



THUNCHATH EZHUTHACHAN MALAYALAM UNIVERSITY

WATER AUDIT REPORT

PREPARED BY:

SCHOOL OF ENVIRONMENTAL STUDIES

THUNCHATH EZHUTHACHAN MALAYALAM UNIVERSITY

TIRUR



MARCH 2024

FOREWORD

Among the problems we confront in the current day are a shortage of water and deteriorating water quality. Increasing awareness of the need to use water resources wisely and efficiently is crucial. By examining the efficiency of water resources and their management, as well as the usage of water on university property, this water audit report represents a significant step towards achieving this goal. This report demonstrates our university's ongoing dedication to environmental conservation.

The objective of this water audit is to assess the existing status of water use in the university premises, identify water wastage zones and make concrete recommendations to improve the efficiency of water conservation. This audit will help students, teachers and non-teaching staff understand the importance of water conservation and increase awareness about how their actions impact the ecological balance. It is expected that this audit report will be useful in comprehensively understanding our water footprint and identifying practical ways to reduce it. More effective watering techniques are required, according to one of the audit's main conclusions. The study emphasises how crucial it is for institutions to implement water-saving measures like rainwater harvesting and drip irrigation. Large-scale water losses are caused by leaks and inefficiency in water supply systems. The sites highlighted in this report require prompt repair in order to prevent further water loss.

Maintaining sustainability over the long run requires a shift in how we think about and use water. Promotional initiatives, training sessions, and reward schemes can significantly contribute to cultivating a compassionate culture within the academic community. We are not only meeting our responsibilities as an educational institution but also leading by example by actively promoting water conservation. I would like to thank everyone who took part in our water audit. The university's dedication to environmental protection is demonstrated by this water audit report, which is more than just a document. It is our aim that the data obtained from this audit would enable us to consistently change our habits and approaches to water management, leading to the adoption of sustainable water conservation measures.

Faithfully,

Dr. Arun Babu V.

Director

School of Environmental Studies

Thunchath Ezhuthachan Malayalam University,

Tirur.

CONTENTS

Introduction.....	4
Executive Summary.....	5
1. General Informations.....	6
1.1. History and Vision.....	11
1.2. Faculties and Programmes.....	12
1.3. Demography.....	14
1.4. Buildings.....	14
1.5. Environmental Characteristics.....	23
1.5.1. Geography.....	23
1.5.2. Climate.....	23
1.5.3. Watershed Characteristics.....	24
1.5.4. Soil Types.....	24
1.5.5. Biodiversity.....	24
1.5.6. Waste Management.....	24
1.5.7. Energy Management.....	24
1.5.8. Nearby Waterbodies.....	24
1.5.9. Monsoon Flooding.....	25
2. Methodology.....	27
2.1. Water Audit Team.....	27
2.2. Meetings.....	27
2.3. Data Collection.....	27
2.4. Data Analysis.....	28
2.5. Report Preparation.....	30
3. Water Audit.....	31
3.1. Water Supply Informations.....	31
3.2. Water Demand Informations.....	40
3.3. Water Storage and Distribution.....	46
3.4. Water Quality.....	50
3.5. Waste Water Treatment.....	50
3.6. Current Water Conservation Activities.....	53
4. Follow-up Activities.....	54

Introduction

The theme of last year's World Water Day is 'Accelerating the Change to Ensure Water Security'. Water security is one of the most important aspects of the infrastructure of every region and institution. Sustainability in the water resources sector greatly influences our quality of life and progress. During this period, climate change and population growth are putting great pressure on the water resources sector. Therefore, it is an important step towards the future that through such water audits, we have to closely assess the availability, quality, water requirements and the anomalies in utilization of water. This is the first water audit report of Aksharam campus of Thunchath Ezhuthachan Malayalam University, Tirur. The report was prepared by the university's School of Environmental Studies. As part of the State Government's Haritha Keralam Mission's Campus for Nava Keralam project, excellent technical support has been made available for the preparation of this report. The university's Bhumitra Sena Club and the Engineering department also made outstanding contributions towards the preparation of this report. Recently, for the first time in India, Kerala prepared water budget documents through Haritha Keralam Mission. The structure of these water budget documents has greatly influenced this report. The Haritha Keralam Mission's Water Budget Project was developed with the technical assistance of CWRDM, located at Kunnamangalam, Kozhikode, under the Kerala State Council for Science, Technology and Environment, the most important research institution in the field of water resources in Kerala. The Water-Budget project helped in collecting information about the rainfall in the nearby areas. As part of this project, a workshop of the Haritha Keralam Mission was organized for the students of the School of Environmental Studies on January 25, 2024. That workshop also took the first step towards preparing this water audit report. I am happy that I was able to prepare a water audit report by joining hands with Kerala, which is dreaming of a water secure Kerala.

In this water audit report of Aksharam campus has included the the environmental features of the area where the campus is located along with basic information of the campus. Aksharam campus is located at Vakad in Vettam grama panchayat, just 420 metres from the Arabian Sea. The campus is designed for the Malayalam language and the State, which is rich in biological diversity, overcoming the adverse factors in the coastal sandy soil. More than 500 students, faculty and staff members participated in the daily working of the campus. These efforts will help to ensure excellent services and transform Malayalam University into an institution of high quality. This water audit report has analyzed the ecological characteristics of the water resources sector, water resources, data on water availability, data on various water needs, water quality, wastewater treatment system, current water conservation activities, and follow-up actions for improvement. There is a need to improve the existing system and develop all-round water supply. This water audit report will help in guiding such activities which will ensure better services for generations.

Executive Summary

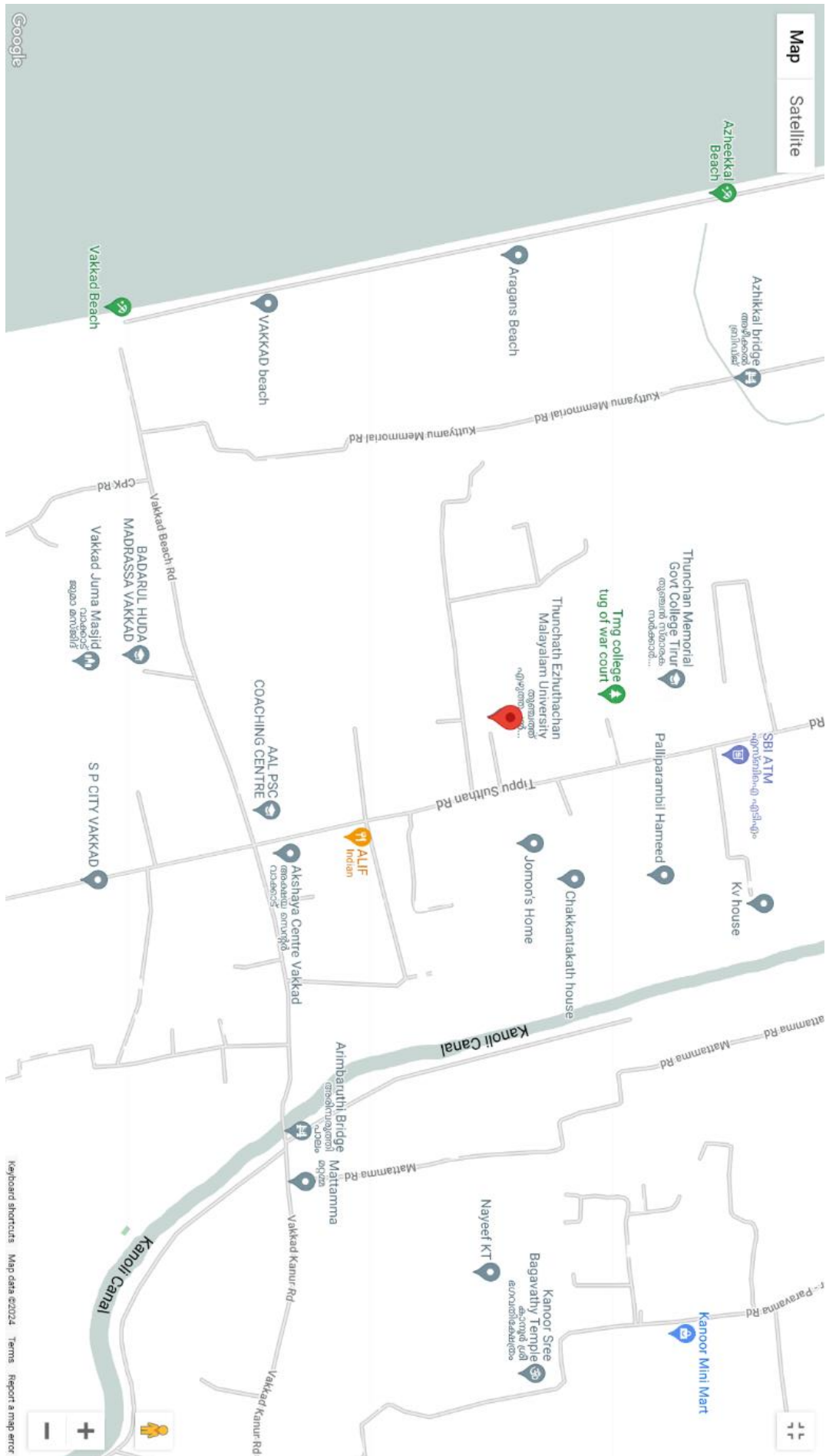
This water audit report has studied the infrastructure in the water resources sector in the Aksharam campus of Thunchath Ezhuthachan Malayalam University, Tirur. Facilities to ensure better services are available at Aksharam campus. It is a plant-rich campus that survives and sustains adverse environmental factors, including soil and water quality in the coastal region. The Aksharam campus is spread over 20234.30 square metres in the Vakkad area in the Avipuzha watershed of Vettam grama panchayat, 420 metres from the Arabian Sea. More than 550 people participate in the daily activities of the campus. Rain is the main source of water. Only ground water sources are considered for water needs. Even during the summer months of March and April, there is no demand for water in tankers. The average annual rainfall is about 2500 mm. The heaviest rainfall occurs in June, July and August. Three tube wells serve as the campus's groundwater sources. The main findings in the field of water resources at the university are given below:

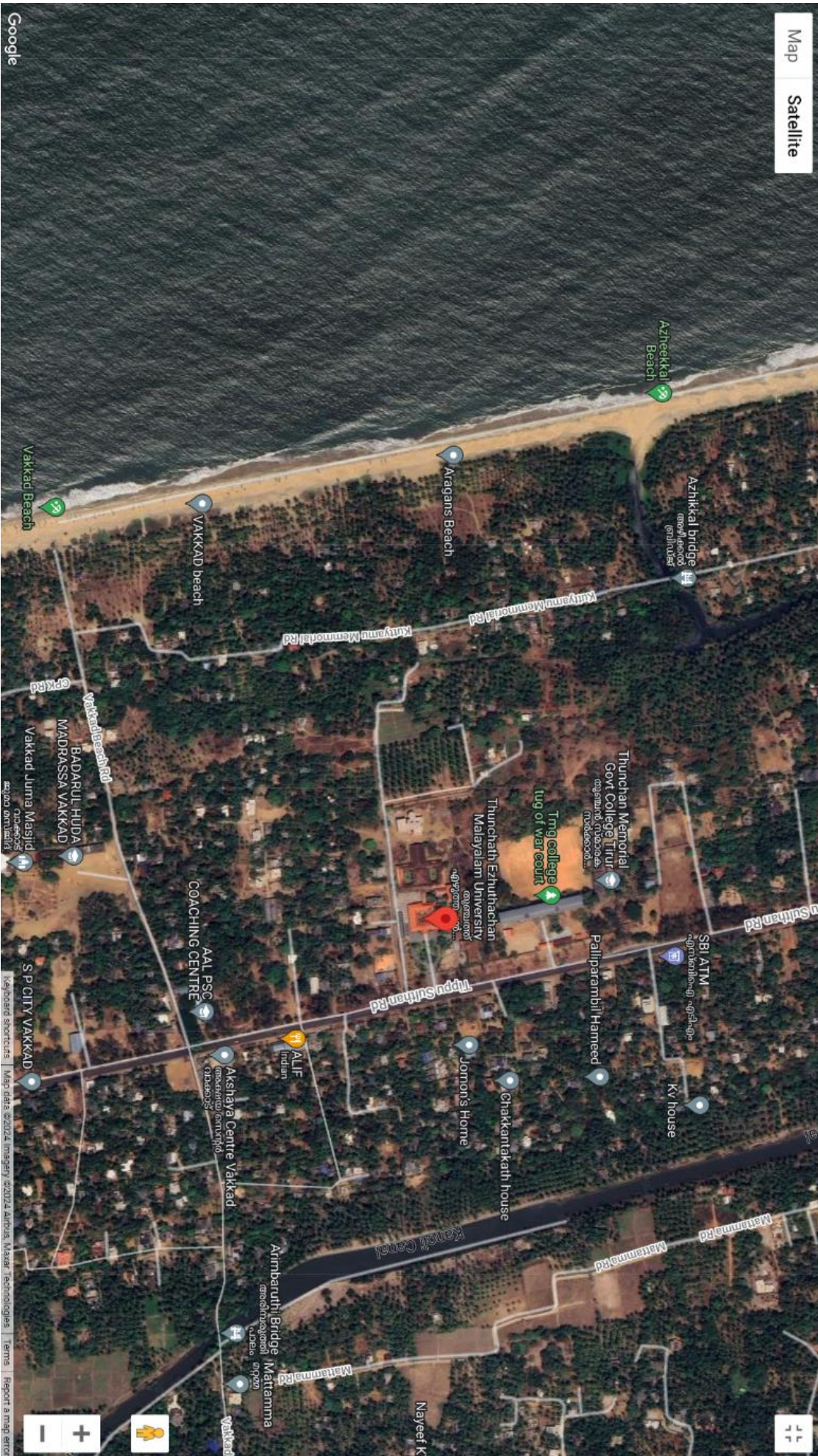
- The basic needs of the university are met entirely on the basis of groundwater resources. Surface water needs to be reused efficiently to ensure water quality in the coastal region and to conserve groundwater resources.
- On an average, the university receives more than 12.27 million litres of rainwater per annum from its 4731 square metre rooftop. It is currently not being used effectively.
- Approximately 32,500 liters of water per day are needed for the activities of Aksharam campus.
- In summer, more than 12,000 litres of water is used daily for landscaping purposes. This water loss can be reduced to a great extent through micro irrigation techniques and soil conservation activities.
- The campus has 60 toilets and 59 flush tanks in 20 toilet blocks. There are no double flushing tanks in these toilets. By installing them, water loss can be reduced.
- Waste water is not currently recycled on campus. With the help of better technologies, major water needs, including landscaping, can be met in this way.
- As many as 123 water taps are functioning in various buildings and courtyards of the campus. If these are made into sensor taps, water use will be more efficient.
- By working together with institutions and agencies that can provide the best technical assistance in the field of water resources, an advanced management system can be developed in the university.

1. General Informations

Name of the institution	THUNCHATH EZHUTHACHAN MALAYALAM UNIVERSITY, TIRUR
Name of the campus	Aksharam Campus
Address of the campus	Thunchath Ezhuthachan Malayalam University Vakkad, Tirur Malappuram-676 502.
Gramapanchayath	Vettom Gramapanchayath
Gramapanchayath Ward	16, Vakkad
Block	Tirur
Taluk	Tirur
District	Malappuram
Date of inauguration	2012 November 1
Commencement of functioning	2013 April
Type of university	State University
UGC status	12 B Status
Area	20234.30 square metres
Population	558
Number of Students	445
Number of Teachers	46
Number of Non-teaching staff	67
Latitude	10° 53' 01" N
Longitude	75° 53' 44" E
Boundaries	
North	Thunchan Memorial Government College, Tirur
South	Avippuzha Beach Road
East	Tipu Sultan Road
West	Mud Road, Coconut Plantation
Distance from Arabian Sea	420 metres
Distance from Vakkad Beach	1 Kilo metre
Travelling distance from Tirur Bus stand	7.3 Kilo metres
Website	http://malayalamuniversity.edu.in
E-mail	Info@temu.ac.in
Phone	0494 2631230

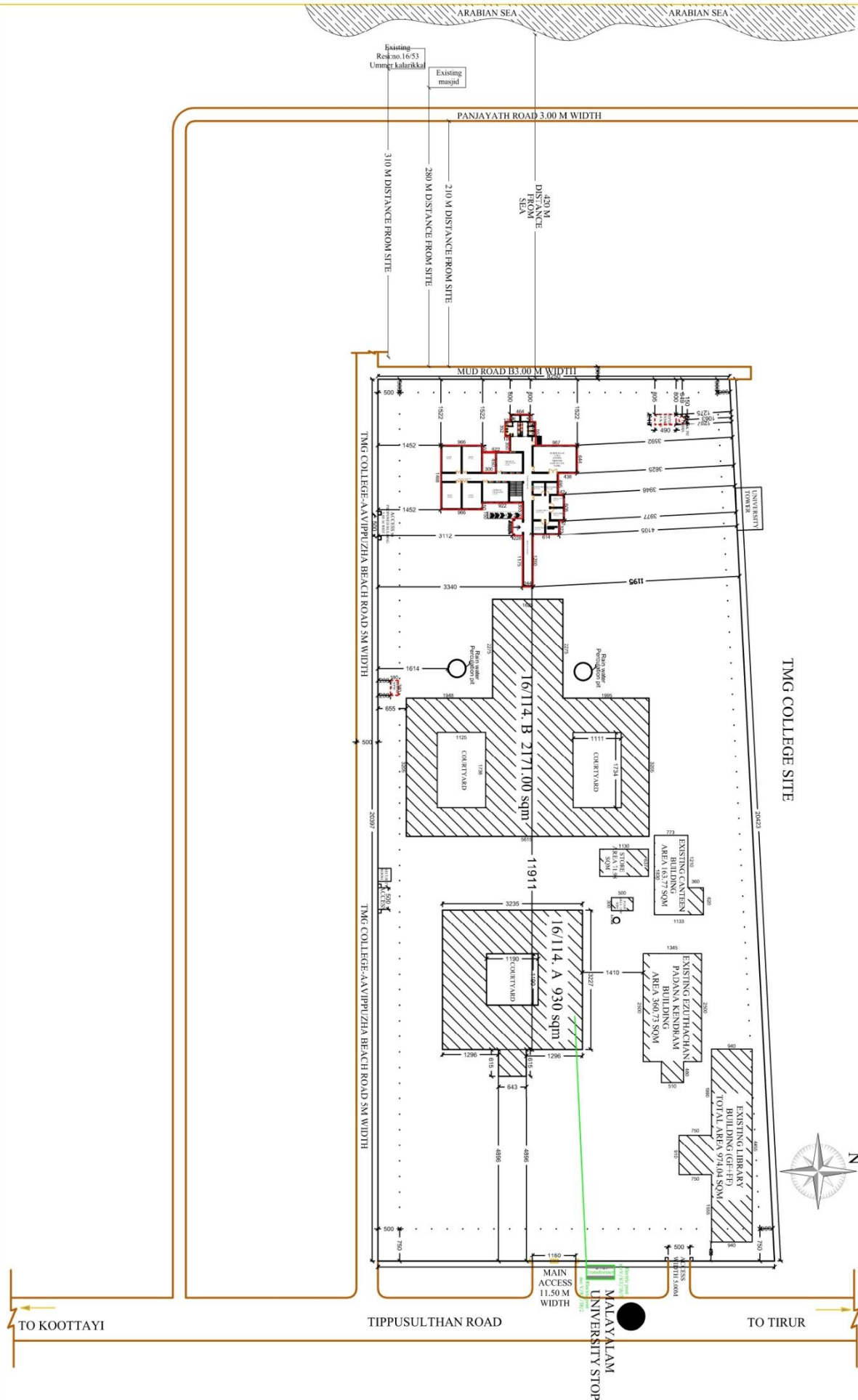








TMG COLLEGE SITE



1.1. History and Vision

Thunchath Ezhuthachan Malayalam University was established by the Government of Kerala in 2012. On November 1, 2012, at a function held at Thunchanparambu in Tirur, Malappuram, Kerala, the Chief Minister, Shri. Oommen Chandy inaugurated the event. Functioning commenced in April 2013. K. Jayakumar IAS prepared the project report of the university. He is a civil servant of the Indian Administrative Service cadre who retired as the Chief Secretary of Kerala on October 31, 2012. He was also the first Vice-Chancellor of Thunchath Ezhuthachan Malayalam University, Tirur. He served for five years until Usha Titus IAS took over on November 1, 2017. From 2018 to 2023, Dr. Anil Vallathol was the vice-chancellor of Malayalam University. As of June 2023, Dr. L. Sushma has been appointed as the Vice Chancellor of Thunchath Ezhuthachan Malayalam University. The university is named after the 16th-century Malayalam writer Thunchath Ramanujan Ezhuthachan whose writings helped develop Malayalam as a language with 51 letters, vocabulary and literature. Thunchath Ezhuthachan was born in Thrikkandiyoor, Thunchanparambu, Tirur.

Thunchath Ezhuthachan Malayalam University, Tirur is not just a university for Malayalam literature. But it is to study all the knowledge of the world in Malayalam language and to produce knowledge in Malayalam language and thus to build the confidence of Malayalees. This university has been established with the intention of promoting mother tongue pride and conducting many studies among the Malayalee community. The university is dedicated to the study of literature, science, humanities, social science and technology through the medium of Malayalam. Malayalam language, comparative literature, Malayalam criticism, culture and heritage, script evolution of South Indian languages, tribal languages, local languages, Malayalam poetry, short story, novel, Kerala Renaissance, history, Kerala's cognitive heritage, archaeological knowledge, museum studies and translation have given significance. The university offers postgraduate and research courses in Malayalam language. The above courses have been conceived with an emphasis on the cultural and intellectual tradition of Kerala. The University also considers collecting, preserving and presenting the cultural heritage of Kerala as its main mission. Moreover, the plans to develop Malayalam according to the new information technology will also come in the perspective of the university.

1.2. Faculties and programmes

1.2.1. Faculties

1. Malayalam Faculty
 - School of Linguistics
2. Literature Faculty
 - School of Ezhuthachachan Studies
 - School of Literature Studies
 - School of Creative Writing

3. Arts Faculty
4. Heritage Studies Faculty
 - School of Cultural Heritage Studies
5. Traditional Knowledge Faculty
6. Social Science Faculty
 - School of Historical Studies
 - School of Sociology
 - School of Development Studies
7. Environmental Studies Faculty
 - School of Environmental Studies.

1.2.2. Programmes

❖ Post Graduation Courses

- Malayalam will be the medium of instruction for postgraduate courses and research.
- Open elective courses are offered as part of postgraduate courses.
- The program of study is based on the credit and semester system.
- The postgraduate courses will be completed in four semesters.

➤ M.A. Linguistics

MA Linguistics course is designed to equip human resources with the skills and capabilities to meet the challenges posed by new technological environments. At the core of this course is an interdisciplinary curriculum designed to develop skills to identify and address the existing limitations in natural language translation and machine comprehension of the Malayalam language. In addition to basic linguistics subjects, the course gives priority to language documentation, archiving of endangered tribal languages, corpus building, linguistic diversity studies, and language learning and resource development.

➤ MA Malayalam (Literature Studies)

This course provides rich and structured knowledge in the areas of literature and linguistics. The emphasis is on the diversity of literary history and movements, with a special emphasis on contemporary literature. The course opens up research possibilities in key authors and fields. Lectures, seminars and workshops are planned as part of the course to understand the methodological and theoretical issues.

➤ MA Malayalam (Creative Writing)

This course is designed by the university with a special emphasis on literary writing. The course provides comprehensive knowledge of Malayalam language and literature with emphasis on creative writing. The course introduces students to a wide variety of literary models and styles and helps them develop their own tastes. The capacity for creative expression is enhanced through students with the help of experts.

➤ MA Malayalam (Cultural Heritage Studies)

The course aims at a comprehensive and interdisciplinary study of the cultural heritage of Kerala. The main areas of study are cultural heritage, Kerala history, settlement pattern and cultural geography, language and literary heritage, art and culture, agricultural heritage and knowledge traditions. Students are also exposed to a wide range of areas such as heritage conservation institutions, palmistry and archaeology.

➤ MA Journalism and Mass Communication

Basic principles related to communication are part of the course. The course covers the theoretical and practical levels of reporting, editing, advertising, and corporate communication. There are special papers on film and television. Practical training in web planning and visualization is also part of the course.

➤ MA Environmental Studies

MA Environmental Studies course covers topics such as environmental protection, sustainable development, environmental information exchange, environmental history, green politics, environmental features of Kerala, environment and development, voluntary organisations, and more.

➤ MSc Environmental Studies

The MSc Environmental Studies course provides an opportunity to study scientific areas such as Environmental Chemistry, Environmental Geology, Environmental Biology, Environmental Pollution, Energy and Environment, Waste Management and Biodiversity Conservation with a lab system. Field study and Practical Lab are also included.

A recognized degree in any discipline for MA and a recognized degree in any science subject is the eligibility for MSc. Environmental Studies. For the first time, a Malayalam university is offering the opportunity to study a science subject in Malayalam at the postgraduate level. It also provides an opportunity to study at various universities. The university also offers Ph.D. programmes in the Environmental Studies.

➤ MA Sociology

It helps the students to acquire a comprehensive social science knowledge by introducing them to the contributions of social thinkers, features of Indian society, Kerala society - features and research models. Kerala's migration experiences and the globalisation context are the unique learning areas of the course.

➤ MA Historical Studies

The course covers Indian and world history with special emphasis on the history of Kerala. Archaeology is also a part of the curriculum.

➤ MA Film Studies

Special emphasis is given to Malayalam cinema and Acharyas along with the history of cinema, theories, world cinema and Indian cinema. It helps the students to get acquainted with the new trends in film making and film criticism.

❖ Doctor of Philosophy (PhD) Courses

It aims to create a new culture of critical thinking and critical thinking. The university has a distinct research policy. The university gives priority to the expansion of knowledge about Kerala. In the PhD course of 6 semesters, students are required to complete a semester-long coursework..

1.3. Demography

Post Graduation Students: 365

Research Scholars: 80

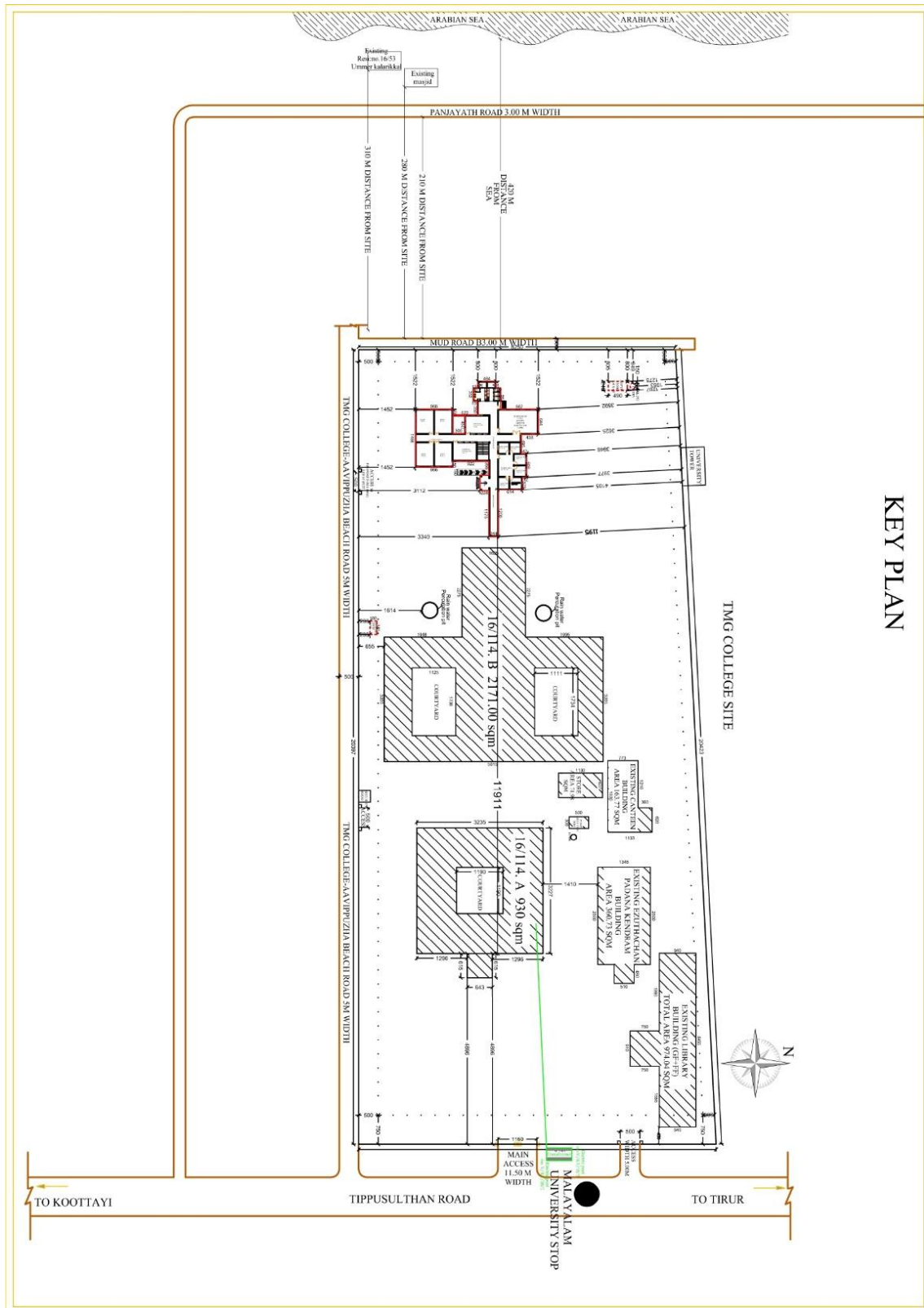
Teachers: 46

Non-Teaching Staff: 67

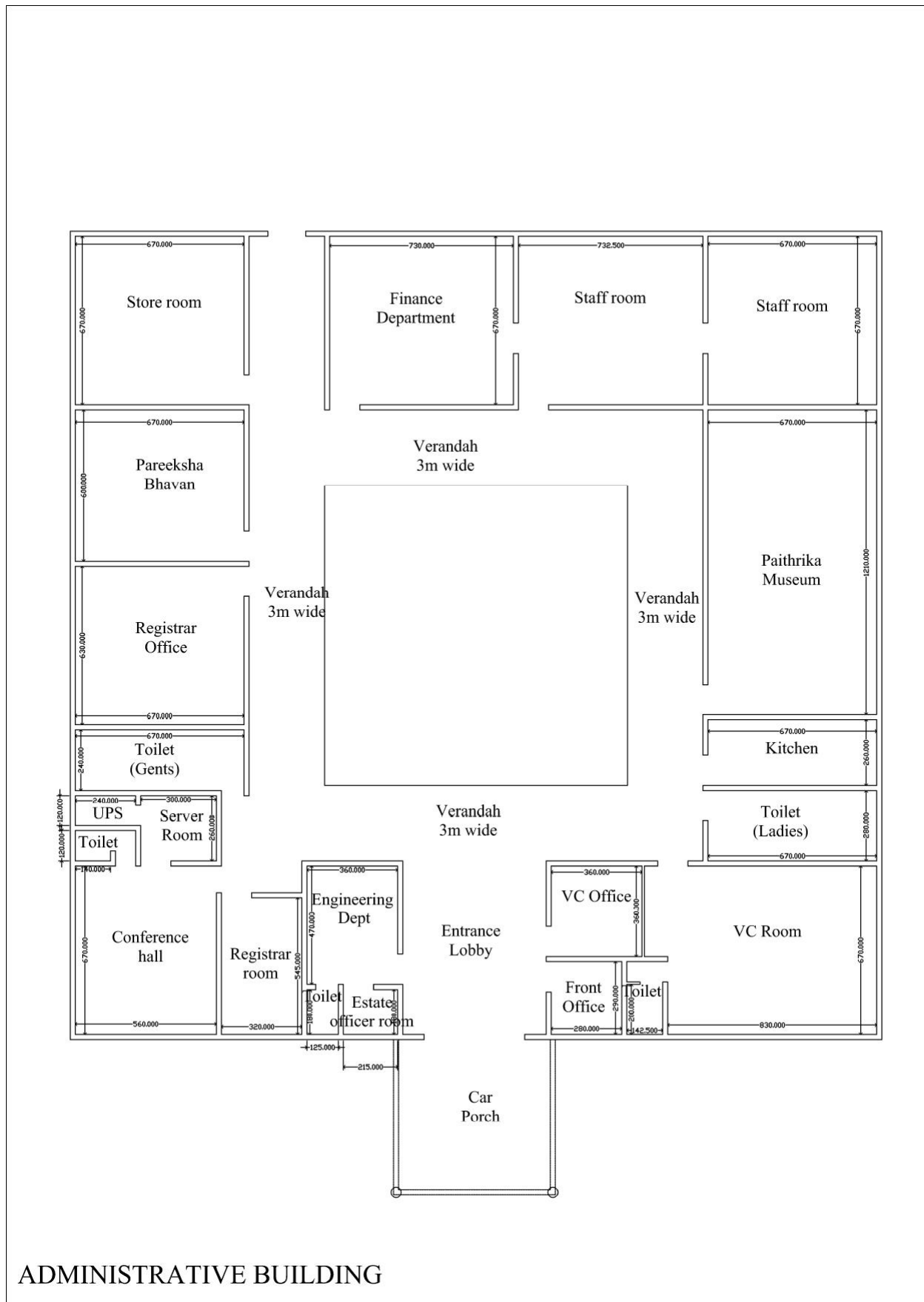
Total Population: 558.

1.4. Buildings

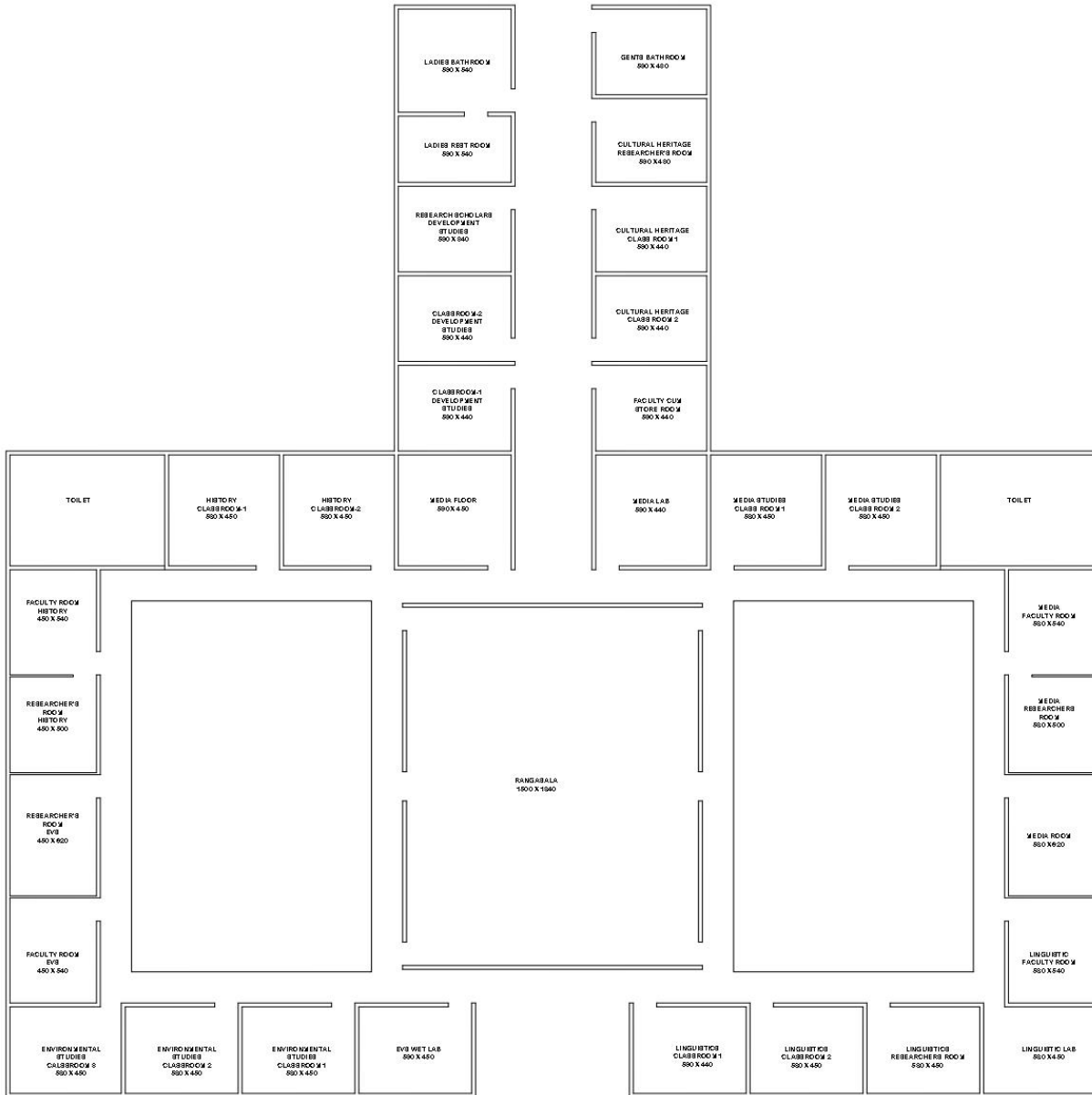
1. Administrative Block
2. Academic Block
3. Excellence Block
4. Ezhuthachan Studies Block
5. Library Block
6. Canteen
7. Pump Room
8. Storage Room



1.4.1. Administrative Block



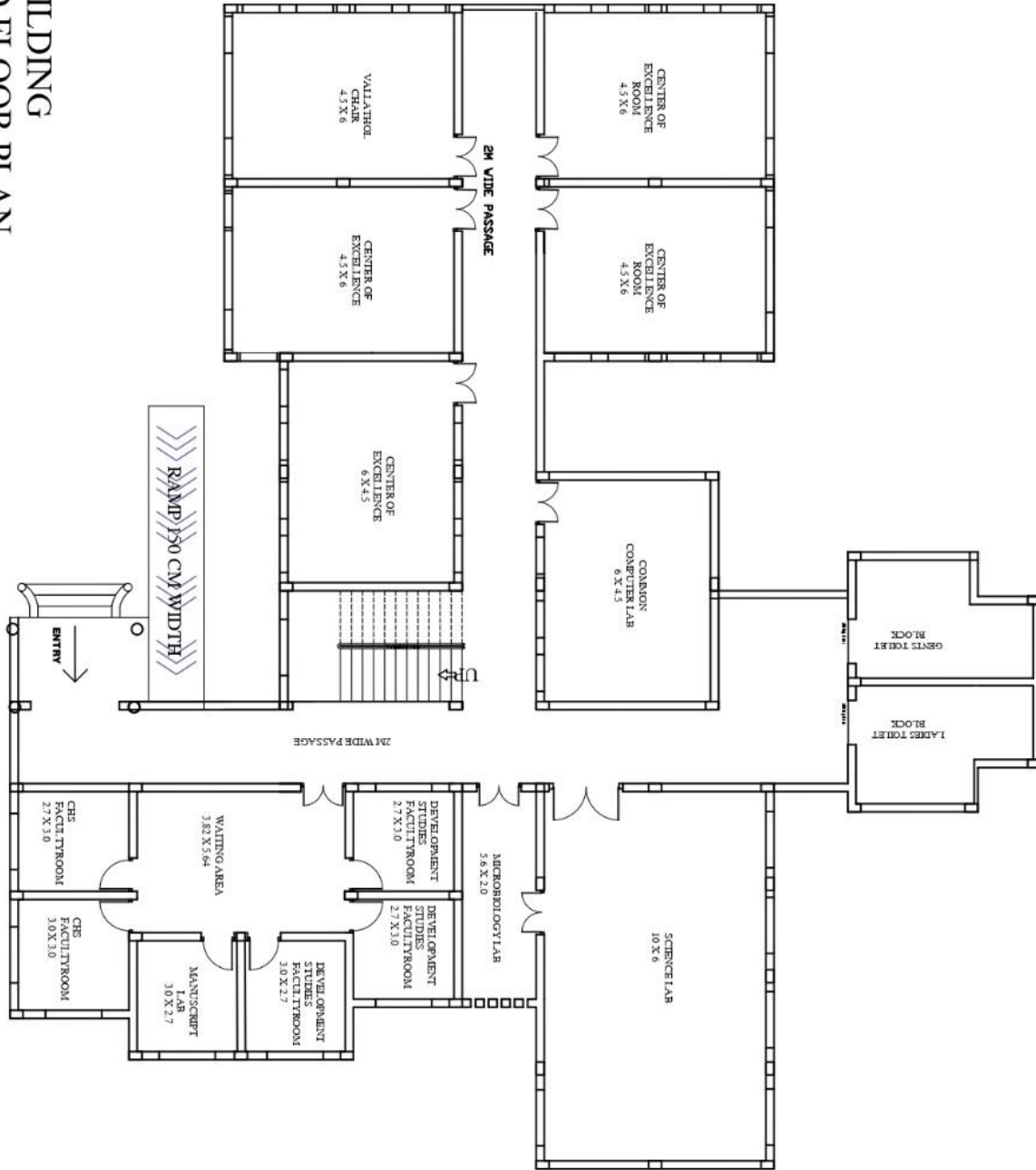
1.4.2. Academic Block



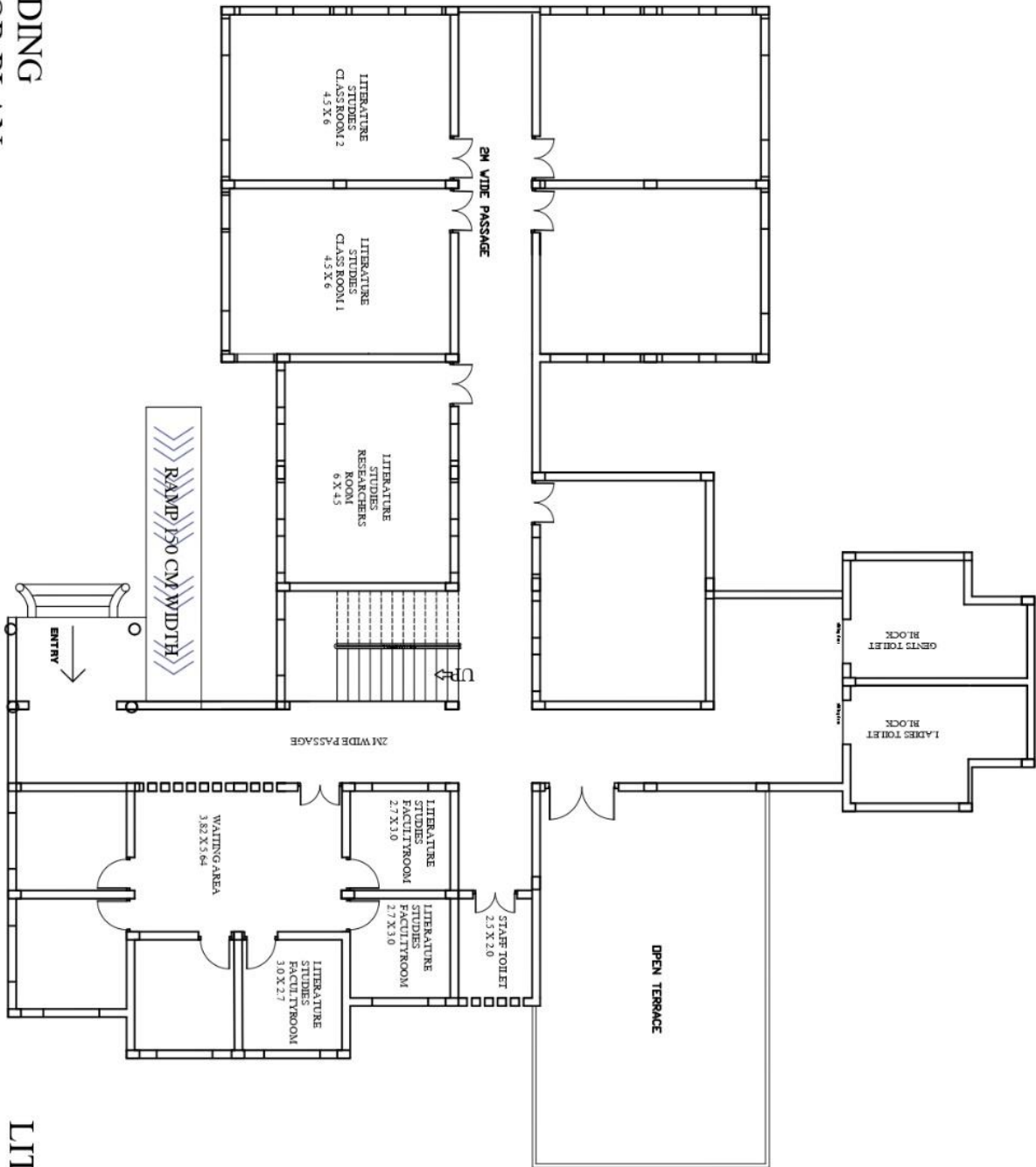
ACADEMIC BUILDING

1.4.3. New Academic Block

NEW BUILDING GROUND FLOOR PLAN

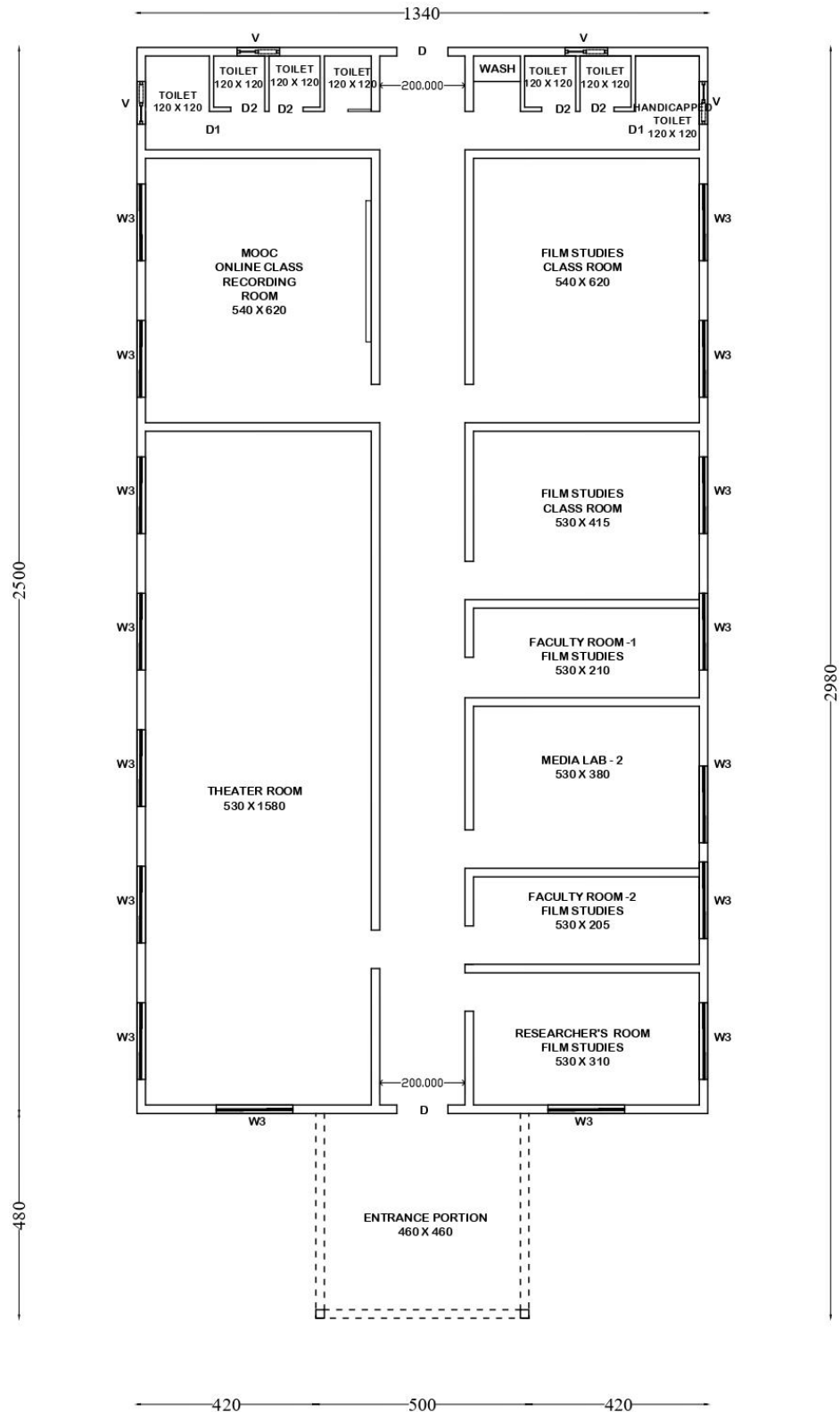


NEW BUILDING
FIRST FLOOR PLAN



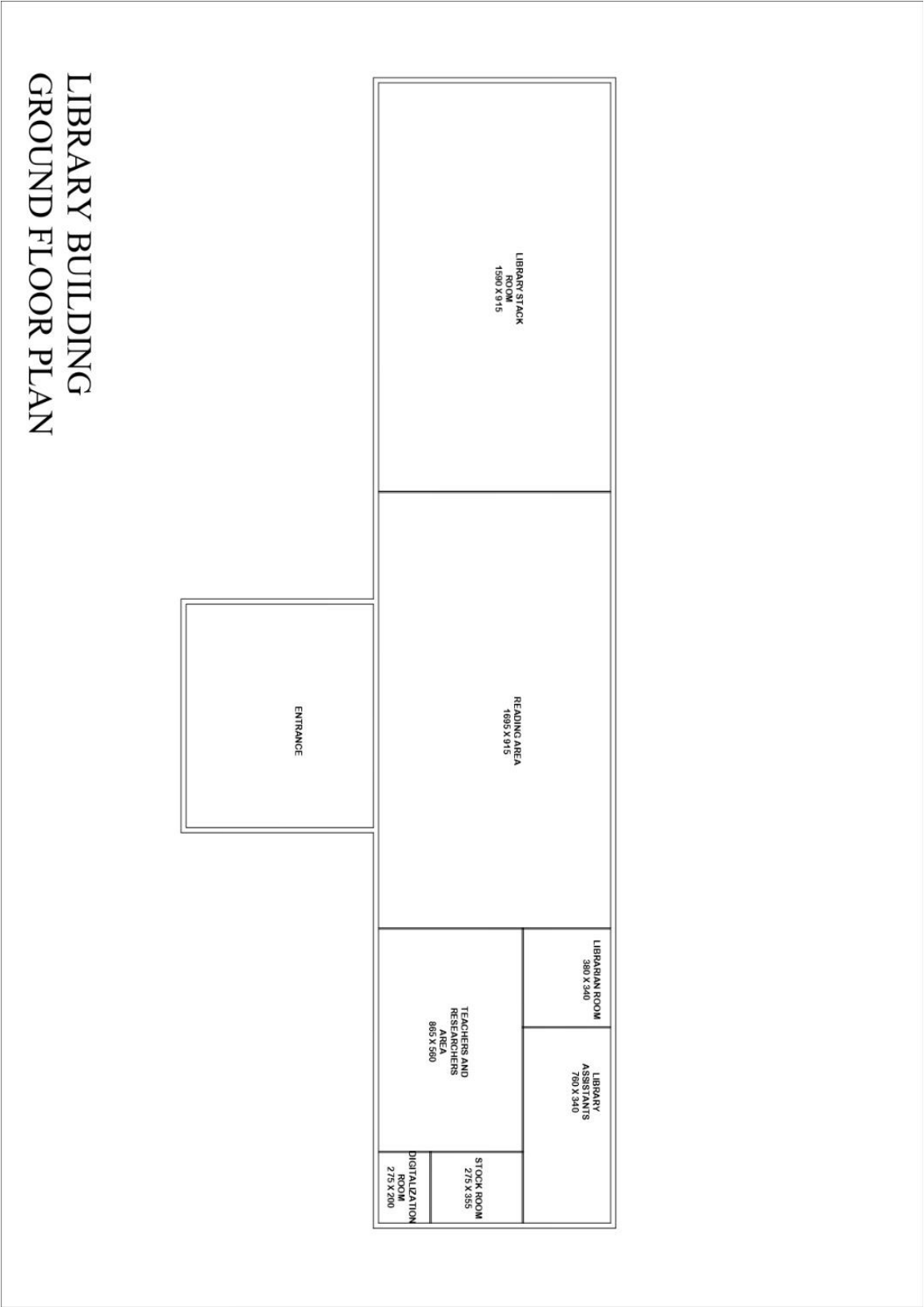
LITERATURE
STUDIES

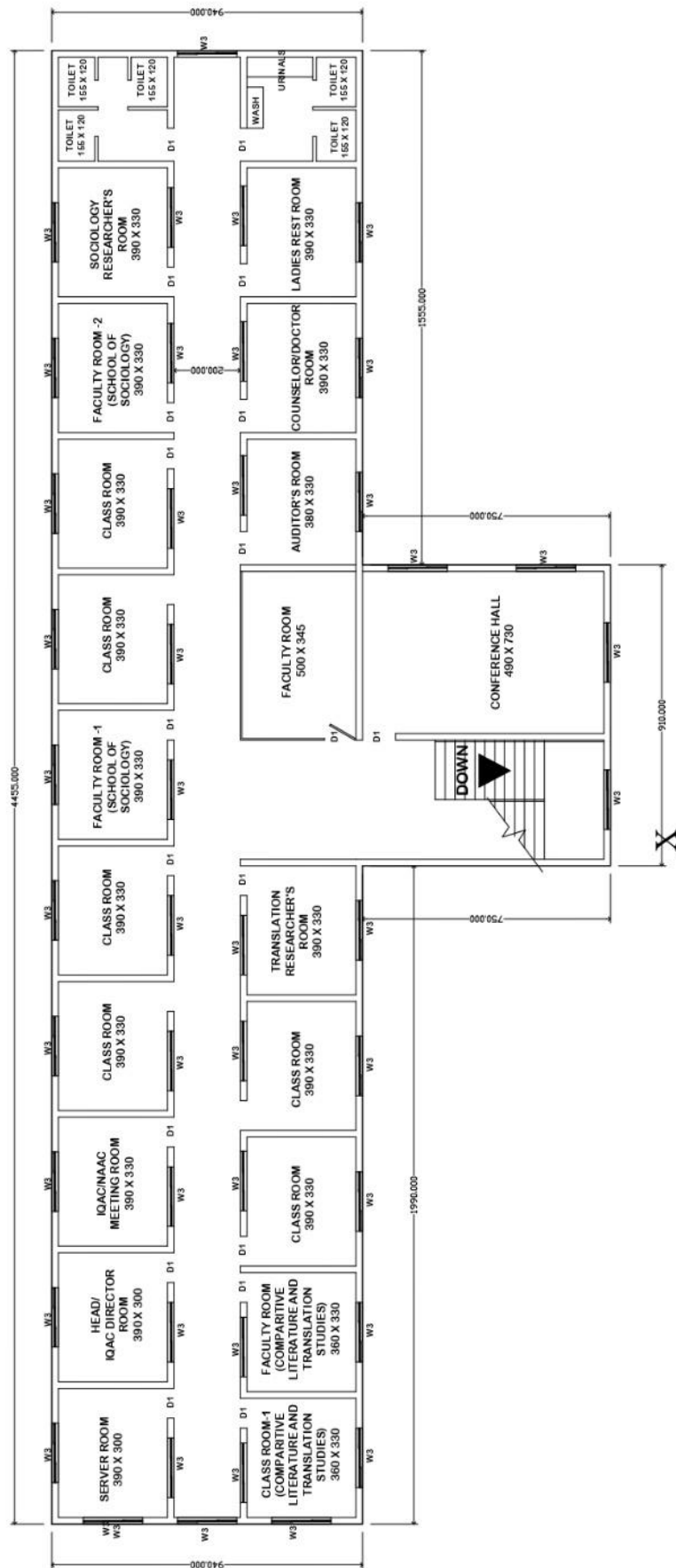
1.4.4. Ezhuthachan Studies Block



EZHUTHACHAN
PADANA KENDRAM

1.4.5. Library Block





LIBRARY BUILDING FIRST FLOOR PLAN

1.4.6. Canteen



1.4.7. Pump Room



1.4.8. Storage Room



1.5. Environmental Characteristics

1.5.1. Geography

Aksharam Campus of Thunchath Ezhuthachan Malayalam University is located on the landscape is coastal plain. The campus is just 420 metres from the Arabian Sea. Its height is only one meter above sea level.

1.5.2. Climate

An average annual precipitation of 2500-3000 mm is expected in the region. The monsoon season is from June to August, the spring season is from September to October, and the hot summer season is from March to April.

1.5.3. Watershed Characteristics

The campus is located in the Avippuzha Watershed (21T2a) of the Tirur-Ponnani river basin.

1.5.4. Soil Characteristics

The campus consists of coastal sand dunes. Because of the low organic matter content, the soil is relatively fertile.

1.5.5. Biodiversity

Aksharam campus is a campus rich in biodiversity. The two green islands(The Pachathuruthu project) is registered under the State Government's Haritha Keralam Mission and the Sanjeevanam Herbal Garden built with the technical assistance of the Kottakkal Arya Vaidyasala are important components of the biological diversity of the Aksharam campus. At present, 137 plants have been found in the survey conducted under the auspices of the School of Environmental Studies.

1.5.6. Waste Management

Waste management is progressing well at Aksharam campus. Three bins each have installed at 9 locations for primary sorting of inorganic and organic waste. Paper, plastic and food waste can be sorted and deposited in these bins.

1.5.7. Energy Management

Aksharam campus meets its energy needs by purchasing electricity from the Kerala State Electricity Board. At present, the university does not generate its own energy using solar-powered potential. Aksharam campus has a generator working for emergency power needs.

1.5.8. Nearby Waterbodies

Aksharam campus is located just 420 meters away from the Arabian Sea. The Kanoli canal, a famous irrigation structure in Kerala, runs through the area adjacent to Aksharam campus. The nearest river to Aksharam campus is the Tirur Ponnani River.

1.5.9. Monsoon Flooding

Aksharam campus is located just 420 meters away from the Arabian Sea. The Canoli canal, a famous irrigation structure in Kerala, runs through the area adjacent to Aksharam campus. The nearest river to Aksharam campus is the Tirur Ponnani River.



The areas where waterlogging occurs in Aksharam campus during the monsoon season have been marked on the map.





At the end of the monsoon, the water table recedes as the rainfall subsides.

2. Methodology

2.1. Water Audit Team

The water audit report was prepared under the leadership of the School of Environmental Studies at Thunchath Ezhuthachan Malayalam University. Teachers, students, researchers from the School of Environmental Studies, members of the Bhoomithra Sena Club, and resource persons from the State government's Haritha Keralam Mission were part of the preparation of the water audit report.

2.2. Meetings

Meetings for the water audit report will be held at the Aksharam campus in January and February 2024. As part of the water audit activities, four meetings were held under the chairmanship of the Director in the School of Environmental Studies classroom. The importance of water audit, water audit reports of various institutions were discussed. Recently, The Water budget reports are prepared for the first time in India based on local body under the aegis of Haritha Keralam Mission of the State Government. The structure and methodology of water audit report and features of Aksharam campus were discussed. As per the decision of the meeting, it was agreed to determine the schedule for the preparation of the water audit report and to devise further activities based on the report and to revise and reprint it in the coming years.

2.3. Data Collection

2.3.1. Preparation

The water audit activities were envisaged in January and February 2024. As part of the preparatory activities for water audit report of Aksharam campus, Thunchath Ezhuthachan Malayalam University, Tirur, detailed information was collected about the water audit activities. Water audit reports of various institutions within and outside India were examined in detail. The characteristics of the water audit were analyzed. Based on that, Thunchath Ezhuthachan prepared a blueprint for water audit in Malayalam University. The importance of water audit, features, methodology and structure of the report were studied. The Water Audit team members interacted with the staff, teachers and students of Thunchath Ezhuthachan Malayalam University. He interacted with the officials of the engineering department and interacted with them about the infrastructure, structures, technologies used and limitations of the campus.

2.3.2. Walk Through Survey for Primary Data Collection

The members of the water audit team travelled through the entire stretch of Aksharam campus and understood the features. What are the existing water sources, their characteristics, where and how the water needs come from, water storage, water supply, waste water treatment, current water conservation activities, draw backs were all assessed. Collect the necessary photographs. As there were no documents available regarding the water supply system of Aksharam campus, a preliminary data collection was conducted. Water sources, water reservoirs in all buildings, water taps, wash basins, drinking water filters, flush tanks in toilets, rainwater harvesting tanks, drainage pits, sockpits and septic tanks were collected.

2.3.3. Secondary Data Collection

The Website of Thunchath Ezhuthachan Malayalam University is visited and collected the basic informations of the university. Maps and diagrams of the university obtained from the engineering department were used. The special features of the area were collected from the watershed master plan reports prepared by the Vettam grama panchayat under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). The rainfall data was found by examining the water budget reports of the Haritha Keralam Mission. The distance from the Arabian Sea to the campus was measured from satellite imagery using Google Earth software.

2.4. Data Analysis

2.4.1. Assessment of Water Supply

The average rainfall was assessed by evaluating the rainfall data for a period of ten years from the Parappanangadi Raingauge. The availability of groundwater was assessed through a mathematical equation from the Water budget software developed by the Centre for Water Resources Development and Management (CWRDM) of the Kerala Council for Science, Technology and Environment (KSCSTE).

2.4.1.1. Rainfall informations

The main source of water is rainfall. For the water quality study, instead of calculating the total rainfall received in a year or the rainfall received in a rainy season, each day's rainfall was used. Data from the Hydrology Division of the Irrigation Department has been used for this purpose. Data for 10 consecutive years have been used to calculate rainfall availability. Rainfall is calculated using the arithmetic mean method.

$$A = \frac{1}{n} * \sum_{i=1}^n x_i$$

A = Average annual rainfall.

n = Number of terms (e.g. Average items or numbers)

xi = The value of each item in the numbers used to find the average.

After collecting the daily rainfall data and calculating the total rainfall received on 10 days of each month, the total rainfall received on every 10 days of each month of each year and the average rainfall received on these 10 days in 10 years is calculated.

2.4.1.2. Surface Water Supply

The 10-day surface water availability is calculated in the following manner:

Total water availability, $Q = C \times A \times R$.

A = Area of the village

R = 10 days total precipitation in metres (10 year average)

C = Constant of flow, Runoff Coefficient.

The cost of C based on land use is given in Table-1. The soil of Aksharam campus is coastal sandy soil. The flow constant of sandy soil is determined depending on the inclination of the soil and the amount of sand.

Table - 1
Runoff coefficient, C

Type of Soil	Runoff coefficient (C)
Flat slope (Less than 2 %), soil with more than 85 percent sand	0.05 – 0.10
Average slope (2 to 7 %), soil with more than 85 percent sand	0.10 – 0.15
Steeper slope (Higher than 7%), soil with more than 85 percent sand	0.15 – 0.20
Hilly slope, Sandy soil, 4-13 lpm rain fall rate	0.428 – 0.53

2.4.1.3. Ground Water Supply Assessment

The 10-day ground water availability is calculated in the following manner:

Total groundwater recharge = $0.06 \times A \times R$.

Given, A = Area of the plot

R = Rainfall within 10 days in metre.

We can use 90% of the total groundwater recharge.

Hence ground water available for 10 days = Total groundwater recharge X 0.9.

2.4.2. Assessment of Water Demand and Consumption

To determine the water requirement for landscaping, information such as seasonal characteristics, time, water spent for plant maintenance, water sources, pumping motor, flow rate through pipes, etc. was collected and evaluated.

- Rate of flow through pipe = water received (litres) / time (minutes).
- Water spent on an average day for plant maintenance (Lpd)
= rate of flow × time spent (minutes).

Informations about water usage for canteen, cleaning operations and drinking water filters was collected from the concerned staff.

Using data from earlier water storage activities, the campus's overall water consumption was determined. One drawback is that the center's new academic building was not included in the total water consumption estimate. The automatic water pumping system makes it challenging to determine the current overall water consumption.

2.5. Report Preparation

The water audit report of Aksharam Campus was prepared by the team guided by School of Environmental Studies, Thunchath Ezhuthachan Malayalam University with the assistance of Bhumithrasena Club of the campus and Haritha Keralam Mission of the state government. The outline of the water audit report was prepared by examining the water audit reports of various organizations and the water budget reports of the Haritha Kerala Mission.

3. WATER AUDIT

3.1. Water Supply Informations

3.1.1. Rainfall informations

Rain is the main source of water. The data is collected over a period of ten years from the official rain-gauge located at Parappanangadi, a nearby locality. Rainfall data from June 2010 to May 2019 is available from the Parappanangadi Rain-gauge.

Annual Rainfall Informations												
Average Rainfall (mm)												
Month	Ten Days	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
June	First 10 days	480.6	608	144.4	245.6	121.2	122	372.8	161	256	144.4	222.34
	Second 10 days	460.6	246.6	248.4	515.4	166.4	176.2	116.8	168.4	306	201.2	260.6
	Last 10 days	340.4	192.2	181.2	295.8	80.4	307.8	153	302.2	170	111.2	213.42
July	First 10 days	144.4	104.4	248	343.4	145.6	108.4	167.4	178.6	86.4	176.6	170.32
	Second 10 days	204.6	275.6	62.2	229.4	361	193.4	132	189.6	424.6	208.2	228.06
	Last 10 days	280.6	192.2	91	273.4	303.4	100	85	82	185.8	199.4	179.28
August	First 10 days	90.2	216.4	82.2	222.4	405.4	92	63.4	121.4	114.4	351.4	175.92
	Second 10 days	114.6	133	156.6	55	27	30.6	13.6	84.2	364.4	200.4	117.94
	Last 10 days	103.6	123.6	159.2	49.8	276.4	30.4	0	255.8	39.2	203.4	124.14
September	First 10 days	63	357.4	159.2	62.2	143.2	117.2	9.4	19.4	2.1	211.4	114.45
	Second 10 days	80.2	117	48.2	101.6	5.8	102.6	55.4	259.2	0	41.8	81.18
	Last 10 days	168	46.2	0	23	13.8	30.4	5.6	164.6	28.2	30.2	51
October	First 10 days	45.4	0	17.4	75	140.8	358.4	0	92.6	84.2	63	87.68
	Second 10 days	225.4	29.2	20.6	51.4	190.4	52.2	9.4	126	121.4	218.8	104.48
	Last 10 days	121.4	99.6	5.6	75.6	210	24.8	1.8	30.8	0	254.6	82.42
November	First 10 days	83.4	79.8	26	144.4	35.4	48.2	0	38.4	6.6	65	52.72
	Second 10 days	125.4	0	6.8	34	47.6	0.2	0	0	2.4	68.8	28.52
	Last 10 days	106.2	4.2	0	139.8	2.6	23	0	44.6	12.8	56.8	39
December	First 10 days	29.4	0	0	10.4	0	0	1.8	69.8	0	2.6	11.4
	Second 10 days	39	0.8	0	0	0	9.6	12	0	0	0	6.14
	Last 10 days	0	0	4.4	0	10	0	0	0	42.6	0.2	5.72

January	First 10 days	16	0	0	0	0	0	0	0	0	0	1.6
	Second 10 days	0	0	0	0	0	0	0	0	0	0	0
	Last 10 days	0	0	0	0	0	0	0	0	0	0	0
February	First 10 days	0	0	0	0	0	0	0	27.6	0	0	2.76
	Second 10 days	0	36	29.8	0	0	0	0	0	0	0	6.58
	Last 10 days	15.2	0	0	0	0	0	0	0	0	0	1.52
March	First 10 days	0	0	18.2	0	11	0	103.6	0	0	5.6	13.84
	Second 10 days	0	0	9.8	0	24.2	0	10	8.2	0	0	5.22
	Last 10 days	10.4	0	0	0	0	0	0	0	0	7.2	1.76
April	First 10 days	36.4	12.4	0	0	3	0	1	26	0	8.4	8.72
	Second 10 days	58.4	10.6	0	6	77.8	0	0	35	3.4	0	19.12
	Last 10 days	85.4	45.4	0	0	101.8	0	20.2	3.4	26	7.4	28.96
May	First 10 days	16.2	9.8	0	178.6	0	9.8	20.6	123.6	0.8	57.8	41.72
	Second 10 days	15.4	11.2	0	6.6	43.8	80.2	80.4	30.6	0.2	49.6	31.8
	Last 10 days	114.2	13.8	55.6	24	48	119.2	109.6	181.2	51	23.8	74.04
Average Annual Rainfall												2594.37

3.1.2. Water Supply Information

Month	10 days	A (Square metre)	R (Metre)	Total Water Supply (Cubic meter)
June	First 10 days	20234.30	0.22234	4498.89
	Second 10 days	20234.30	0.2606	5273.06
	Last 10 days	20234.30	0.21342	4318.4
July	First 10 days	20234.30	0.17032	3446.31
	Second 10 days	20234.30	0.22806	4614.63
	Last 10 days	20234.30	0.17928	3627.61
August	First 10 days	20234.30	0.17592	3559.62
	Second 10 days	20234.30	0.11794	2386.43
	Last 10 days	20234.30	0.12414	2511.89
September	First 10 days	20234.30	0.11445	2315.82
	Second 10 days	20234.30	0.08118	1642.62
	Last 10 days	20234.30	0.051	1031.95
October	First 10 days	20234.30	0.08768	1774.14
	Second 10 days	20234.30	0.10448	2114.08
	Last 10 days	20234.30	0.08242	1667.71
November	First 10 days	20234.30	0.05272	1066.75
	Second 10 days	20234.30	0.02852	577.082
	Last 10 days	20234.30	0.039	789.138
December	First 10 days	20234.30	0.0114	230.671
	Second 10 days	20234.30	0.00614	124.239
	Last 10 days	20234.30	0.00572	115.74
January	First 10 days	20234.30	0.0016	32.3749
	Second 10 days	20234.30	0	0
	Last 10 days	20234.30	0	0
February	First 10 days	20234.30	0.00276	55.8467

	Second 10 days	20234.30	0.00658	133.142
	Last 10 days	20234.30	0.00152	30.7561
	First 10 days	20234.30	0.01384	280.043
March	Second 10 days	20234.30	0.00522	105.623
	Last 10 days	20234.30	0.00176	35.6124
	First 10 days	20234.30	0.00872	176.443
April	Second 10 days	20234.30	0.01912	386.88
	Last 10 days	20234.30	0.02896	585.985
	First 10 days	20234.30	0.04172	844.175
May	Second 10 days	20234.30	0.0318	643.451
	Last 10 days	20234.30	0.07404	1498.15
	First 10 days	20234.30	0.07404	1498.15
Total				52495.3

3.1.2.1. Water Supply into the Soil Surface

താഴെ കൊടുത്തിരിക്കുന്ന രീതിയിലാണ് 10 ദിവസത്തെ ഉപരിതല ജല ലഭ്യത കണക്കാക്കിയിട്ടുള്ളത്.

Water Supply, $Q = C \times A \times R$.

A, Area = 13534.59 Square metre.

R = Total Rainfall in the 10 days (Average of 10 years).

C, Runoff Coefficient = 0.075.

Month	10 Days	C	A	R	Q
June	First 10 days	0.075	13534.59	0.22234	225.6960555
	Second 10 days	0.075	13534.59	0.2606	264.5335616
	Last 10 days	0.075	13534.59	0.21342	216.6414148
July	First 10 days	0.075	13534.59	0.17032	172.8908527
	Second 10 days	0.075	13534.59	0.22806	231.5023947
	Last 10 days	0.075	13534.59	0.17928	181.9860971
August	First 10 days	0.075	13534.59	0.17592	178.5753805
	Second 10 days	0.075	13534.59	0.11794	119.7202158
	Last 10 days	0.075	13534.59	0.12414	126.0138002
September	First 10 days	0.075	13534.59	0.11445	116.1775369
	Second 10 days	0.075	13534.59	0.08118	82.40535122
	Last 10 days	0.075	13534.59	0.051	51.76980675
October	First 10 days	0.075	13534.59	0.08768	89.00346384
	Second 10 days	0.075	13534.59	0.10448	106.0570472
	Last 10 days	0.075	13534.59	0.08242	83.66406809
November	First 10 days	0.075	13534.59	0.05272	53.51576886
	Second 10 days	0.075	13534.59	0.02852	28.95048801
	Last 10 days	0.075	13534.59	0.039	39.58867575
December	First 10 days	0.075	13534.59	0.0114	11.57207445
	Second 10 days	0.075	13534.59	0.00614	6.232678695
	Last 10 days	0.075	13534.59	0.00572	5.80633911
January	First 10 days	0.075	13534.59	0.0016	1.6241508
	Second 10 days	0.075	13534.59	0	0
	Last 10 days	0.075	13534.59	0	0
February	First 10 days	0.075	13534.59	0.00276	2.80166013
	Second 10 days	0.075	13534.59	0.00658	6.679320165
	Last 10 days	0.075	13534.59	0.00152	1.54294326
March	First 10 days	0.075	13534.59	0.01384	14.04890442
	Second 10 days	0.075	13534.59	0.00522	5.298791985
	Last 10 days	0.075	13534.59	0.00176	1.78656588
April	First 10 days	0.075	13534.59	0.00872	8.85162186
	Second 10 days	0.075	13534.59	0.01912	19.40860206
	Last 10 days	0.075	13534.59	0.02896	29.39712948

May	First 10 days	0.075	13534.59	0.04172	42.34973211
	Second 10 days	0.075	13534.59	0.0318	32.27999715
	Last 10 days	0.075	13534.59	0.07404	75.15757827
ആകെ					2633.530069

3.1.2.2. Rain Water Supply in to the Rooftop

Building Blocks	Rooftop Area (Square meter)
Academic Block	1980
Administrative Block	1055
Library Building Block	562
Centre for Ezhuthachan Studies	414
Canteen	200
Centre for Excellence	520
Parking Shed	
ആകെ	4731

Month	10 Days	R (Meter)	A (Square meter)	Rooftop water supply (Cubic meter)
June	First 10 days	0.22234	4731	1051.891
	Second 10 days	0.2606	4731	1232.899
	Last 10 days	0.21342	4731	1009.69
July	First 10 days	0.17032	4731	805.7839
	Second 10 days	0.22806	4731	1078.952
	Last 10 days	0.17928	4731	848.1737
August	First 10 days	0.17592	4731	832.2775
	Second 10 days	0.11794	4731	557.9741
	Last 10 days	0.12414	4731	587.3063
September	First 10 days	0.11445	4731	541.463
	Second 10 days	0.08118	4731	384.0626
	Last 10 days	0.051	4731	241.281
October	First 10 days	0.08768	4731	414.8141
	Second 10 days	0.10448	4731	494.2949
	Last 10 days	0.08242	4731	389.929
November	First 10 days	0.05272	4731	249.4183
	Second 10 days	0.02852	4731	134.9281
	Last 10 days	0.039	4731	184.509
December	First 10 days	0.0114	4731	53.9334
	Second 10 days	0.00614	4731	29.04834
	Last 10 days	0.00572	4731	27.06132
January	First 10 days	0.0016	4731	7.5696
	Second 10 days	0	4731	0
	Last 10 days	0	4731	0
February	First 10 days	0.00276	4731	13.05756
	Second 10 days	0.00658	4731	31.12998
	Last 10 days	0.00152	4731	7.19112
March	First 10 days	0.01384	4731	65.47704
	Second 10 days	0.00522	4731	24.69582
	Last 10 days	0.00176	4731	8.32656
April	First 10 days	0.00872	4731	41.25432
	Second 10 days	0.01912	4731	90.45672

	Last 10 days	0.02896	4731	137.0098
May	First 10 days	0.04172	4731	197.3773
	Second 10 days	0.0318	4731	150.4458
	Last 10 days	0.07404	4731	350.2832
ആകെ				12273.96447

- Total Rainfall Supply into the Rooftops of Aksharam Campus = 12273.96447 Cubic Metres = 1,22,73,964.47 Litres = 12.2739447 Million Litres.

3.1.2.3. Rainfall Supply into the Ground Concrete Surface

Area of the Ground Concrete Surface in the Aksharam campus = 1968.71 Square meter.

Month	10 Days	R (Meter)	A (Square meter)	Total Water Supply (Cubic meter)
June	First 10 days	0.22234	1968.71	437.723
	Second 10 days	0.2606	1968.71	513.046
	Last 10 days	0.21342	1968.71	420.162
July	First 10 days	0.17032	1968.71	335.311
	Second 10 days	0.22806	1968.71	448.984
	Last 10 days	0.17928	1968.71	352.95
August	First 10 days	0.17592	1968.71	346.335
	Second 10 days	0.11794	1968.71	232.19
	Last 10 days	0.12414	1968.71	244.396
September	First 10 days	0.11445	1968.71	225.319
	Second 10 days	0.08118	1968.71	159.82
	Last 10 days	0.051	1968.71	100.404
October	First 10 days	0.08768	1968.71	172.616
	Second 10 days	0.10448	1968.71	205.691
	Last 10 days	0.08242	1968.71	162.261
November	First 10 days	0.05272	1968.71	103.79
	Second 10 days	0.02852	1968.71	56.1476
	Last 10 days	0.039	1968.71	76.7797
December	First 10 days	0.0114	1968.71	22.4433
	Second 10 days	0.00614	1968.71	12.0879
	Last 10 days	0.00572	1968.71	11.261
January	First 10 days	0.0016	1968.71	3.14994
	Second 10 days	0	1968.71	0
	Last 10 days	0	1968.71	0
February	First 10 days	0.00276	1968.71	5.43364
	Second 10 days	0.00658	1968.71	12.9541
	Last 10 days	0.00152	1968.71	2.99244
March	First 10 days	0.01384	1968.71	27.2469
	Second 10 days	0.00522	1968.71	10.2767
	Last 10 days	0.00176	1968.71	3.46493
April	First 10 days	0.00872	1968.71	17.1672
	Second 10 days	0.01912	1968.71	37.6417
	Last 10 days	0.02896	1968.71	57.0138
May	First 10 days	0.04172	1968.71	82.1346
	Second 10 days	0.0318	1968.71	62.605
	Last 10 days	0.07404	1968.71	145.763
Total				5107.562163

3.1.3. Ground Water Informations

Currently, Thunchath Ezhuthachan Malayalam University's Aksharam campus has three tube wells that serve as groundwater supplies. Two of them are doing a good service. Due to the septic tank's proximity to the tube well beside the pump room, the other one can't be used. The third tube well is now only utilised for gardening.

Serial No:	Location of the Ground Water Source	Type	Working Condition
1	Behind the Canteen	Tube-well	Active
2	Behind the New Academic Block	Tube-well	Active
3	Adjacent to Pump Room	Tube-well	Partially active



Tube-well behind the New Academic Block



Tube-well behind the Canteen

3.1.3.1. Ground Water Supply

Ground water availability for 10 days is calculated in the following manner:

Total groundwater recharge = $0.06 \times A \times R$

Soil surface area (A) = 13534.9 sq.m.

R = 10 days total precipitation in meters (10-year average)

We can use 90% of the total groundwater recharge.

Therefore, Water available for the first 10 days = Total groundwater recharging $\times 0.9$.

Month	Ten Days	R (Meter)	A (Square meter)	Ground Water Recharge (Cubic meter)	Ground Water Availability (Cubic meter)
June	First 10 days	0.22234	13534.9	1805.61	1625.049
	Second 10 days	0.2606	13534.9	2116.317	1904.685
	Last 10 days	0.21342	13534.9	1733.171	1559.854
July	First 10 days	0.17032	13534.9	1383.159	1244.843
	Second 10 days	0.22806	13534.9	1852.062	1666.855
	Last 10 days	0.17928	13534.9	1455.922	1310.33
August	First 10 days	0.17592	13534.9	1428.636	1285.772
	Second 10 days	0.11794	13534.9	957.7837	862.0053
	Last 10 days	0.12414	13534.9	1008.133	907.3201
September	First 10 days	0.11445	13534.9	929.4416	836.4974
	Second 10 days	0.08118	13534.9	659.2579	593.3321
	Last 10 days	0.051	13534.9	414.1679	372.7511
October	First 10 days	0.08768	13534.9	712.044	640.8396
	Second 10 days	0.10448	13534.9	848.4758	763.6282
	Last 10 days	0.08242	13534.9	669.3279	602.3951
November	First 10 days	0.05272	13534.9	428.136	385.3224
	Second 10 days	0.02852	13534.9	231.6092	208.4483
	Last 10 days	0.039	13534.9	316.7167	285.045
December	First 10 days	0.0114	13534.9	92.57872	83.32084
	Second 10 days	0.00614	13534.9	49.86257	44.87631
	Last 10 days	0.00572	13534.9	46.45178	41.8066
January	First 10 days	0.0016	13534.9	12.9935	11.69415
	Second 10 days	0	13534.9	0	0
	Last 10 days	0	13534.9	0	0
February	First 10 days	0.00276	13534.9	22.41379	20.17241
	Second 10 days	0.00658	13534.9	53.43579	48.09221
	Last 10 days	0.00152	13534.9	12.34383	11.10945
March	First 10 days	0.01384	13534.9	112.3938	101.1544
	Second 10 days	0.00522	13534.9	42.39131	38.15218
	Last 10 days	0.00176	13534.9	14.29285	12.86357
April	First 10 days	0.00872	13534.9	70.8146	63.73314
	Second 10 days	0.01912	13534.9	155.2724	139.7451
	Last 10 days	0.02896	13534.9	235.1824	211.6642
May	First 10 days	0.04172	13534.9	338.8056	304.9251
	Second 10 days	0.0318	13534.9	258.2459	232.4213
	Last 10 days	0.07404	13534.9	601.2744	541.147
Total				21068.72	18961.85

3.2. Water Demand Informations

3.2.1. Landscaping



Aksharam Campus spends the most water for plant care and landscaping. There are three employees working at the university for gardening. According to the information collected from them, water is pumped from tube wells for plant care on an average of 5.30 hours in summer days. Two pumps are used for irrigation at the same time. The summer season is defined as the six months from December to May.

Watering time in the summer	Duration
7.30 AM to 10 AM	2.30 hours
11 AM to 1 PM	2 hours
2 PM to 3 PM	1 hour
Total	5.30 hour

- Rate of flow through pipe = $6.8 \text{ l} / 20 \text{ sec} = 1224 \text{ liters} / \text{hour}$.
- The amount of water pumped in 5.30 hours = 6487.2 liters.
- The total amount of water used for landscaping through two pumps in a day = **12974.4 litres.**

3.2.2. Canteen

The canteen is functioning well in the campus. The canteen usually operates five days a week from Monday to Friday. Breakfast, lunch and dinner are served at the restaurant. They also sell ice cream and fruit salad in the freezer. The canteen has a wash basin with four water taps for the diners to wash their hands. According to the information collected from the canteen staff, about 1200 liters of water is required for the functioning of the canteen every day. Most of the water in the canteen is used for washing dishes. At the same time, water is used for cooking and cleaning. The exact amount of water is not known. Two buckets of water per day are needed to clean the kitchen and the dining area. A drinking water filter, a refrigerator and two freezers are used for the needs of the canteen. The devices are kept clean. Cleaning at regular intervals.

3.2.3. Pantry Room

In the administrative block, near the heritage museum, the pantry room works. The pantry room has a small dining area for staff and guests, a gas stove for small-scale cooking, a gas cylinder, a refrigerator, utensils, washbasins and a drinking water filter. Cleaning every day.



3.2.4. Toilets

The campus currently has 20 toilet blocks including 60 toilet rooms. On working days, the cleaning staff of the university cleans the toilets twice a day.

Building	Toilet Blocks	Number of Toilets	Number of Urinals	Number of Flush Tanks	Number of Wash basins
Administrative Block	GENTS -1	2	12	2	3
	LADIES – 1	4	-	4	2
	VICE CHANCELLOR OFFICE-1	1	-	1	1
	CONFERENCE ROOM-1	1	-	1	1
Centre for Ezhuthachan Studies	GENTS -1	3	-	3	1
	LADIES – 1	3	-	3	1
Academic Block	LEFT STAFF GENTS-1	3	-	3	2
	LEFT STAFF LADIES -1	3	-	3	2
	RIGHT STAFF GENTS-1	3	-	3	2
	RIGHT STAFF LADIES-1	3	-	3	2
	STUDENTS GENTS -1	6	8	6	2
	STUDENTS LADIES-1	8	-	8	6
New Academic Block	GROUND FLOOR GENTS-1	3	-	3	3
	GROUND FLOOR LADIES -1	3	-	3	3
	FIRST FLOOR GENTS -1	3	8	3	3
	FIRST FLOOR LADIES -1	3	-	3	3
	STAFF -1	1	-	1	1
Library Block	GENTS – 1	3	-	3	1
	LADIES - 1	3	-	3	1
Storage Room	STAFF - 1	1	-	-	-
Total	20	60	28	59	40

3.2.5. Cleaning Activities

All the verandahs, corridors, offices, halls, classrooms and toilets that are used daily in the Aksharam campus are kept clean every day by the sanitation workers. Cleaning is easy because the floors are tiled. Floors are cleaned by mixing water with disinfectant liquid. Exactly how much water each block will cost for cleaning has not been calculated.

3.2.6. Drinking Water Filter Units

At present, 5 drinking water filtration units are functioning at Aksharam campus. The students mainly depend on these drinking water filters for drinking water. Both hot and cold water are available through the hot water faucet. Mini filters can be seen on the wall in the father's study block and on the first floor of the library block, but do not work. Relevant informations of water filter units are given below:

Serial Number	Position of Drinking Water Filter unit	Temperature of Water	Manufacturing company and brand of the filter	Water Cooler Manufacturing company	Technologies used	Tank Cleaning Frequency
1	In front of Rangashala at the Academic Block	Hot Water and Cold Water available	KENT RO SYSTEMS LIMITED	BLUE STAR 80 Litre Tank	Reverse Osmosis + Ultra Filtration + UV LED Disinfection + TDS Controller + UV LED Disinfection in the Tank	Two months
2	At ground floor of the library block	Hot Water and Cold Water available	KENT RO SYSTEMS LIMITED KENT GRAND +	BLUE STAR	Activated Charcoal Filtration+ Reverse Osmosis + Ultra Filtration + TDS Controller + UV LED Disinfection in the Tank	Two months
3	At kitchen of the canteen	Luke warm water	Wave Water Purifiers	Nil	Reverse Osmosis + Ultra Filtration + TDS Controller + UV LED Disinfection in the Tank	Two months
4	At the pantry of Administrative block	Luke warm water	KENT RO SYSTEMS LTD	Nil	Reverse Osmosis + Ultra Filtration + TDS Controller + UV LED Disinfection in the Tank	Two months
5	At the first floor of New Academic Block	Luke warm water	KENT RO SYSTEMS LIMITED KENT GRAND +	Nil	Reverse Osmosis + Ultra Filtration + TDS Controller + UV LED Disinfection in the Tank	Two months



1. Drinking water filter unit in the academic block



2. Drinking water filter unit in the library block



3. Drinking Water Filter unit at Kitchen of the Canteen



4. Drinking Water Filter unit at Pantry room of Administrative Block



5. Drinking Water Filter unit at New Academic Block

3.2.7. Science Laboratories

Two science labs are currently functioning under the School of Environmental Studies. The smaller science lab system is located in the academic block and the larger science lab is located on the ground floor of the New building. Science lab experiments are included practical part of the syllabus for third semester MSc Environmental Studies students. Science labs are also used for other research activities. The chemical experiments consume only a limited amount of water. Water is needed mainly for water distillation unit that purify water. Wash basins and drainage are also well-functional at both science labs.

❖ Total Water Demand of the Campus

Total water demand of the campus is approximately estimated that 32,500 Litres per day based on the previous water storage operations, excluding the New Academic Block.

3.3. Water Storage and Distribution

3.3.1. Water Storage Tanks

4 water tanks are functioning in Aksharam campus. Water tanks are cleaned once a year during summer vacation. Earlier it was a switched motor pumping system, but now automatic pumping system is used to fill the water tanks.

Serial Number	Position of the Water Tank	Building material of the tank	Volume (Litres)	Ground Water Source
1	Over the Pump Room	Plastic	3000 Litres	Tube-well behind the Canteen
2	Over the Pump Room	Plastic	2500 Litres	Tube-well behind the Canteen
3	Over the Pump Room	Plastic	2500 Litres	Tube-well behind the Canteen
4	Over the New Academic Block	Cement Concrete	11,000 Litres	Tube-well behind the New Academic block



The three water tanks over the pump room



The Cement Concrete Water Tank over the New Academic Block

3.3.2. Water Distribution Network

3.3.2.1. Administrative Block

Serial Number	Toilet Block	Number of Toilets	Number of Flush Tanks	Number of Urinals	Number of Wash Basins	Number of Water taps
1	GENTS	2	2	12	3	5
2	LADIES	4	4	-	2	6
3	VICE CHANCELLOR OFFICE	1	1	-	1	2
4	CONFERENCE ROOM	1	1	-	1	2
Total		8	8	12	8	15

3.3.2.2. Academic Block

Serial Number	Toilet Block	Number of Toilets	Number of Flush Tanks	Number of Urinals	Number of Wash Basins	Number of Water taps
1	LEFT STAFF GENTS	3	3	-	2	5
2	LEFT STAFF LADIES	3	3	-	2	5
3	RIGHT STAFF LADIES	3	3	-	2	5
4	RIGHT STAFF GENTS	3	3	-	2	5
5	STUDENTS GENTS	6	6	8	2	8
6	STUDENTS LADIES	8	8	-	6	14
Total		20	20	8	16	42

3.3.2.3. New Academic Block

Serial Number	Toilet block	Number of Toilets	Flush tanks	Urinals	Wash basins	Water taps
1	GROUND FLOOR GENTS	3	3	-	3	6
2	GROUND FLOOR LADIES	3	3	-	3	6
3	FIRST FLOOR LADIES	3	3	-	3	6
4	FIRST FLOOR GENTS	3	3	8	3	6
5	FIRST FLOOR LADIES	3	3	-	3	6
6	FIRST FLOOR STAFF	1	1	-	1	2
Total		13	13	8	13	32

3.3.2.4. Centre for Ezhuthachan Studies

Serial Number	Toilet block	Number of Toilets	Flush Tanks	Number of Urinals	Number of Wash basins	Water taps
1	GENTS	3	3	-	1	4
2	LADIES	3	3	-	1	4
Total		6	6	-	2	8

3.3.2.5. Library Block

Serial Number	Toilet block	Number of Toilets	Flush Tanks	Number of Urinals	Number of Wash basins	Water taps
1	GENTS	3	3	-	1	4
2	LADIES	3	3	-	1	4
Total		6	6	-	2	8

3.3.2.6. Storage Room

Serial Number	Toilet block	Number of Toilets	Flush Tanks	Number of Urinals	Number of Wash basins	Water taps
1	STAFF	1	-	-	-	1
Total		1	-	-	-	1

3.3.2.7. Canteen block

Serial Number	Room	Wash basin	Water taps
1	Dining Hall	4	4
2	Kitchen Room 1	1	1
3	Kitchen Room 2	1	1
4	Wash basin outside Kitchen	1	1
Total		7	7

3.3.2.8. Water taps in the gardens

Serial Number	Site	Water taps	Purpose	Remarks
1	Front side of Pump room	1	Irrigation into the front gardens	-
2	Back side of Pump room	1	Irrigation into the back gardens	-
3	At the Sanjeevanam Medicinal Garden	1	Irrigation into the front gardens	-
4	Behind the Academic block	2	Irrigation into the adjacent gardens	One tap is not working.
5	Water tap from the tube-well located behind the Canteen	1	Irrigation into the adjacent gardens	-
6	Wash basin outside storage room	1	Irrigation into the adjacent gardens	Needer cleaner sink and drainage
Total		7	-	-

3.3.2.9. Limitations in Water Supply and Consumption

Serial Number	Site	Limitations
1	Valve in front of Pump room	Leakage
2	A Wash basin at the staff toilet block, behind and right to the Rangashala in Academic block	There is no connection pipe to drain the waste water from the wash basin sink
3	Wash basin outside the girls's toilet in the academic block	Not working
4	Sink of the wash basin outside storage room	It is commonly littered with garbage including food waste
5	Toilets in the Ezhuthachan Padana Kendram block	Presence of mosquitoes
6	A water tap in the garden behind the Academic block	Not working



3.4. Water Quality

The quality of water obtained from the water taps of Aksharam campus was studied for a period of one year from April 2023 to March 2024. The parameters studied were pH, Turbidity, Total Dissolved Solids (TDS), Chloride, Total Hardness, Acidity, Alkalinity, BOD and E Coli.

Parameter	Apr 2023	May 2023	Jun 2023	Jul 2023	Aug 2023	Sep 2023	Oct 2023	Nov 2023	Dec 2023	Jan 2024	Feb 2024	Mar 2024
pH	6.7	6.62	6.71	6.62	6.91	6.90	6.85	6.77	6.75	6.78	6.66	6.83
Turbidity	2.2	3	2.5	1.2	1	2.3	2.1	2.7	2.6	2.9	3	3
Total Dissolved Solids	180	195	90	74	65	87	90	120	150	130	165	185
Chloride	65	70	45	17	23	45	80	74	85	78	60	66
Total Hardness	172	180	142	145	130	127	156	160	172	160	165	180
Acidity	25.6	30.2	20.2	11.52	15.6	17.1	14.5	20.3	24.6	24.0	25.8	30.5
Alkalinity	36	45	26	28	35	42	28	25	35	28	62	48
BOD	3.6	4.5	2.4	Nil	2.8	2.9	3.2	Nil	4.1	2.6	3.3	4.2
E.Coli.	6	8	Nil	Nil	5	8	9	Nil	9	Nil	7	Nil

3.5. Waste Water Treatment

At present, the sewage treatment works in Aksharam campus are progressing at a good level. There are 6 septic tanks in the university. Work is being done at regular intervals. Socking pits work well to treat waste water in washbasins. At present, there is no sewage treatment plant.

Serial Number	Position of the septic tank
1	Close to the library building
2	To the right of the administrative block
3	On the left side of the administrative block
4	Close to the Academic Block.
5	Close to the New Academic Block
6	Close to the Canteen

3.6. Current water conservation activities

1. Rain water harvesting

An underground water tank has been constructed below the building of the newly constructed Centre of Excellence on the Aksharam campus to store an extensive amount of rainwater.

2. Ground water recharge

Aksharam campus has a lawn amidst the 3 quarters (*Naalukettu*) of the administrative block and the academic block. The rainwater falling here is collected and used for irrigation.



3. Quality of Drinking Water

Standard drinking water filter units and maintenance operations at regular intervals ensuring the quality of drinking water.

4. Hygienic rooms and toilets

All the rooms are cleaned everyday by the cleaning staff.

5. Pre-monsoon cleaning

Under the auspices of the School of Environmental Studies and the staff, pre-monsoon cleaning activities are carried out and fish belonging to the *Gambusia* group are reared in the useful empty water tank where mosquitoes used to grow and mosquito breeding is minimized.

6. Water Conservation Campaigns, workshops and trainings

Under the support of the Bhoomithra Sena Club and the School of Environmental Studies, a water conservation campaign was conducted, and with the technical assistance of Haritha Keralam Mission, a water budget workshop was held for the School of Environmental Studies students.

4. Follow-up activities

1. Rain water harvesting

- 1.1. Improved roof-top rain water harvesting
- 1.2. Designing more rain pits and ground water recharging

2. Water efficiency in Irrigation

- 2.1. Implementation of micro-irrigation techniques
- 2.2. Soil conservation activities
- 2.3. Increasing vegetation with Indigenous coastal plants with increased tolerance towards drought and water logging at suitable sites.
- 2.4. Sustainable Agriculture Development initiatives.

3. An effective strategy for mitigating monsoon floods

A permanent solution to the problem of waterlogging during the monsoon season has to be found by providing better drainage and pumping systems.

4. Water Smart Devices

- 4.1. Sensor taps
- 4.2. Dual flush toilets

5. Grey-water Recycling

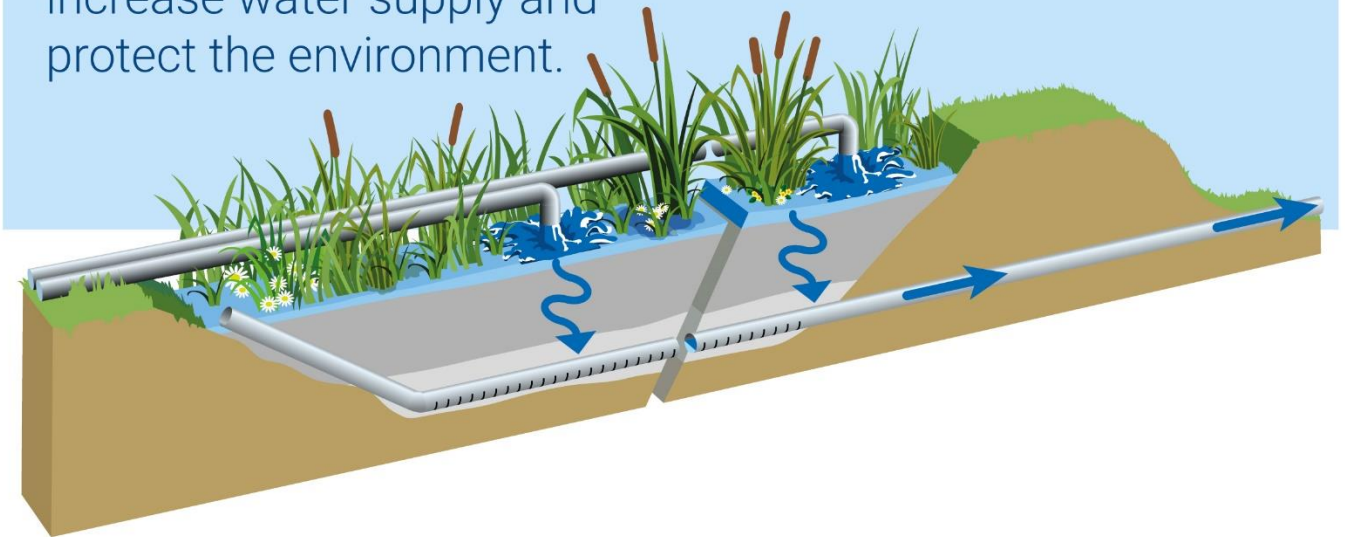
Grey water from the sinks is subjected to efficient wastewater treatment making it possible for recycling. This water can be used for flushing toilets and landscaping.

5.1. Constructed Wetlands

The wastewater from the wash basins and sinks can be treated and recycled using the built-in wetland technology. In the first phase, this technology will be used to treat waste water in the canteen with a high wash basin.

Constructed wetlands

help reduce water pollution,
increase water supply and
protect the environment.



6. Effective monitoring and management system

- 6.1. Monitoring regular intervals.
- 6.2. Improvisations of water audit reports.
- 6.3. Smart meters for assessment.

7. Educational, Research and Development activities.

Under the aegis of the School of Environmental Studies, an action plan will be formulated to propagate water conservation activities among students and staff. Seminars, workshops and research studies on innovative technologies in the field of water conservation will be held under the aegis of the School of Environmental Studies. Skill development will be provided to the students of the School of Environmental Studies in the field of water auditing.

8. Collaboration

The School of Environmental Studies of Thunchath Ezhuthachan Malayalam University, the Department of Engineering, Bhoomithra Sena, the National Service Scheme, the

State Government's Haritha Keralam Mission, the Shuchithwa Mission, and the Local Self Government Institutions etc. can contribute to water conservation activities of the campus. In future, collaborations with technical institutions and experts in the field of water resources can make a great contribution to the water resources sector of the institution.