GROUNDWATER IMPROVEMENT METHOD USING ARTIFICIAL RECHARGE

PROJECT REPORT

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(Deemed to be University under section 3 of UGC Act, 1956)

CERTIFICATE

This is to certify that the project work entitled “Ground Water Improvement Method Using Artificial Recharge” that is being submitted by, “Samyak Jain, Manish Singh, Asif Khan and Mridul Mathur” for Engineering Geology(CLE 1011) is a record of bonafide work done under my supervision. The contents of this project work, in full or in parts have neither been taken from any other source nor have been submitted for any other CAL course.

Place: Vellore

ACKNOWLEDGEMENT

It gives us immense pleasure in bringing out this synopsis of the project entitled “Ground Water Improvement Method Using Artificial Recharge”.

The completion of any inter-disciplinary project depends upon cooperation, co-ordination and combined efforts of several sources of knowledge. We are grateful to Prof. Porchelvan P. for his willingness to give us valuable advice and direction; whenever we approached him with a problem. We are thankful to him for providing immense guidance for this project.

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ABSTRACT

Water is an essential component of our life. As groundwater is declining day by day rooftop harvesting has become very important in the present scenario. Housetop Rain Water Harvesting is the method through which rain water is caught from the rooftop catchments and put away in repositories. Reaped rain water can be put away in sub-surface ground water repository by embracing fake revive methods to meet the family unit needs through capacity in tanks. The Main Objective of housetop rain water gathering is to make water accessible for future utilize. In the Project, the rooftop area is calculated with the help of Google Earth Pro of VIT in Vellore, (Tamil Nadu) to estimate the volume of water that can be collected, which can be further used in all domestic purposes. Through, swmm(storm water management model)software, here we can conclude the concept behind distribution of pipes using the knowledge of slope and elevation.

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Introduction

- The water shortage is one of the significant issue which is yet not solve totally and consumption of the water table has turned into a noteworthy issue over the world.

- Demand for water increases as our population increases. Despite the fact that 75% of the earth is secured by water, just a little amount of it is fit for human utilization.
- Water is being used extensively for a variety of human, agriculture and industrial use.

- The revive rate is considerably less than the rate at which the water is being directed out. This overexploitation has a ton of natural impacts which incorporate corruption of water quality, diminished amount of water in wells and springs.

- Artificial methods to recharge the groundwater can be used to supplement our water resources.

AIM

- To ensure that ground settlements caused by drawdown is less, this reduce the risk of damage to nearby structures.
- To avoid depletion of water resources when water consumption is done in aquifers used for water supply.
- To reduce environmental impacts on sensitive water-dependent features such as wetlands.
- Design of recharge systems

OBJECTIVE OF PROJECT

- Supplement the quantity of available groundwater.
- Eliminate the decline in ground water level.
- Store water to reduce pumping and piping costs.
- To improve the quality of existing groundwater by dilution
- Conservation and storage of excess ground water for future uses.

Methodology Adopted:

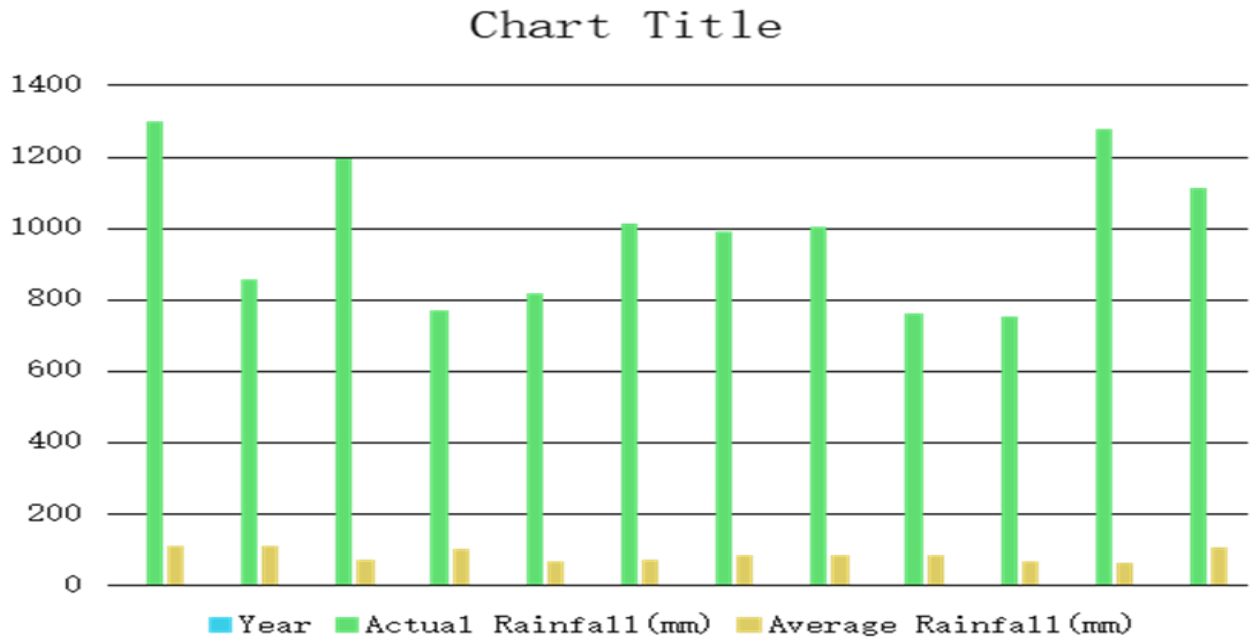
- The objective is of finding the maximum possible amount of rain water that can be conserved in our VIT campus.

- We will first collected the information about the surface area(roof area) of the present VIT buildings.

- We will get the average rainfall depth obtained in VIT.
  We can get the volume of water that can be saved.
  We will then proceed by method of designing tank and analysis for making improvement in water recharge.

ANALYSIS OF RAINFALL DATA

YEAR	ACTUAL RAINFALL (mm)	AVERAGE MONTHLY RAINFALL (mm)
2005-2006	1297.7	108.14
2006-2007	855.5	71.29
2007-2008	1195.7	99.64
2008-2009	768.3	64.025
2010-2011	814.8	67.9
2011-2012	1011.9	84.32
2013-2014	991.5	82.625
2014-2015	1004.1	83.675
2016-2017	760.7	63.39
2017-2018	750.8	62.567



Concept behind distribution of pipes

- Through ,using software(swmm 5.1) we can locate the distribution of pipes.
- Also,through the help of slope and elevation we can get water elevation profile as per location of nodes.
- Basically from input data such as roughness, depth,slope, we can distribute location of pipes as per colour.
- Finally, through all these input we can locate distribution of pipes in economical & convinient way in region like vit vellore.

Concept behind how to find discharge of water through permeable soil

As per Darcy law,

Q=kia ,where Q = discharge(m^3)

k = coefficient of permeability(kg-m/N-s)

i = hydraulic gradient

a= area(m^2)

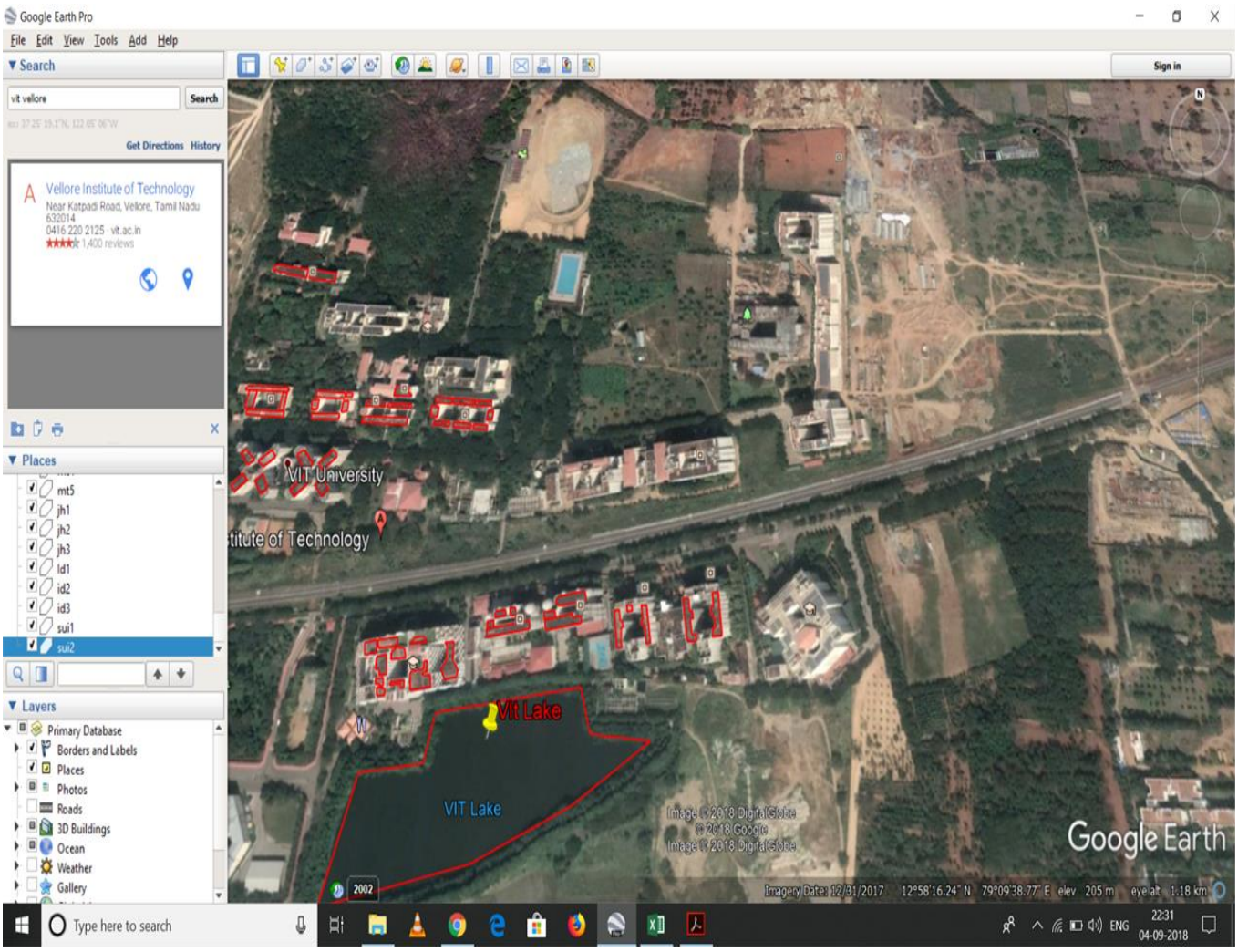
The type of soil present in Vellore region is sandy soil i.e. coefficient of permeability(k) = 10^-4 m*s^-1

As from the data of CGWB ,the average depth of ground water table in vellore is about 100 m.

LITERATURE REVIEW

- The water shortage is one of the significant issue which is yet not solve totally and consumption of the water table has turned into a noteworthy issue over the world.
- Demand for water increases as our population increases. Despite the fact that 75% of the earth is secured by water, just a little amount of it is fit for human utilization.
- Water is being used extensively for a variety of human, agriculture and industrial use.
- The revive rate is considerably less than the rate at which the water is being directed out. This overexploitation has a ton of natural impacts which incorporate corruption of water quality, diminished amount of water in wells and springs.
- Artificial methods to recharge the groundwater can be used to supplement our water resources.

RESULT AND DISCUSSION



To find slope, elevation, area we use modern software like Google Earth pro to make our work easier and efficient.

Comparision table b/w artificial tank and natural soil	Discharge of water through artificial tank in ground water table (m^3s^-1)	Quantity ofwater that reaches to ground water table(GL)through artificial tank(in a year)(m^3)	Discharge of water through natural soil in ground water table(m^3s^-1)	Quantity ofwater that reaches to ground water table(GL)through natural soil (in a year) (m^3)	% Incremental improvement in ground water table(in only that area .i.e area of tank)
swimming pool region	36*10^-4	113529.6	28.8*10^-4	90823.6	25
outdoor stadium1 region	52.77*10^-4	166415.4	42.75*10^-4	134816.4	23
outdoor stadium2 region	20.4*10^-4	64333.44	17 *10^-4	53611.20	20
sjt ground1 region	18.65*10^-4	58814.64	15.3*10^-4	48250.08	21
sjt ground 2 region	21.27 *10^-4	67077.0	18.188 *10^-4	57357.6	17

The principal concern with regard to artificial recharge using waters of impaired quality for drinkable purposes is the protection of human health. Several major studies employing state-of-the-art methods for organic analysis and toxic testing show that well-managed recharge projects produce recovered water of essentially the same quality from a health perspective as water from other acceptable sources. However,

there are uncertainties in identifying potentially toxic constituents and pathogenic agents in the methodologies used in these studies, and thus drinkable reuse should only be considered when better quality sources are unavailable**.** A key issue in developing any drinkable water supply, including ground water recharge systems, is the need to balance the risks in using chemical disinfectants to reduce the number of pathogenic microorganisms with those associated with the DBPs formed in the process. As a crude comparison, it has been estimated that the probability of mortality from pathogenic microorganisms in improperly disinfected drinking water would exceed the carcinogenic risks introduced by chlorine as much as thousand times. Chlorination has been the most widely used disinfectant of highly treated municipal wastewater for ground water recharge and other uses, but other disinfection processes, including the use of ultraviolet radiation, are increasingly being assessed.

CONCLUSION

- Assessments of the feasibility of any recharge technology should include analyses of the possible impacts of the use of the system on the environment.
- Monitoring of recharge water should be undertaken as it moves toward points of recovery. This is critical to help ensure that water quality is maintained, to provide early wanting of unexpected problems, and to help maintain the long-term viability of the treatment system.
- The price of recovered water should reflect the true cost of making the water available to ensure that the water is used efficiently. The costs of recharge operations should not be subsidized to make this water source more attractive than it would otherwise be.
- The federal government should assume leadership in supporting the development of artificial recharge with municipal wastewater and other suitable impaired-quality water sources by providing technical assistance to the states and by developing model statutes and guidelines.

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