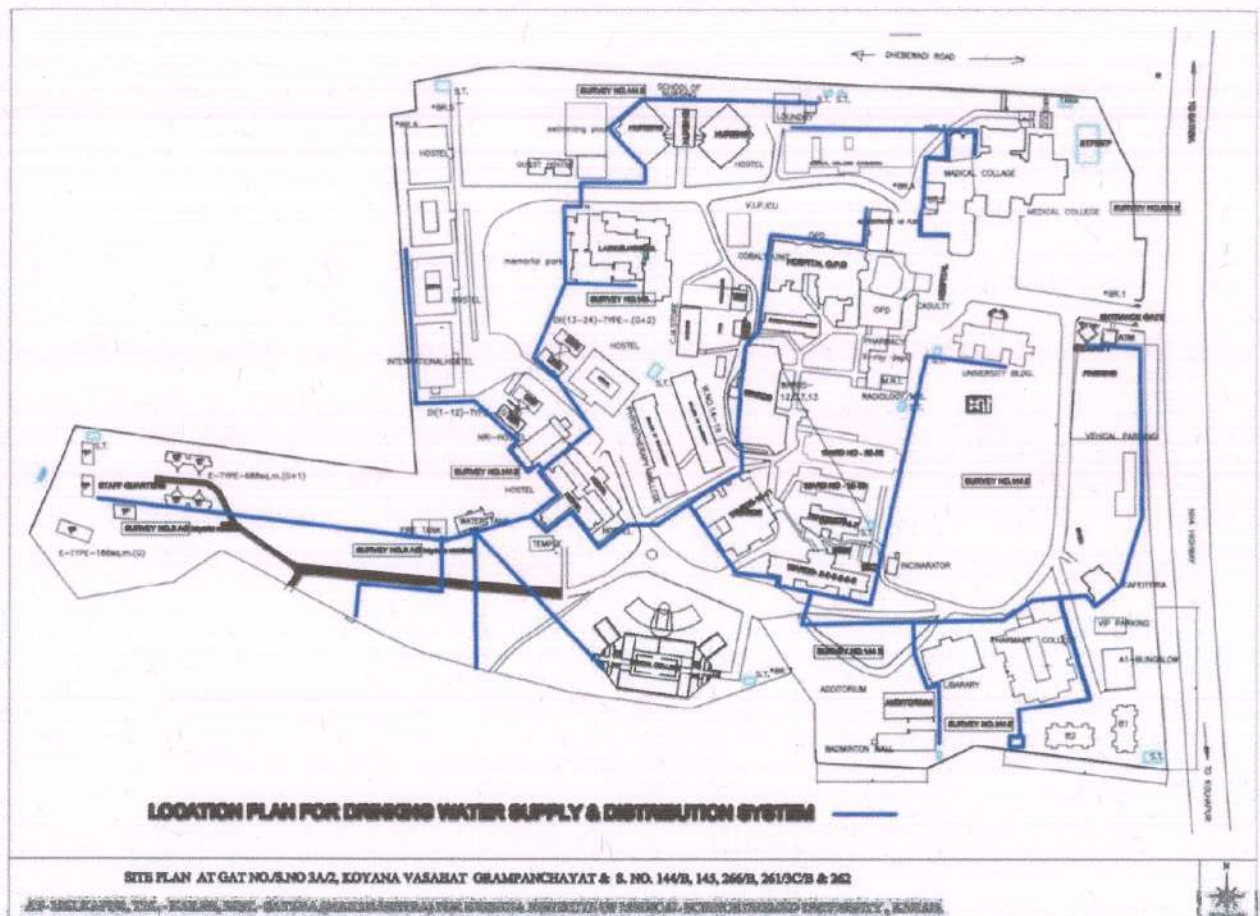
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Annexure II

KVV(DU) - Layout Plan



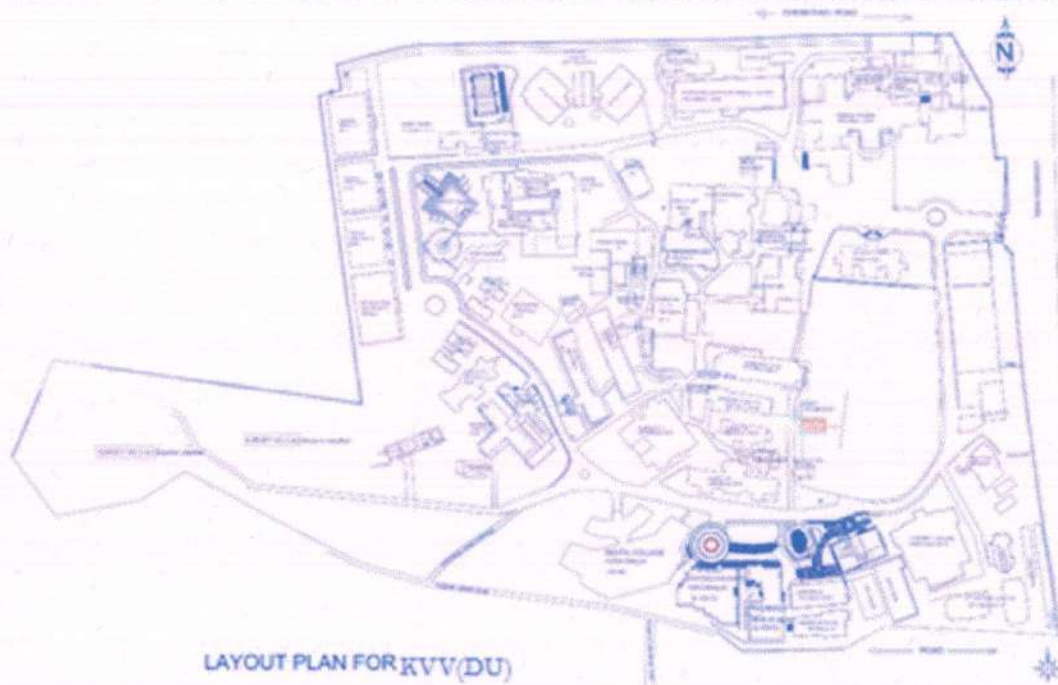
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Annexure II



LAYOUT PLAN FOR KVV(DU)

SITE PLAN AT GAT NO./S.NO 3A/2, KOYANA VASAHAT GRAMPANCHAYAT & S. NO. 144/B, 145, 266/B, 261/3C/B & 262

AT- MALKAPUR, TAL.- KARAD, DIST.- SATARA. FOR Krishna Vishwa Vidyapeeth (Deemed to be University), Karad.

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Annexure III

KVV(DU) – RWH Layout



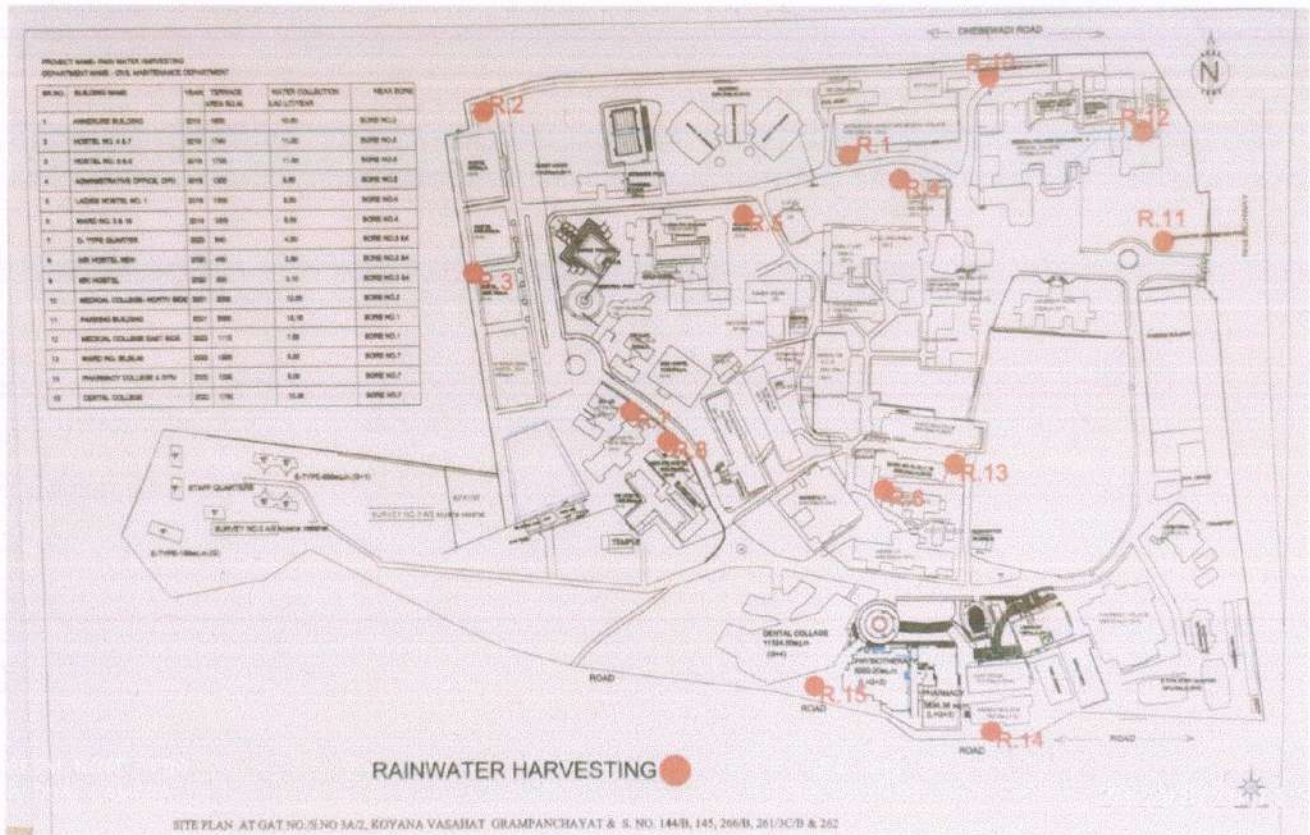
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Annexure III





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Annexure IV

KVV(DU) - Bore well Details



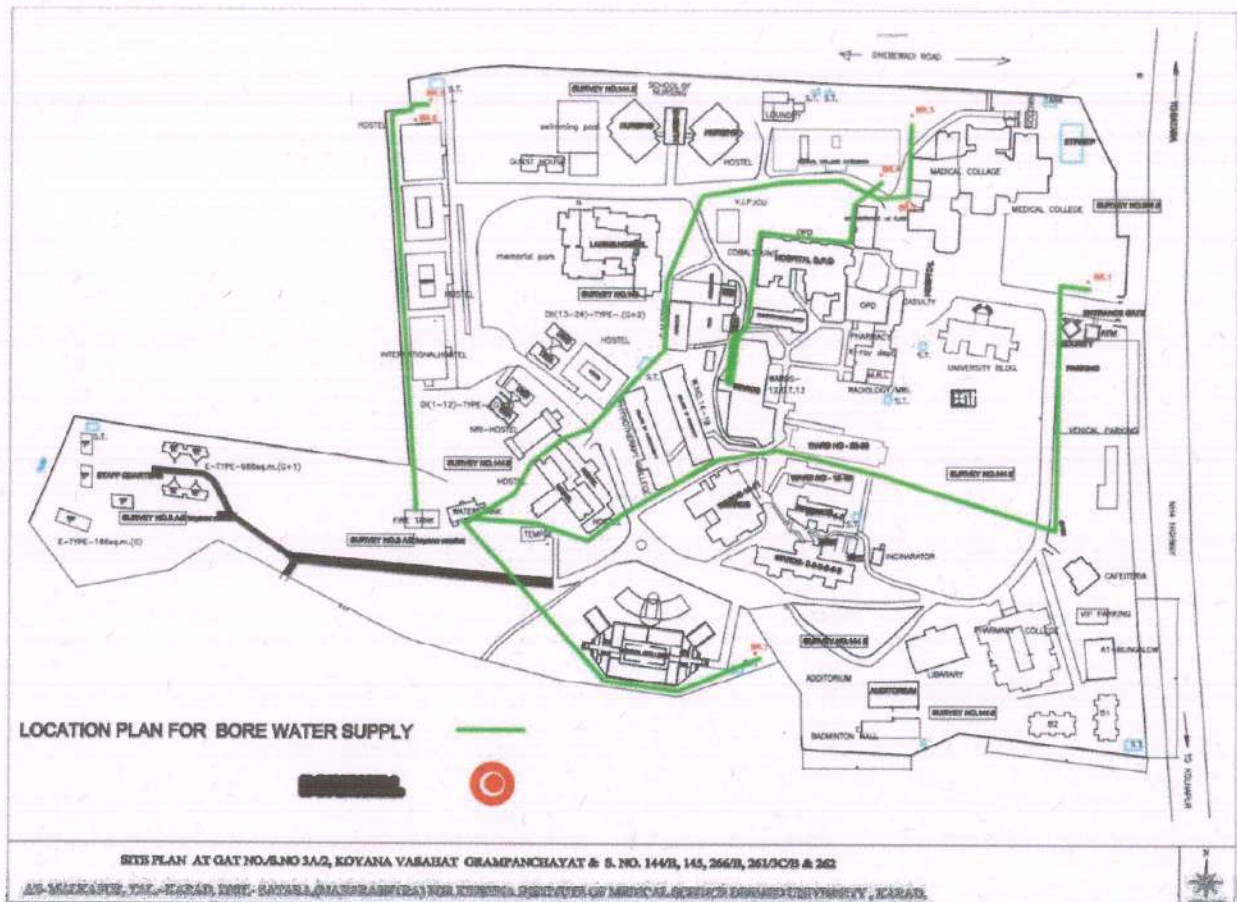
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Annexure IV



Ms. Pragatee Murkute

Mr. Dhiraj Kekalekar

REGISTRAR
Krishna Vishwa Vidyapeeth
(Deemed to be University),
Karad