iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 13 **Issue:** V **Month of publication:** May 2025

DOI: https://doi.org/10.22214/ijraset.2025.69623

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue V May 2025- Available at www.ijraset.com

Rain Water Harvesting Project for DACOE Campus

Gauri Kadam, Simran Mulani, Pradnya Salunkhe, Chaitrali Sawant, Samruddhi Shewale, Prof. M. B. Kumtekar
Final Year B-Tech Department of Civil Engineering, Dr.Dauolatrao Aher College Of engineering Karad

Abstract: ***This abstract details a rain water harvesting project implemented in DACOE Campus designed to enhance water security and sustainability. The project focuses on collecting rainwater from the rooftops of main college buildings, non construction area and directing it to a storage tank for later use, primarily for gardening and other utility purposes. The project aims to reduce reliance on groundwater, conserve water resources, and promote sustainable water management practices. We use advanced technology such as drone, total station, GIS software to conduct survey of DACOE college campus for making contour map for finding reduced level of campus to know the cross drainage for layout of the pipe and to know the location of water tank. We decide parking area as a location of water tank by using survey map. The topography of DACOE campus has steep slope. Hence, we collect rainwater near the parking. The soil in campus is rocky in nature.***
So, constructing water tank near parking area for capacity of 10 lakh liter with construction cost 3 lakh RS. This project will be useful to fulfil the water demands in dry period and to make sustainable use of water resource. This stored water can fulfil the demands.
Keywords: Circular water tank, Rainwater Harvesting, Drone, Total station, GIS software

I. INTRODUCTION

Rain water harvesting system is mainly the process or a phenomenon of collection and conservation of rainwater from various techniques where the rainwater is the main source for the process of harvesting. Here we mainly consider the rooftop rainwater harvesting system for the collection of rainwater from roof or top of the buildings of Dr. Daulatrao Aher College of Engineering Karad campus. The study and implementation of the technique of rainwater harvesting system in DACOE campus mainly fulfill the needs and also resolves the issue of scarcity of water in all seasons by equivalent supply of collected and stored water for future needs.

Also groundwater recharge could be done in efficient way. By implementation of this technique, water source will be increased in the campus which also intern could be used for construction works as well as maintenance of the good gardening works in the campus .Thus we can say it mainly fulfill the needs of scarcity of water and also mainly recharge groundwater. The growth of population and expansion in urbanization, industrialization and irrigated agricultural is imposing growing demand and pressure on water resource. The existing water resources nowadays facing the pollution because of this phenomenon.

A new development of water resource like rainwater is very important to make sure that there is no water shortage in the future. As there will be an ever increasing demand, there is a possibility that the major cities in India will face a water crisis situation. An approach of rainwater harvesting system into the building is an effective way to minimize the use of treated water for non-potable use.

II. OBJECTIVES OF PROJECT

1) To compute total catchment area of DACOE Campus
2) To estimate the rainwater harvesting potential of the catchment area for the overall campus.
3) To estimate total demand of water for DACOE campus
4) To overcome the inadequacy of surface water to meet our demands.
5) To arrest decline in ground water table.
6) To enhance availability of ground water at specific place and time and utilize rain water for sustainable development.
7) Assessment of quantity of rainwater harvested in underground storage tanks.
8) To store the water on surface or underground.

©IJRASET: All Rights are Reserved

III. METHODOLOGY

1) Here for the purpose of the study we mainly require the data of the annual rainfall of the campus area. The data of rainfall is been collected from meteorological Department
2) Topography of College Campus.
3) Total station serving is being done in order to perform the horizontal and vertical measurements for the calculation of the catchment area. Intersections, projection of points, project layout construction, leveling, etc.
4) Water harvesting potential is been estimated.
5) Discharge of water is been calculated.
6) Based on demand, the area of catchment to be selected for the design of Tank for rainwater harvesting system.
7) Design calculations are to be carried out further.
8) Construction of tank for collecting rain water.

IV. STUDY AREA AND RAINFALL DATA

The KARAD is situated in west part of Maharashtra state in India. Karad is a sub-district division in Satara district in Karad there are 217 villages and 5 towns. It has an average annual rainfall of approximately 200 mm. the rainfall is heavily influenced in south west monsoon which contributes most annual total with 88%. The monsoon (June-September) is primary source of rainfall which have 88.4% annual total. A small amount of rainfall occurs during pre-monsoon (March- May),post monsoon(Octomber-December).

1) *Average 10 Years Rainfall Data For Karad City*

MONTH/ YEAR	June	July	August	September
2014	66.9	277.7	181.8	79.1
2015	149.9	25.1	19.9.	67.2
2016	119.8	317	147	70.2
2017	69.7	193.9	82.2	264.8
2018	161.5	230.2	98.7	57.8
2019	137.7	363.4	393.7	208.9
2020	172.5	95.8	284.1	251.1
2021	281.692	368.926	38.77	81.425
2022	69.3	249.6	167.1	132.1
2023	33.5	280.8	42	70.3
2024	211.3	462.1	231	75

Table 1. Average 10 years rainfall data for Karad city

MONTH	AVERAGE 10 YEARS RAINFALL DATA
June	147.4
July	187.8
August	137.2
September	115.2

Table 2. Average 10 years rainfall for specific months

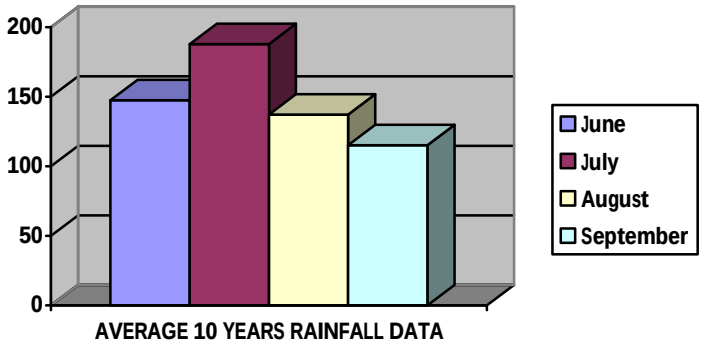


Fig. 1. Average 10 years rainfall data

2) *Calculation Of Constructed Catchment Area*

Sr. No.	Title	Calculations m2
1	DACOE main building	4361.19
2	Pharmacy building	546.84
3	Girls hostel	566.73
4	Boys hostel	608
5	Workshop	953.3
6	Cafeteria	388.5
7	Watchman cabin	50.47
8	Parking area	1419.33
9	Row house	686.84
10	Stage 1	271.3
11	Non Constructed Area	22819

Table 1. Water Demand For College Campus

3) *Water Collected Form Constructed Area*

Sr. No.	Title	Calculations
1	Annual rainfall of Karad city	200 mm
2	Area of roof catchment	12792.07 m2
3	Height of rainfall	0.200 m
4	Rainwater endowment of that area	2558414 liters
5	Coefficient for roof surface adopted	0.85
6	Coefficient for evaporation	0.80

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

7	Approximately total harvested water quantity	912760 liter

Table 2. Water collected from constructed area

4) Water Collected From Non-Constructed Area

Sr No.	Title	Calculations
1	Annual rainfall of the city (Karad)	200 mm
2	Area of non-constructed	22819 m2
3	Height of rainfall	0.200 m
4	Rain water endowment of that area	4563800 liters
5	Harvested water quantity	Liters
6	Area of roof catchment	12792.07 m2
7	Consider Coefficient	0.25
8	Another constant coefficient for evaporation	0.80
9	Approximately effective harvested water quantity	1739721.52litres

Table 3. Water Collected From Non-constructed Area

V. WATER DEMAND FOR COLLEGE CAMPUS

Sr. No.	Title	Calculations
1	No of students in DACOE	1060
2	No of students in girls hostel	100
3	No of students in boys hostel	150
4	DACOE teaching staff and non-teaching staff	145
5	No of students in pharmacy college	115
6	No. of pharmacy college teaching staff	10
7	Water demand for college	56430 LPCD
8	Water demand for hostel	20250 LPCD
9	Total water demand for college and hostel	76680 LPCD

Table 4. Water Demand For College Campus

A. Water Demand For DACOE Campus :-

1) Total rainwater for public use considered 10% of total water demand = 76680x10/100
= 7668 LPCD

2) Total water demand for 6 months = 7668x180
= 1380240 liters

3) 50% Of total water demand =1380240x50/100 = 690120 = 700000 litre

B. Design Water Tank For 700000 litres capacity

1) Volume = Capacity /1000 = 7000000/1000 = 700 m3

2) Assume height of water tank =5.2m

3) Free board = 0.2m

4) Diameter of water tank = 13.35m = 14m

VI. CONTOUR MAP FOR DACOE CAMPUS BY USING DRONE SURVEY

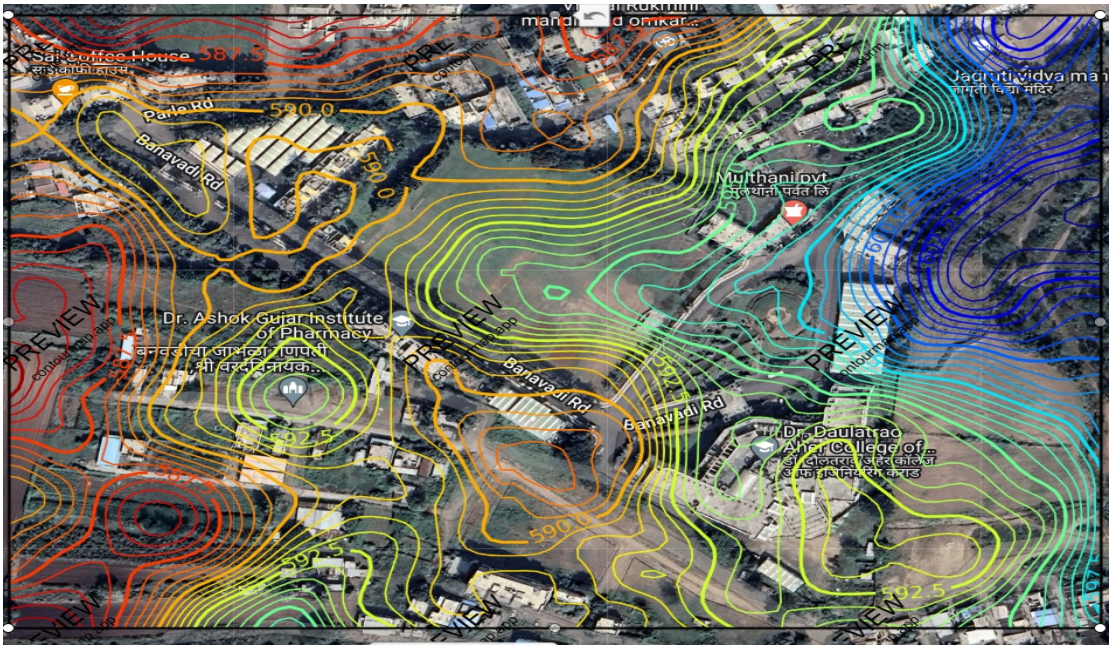


Fig 1. Contour Map Of College Campus

VII. CONCLUSIONS

Hence, conclusion can be made saying that this study mainly on the designing of the rooftop rainwater harvesting structures for the campus of DACOE by the adoption and installation of the system or structure the water source could be increased that mainly facilitates in fulfilling the water needs demands for various utilizations in the campus area. The design of tank for rainwater harvesting systems is been carried or its adoption are been done since ancient times. The technique is simple but it very much fulfill done is or demand of the scarcity of water. Hence the adoption and installation of this technique of Design of tank for Rain water harvesting system place a vital role.

VIII. ACKNOWLEDGMENT

It gives us a great sense of pleasure to present the report of the B.Tech Project undertaken during B.Tech Final Year. We owe special debt of gratitude to Professor Dr. M. B. Kumthekar Department of Civil Engineering, Dr. Ashok Gujar Technical Institute's ,Dr. Daulatrao Aher College of Engineering, Karad for his constant support and guidance throughout the course of our work. His sincerity, thoroughness and perseverance have been a constant source of inspiration for us. It is only his cognizant efforts that our endeavors have seen light of the day.

We also do not like to miss the opportunity to acknowledge the contribution of all faculty members of the department for their kind assistance and cooperation during the development of our project. Last but not the least, we acknowledge our friends for their contribution in the completion of the project.

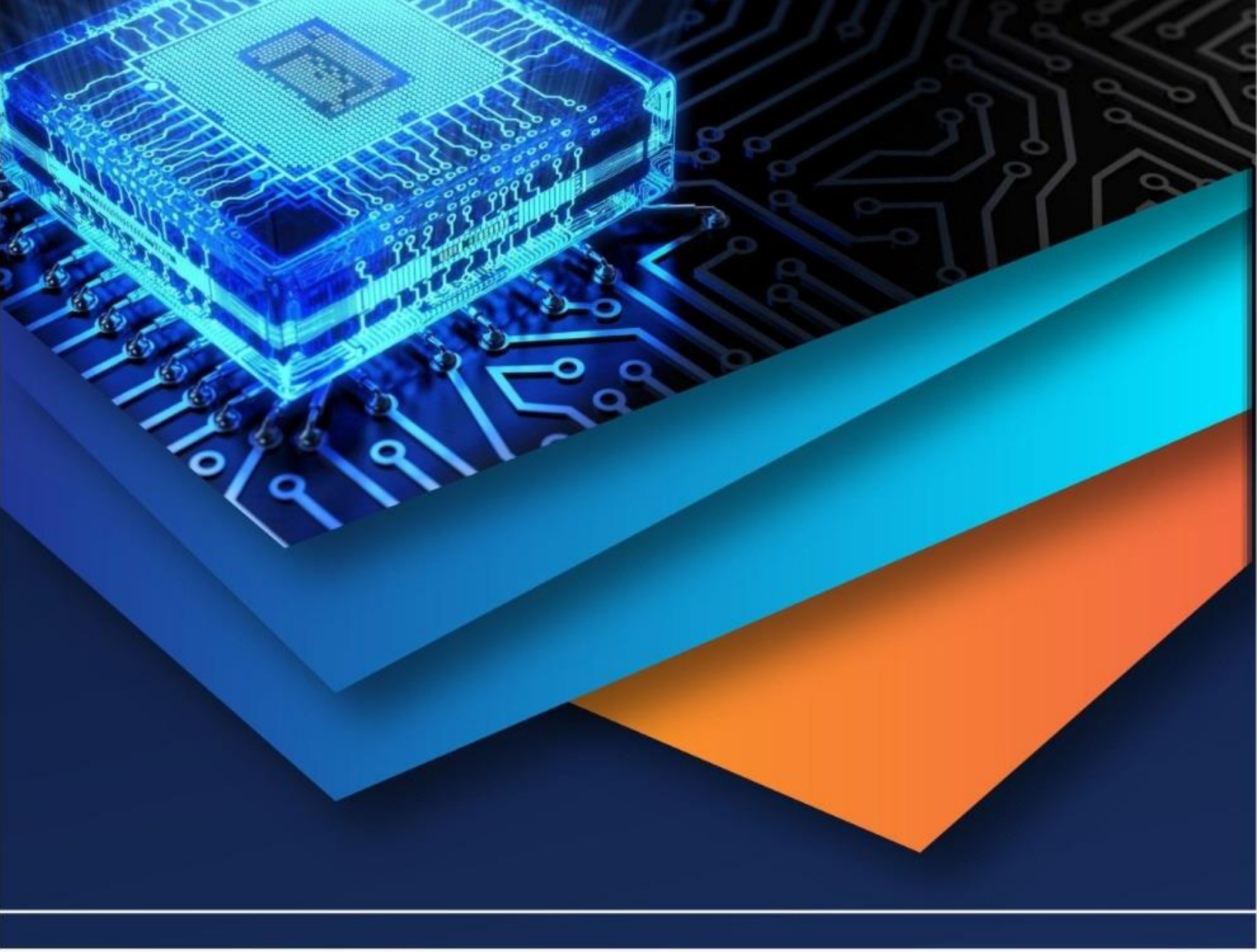
REFERENCES

[1] D. Kornack and P. Rakic, "Cell Proliferation without Neurogenesis in Adult Primate Neocortex," Science, vol. 294, Dec. 2001, pp. 2127-2130, doi:10.1126/science.1065467.

[2] M. Young, The Technical Writer's Handbook. Mill Valley, CA: University Science, 1989.

[3] R. Nicole, "Title of paper with only first word capitalized," J. Name Stand. Abbrev., in press.

[4] K. Elissa, “Title of paper if known,” unpublished.
[5] European Journal of Scientific Research ,ISSN 1450-216X Vol.34 No.1 (2009), pp.132-140 © Europe Journals Publishing, Inc. 2009 Rainwater Harvesting as an Alternative Water Supply Author : Shari N, M.M. Tahir , M.F.M. Zain



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)