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SIMULATION OF DRAINAGE IN VIT BY SWMM SOFTWARE

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Abstract *During monsoon ,we face water logging and Drainage Overflow every year. This happens because of many factors such as, Topography of land because of which the Storm water gets accumulated in a particular area and Drainage system not being designed for that amount of Storm water ,Overflows. And thus,creating a havoc for the people passing by that area.*

SWMM is one of the software which can be used to simulate the storm water in the given dimension of drainage system considering every type of catchment areas. We can find out that for particular amount of storm water, what dimension of drainage system would be suitable. Which will help to reduce accumulation of water, hence, there would not be any kind of havoc.

Keywords: *SWMM, Drainage System, Overflow, Accumulation of Water, Storm Water.*

I.   INTRODUCTION

As we know that in every monsoon, we experience Drainage Overflow and Water Logging in our College area, which is caused because of many factors such as, Drainage capacity is less than that of the amount of Storm water accumulating in that area, Topography of that region, because of which the amount of storm water is increased. Hence, the capacity of Drainage is not enough for that amount of storm water .Hence, it Overflows. So because of overflow, the water gets accumulated in surrounding low lying areas .So, overall this scenario causes problem for the people passing from that area.

So, to avoid and reduce these problems , we will assume the maximum amount of Storm water which can be accumulated in that area by considering pervious and impervious sub catchments. Then we will find out the drainage plan surrounding our college .Then we will input all these information in SWMM software and then simulate the drainage system and see to it that at what amount of Storm water does the drainage system does not overflow. And study the topography of that area and find out the reason for accumulation of rain water in that area and provide the solution for the same.

1.1 Objective

The following are the points which are going to be discussed:

- To create a contour map of the sub catchment surrounding VIT building.
- To collect and input rainfall, drainage system , sub catchment data on the SWMM.
- To simulate rainfall-runoff in SWMM to Check overflowing of the drainage system.
- To provide solutions to decrease runoff and decrease chances of flooding.

1.2 Scope of Study

The Report tells us about one of the technique which can be used to reduce   the flooding or accumulation of Storm water which happens due to over flow of drainage system which is not designed suitably for the amount of storm water   which come and merge in that Drainage system from different catchment areas.

II.   METHODOLOGY

2.1 Introduction

In this Chapter, the method for followed for reduction of accumulation of Storm Water is described. Two different Softwares Namely, Arc GIS and SWMM is been used for creating Contour Map and Simulating Drainage System respectively, which will ultimately help us to provide the solution.

2.2 Site location

VIVA INSTITUTE OF TECHNOLOGY is been selected as a site for our Project.

2.3 Survey

Online survey was done of surrounding area of VIT building using the software named Google Earth Pro.

2.3.1 Capturing aerial picture of the area

An aerial picture was taken using Software named Google Earth Pro. As we have to find the direction of flow of Storm water, maximum suspected area from which the storm water can come and accumulate in college premises is taken under the survey.

2.3.2 Identifying Pervious areas

Pervious areas are the areas which can absorb some amount of Rain water. So, by considering this area , we can find nearly accurate amount of storm water which reaches the Drainage system. The back side of the college area is considered as the water logging mainly takes place in that area.The area marked in the picture is the Pervious area.

2.3.3 Identifying Impervious areas

Impervious area is the type of area which does not absorb the rain water which gives rise to 100% of storm water out of the amount of rainfall. In this also the backside of the college area is considered. The area marked in this picture is impervious area.

2.3.4 Identifying Drainage System

The open drainage is been marked in this picture. This is to show that where the storm water comes and meet.

2.4 Creating Contour Map

The Contour Map is been made by extracting the elevation data from Google earth pro and input it in the ARC GIS Software.

2.4.1 Extracting Elevation data from Google Earth Pro

The Elevation data is extracted from the Google Earth pro Software by selecting the area whose elevation is needed.

2.4.2 Use of Arc GIS software to create Contour Map

The data obtained from the Google earth software, is converted into the gpx file and that gpx file is uploaded in the Arc GIS Software and thereafter the Contour Map of desired area is obtained.

2.5 Study of Contour Map

After creating the contour map, we will study it and find out that from what direction the Storm water is coming from different Sub-Catchment areas. By studying this we will get to know what area on the map should be marked as the Sub catchment area in the SWMM software . Overall, this data increases the accuracy.

2.6 Collection of data for SWMM

The data such as amount of rainfall, drainage plan, pervious and impervious areas, no. of sub-catchments, etc.

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needs to be found out before simulating the drainage system in the SWMM software.

2.6.1 Collection of Rainfall data
The Rainfall data of previous year is to be considered to input in the SWMM software.

2.6.2 Analysing Drainage plan
The dimensions of the drainage system as well as the total length of the open drainage system should be found out so as to input that data in the SWMM software ,so that we can find the capacity of that existing drainage system.

2.7 Simulation of Drainage system using SWMM Software
The data which is obtained is to be inputted in the SWMM software and the drainage system is simulated and it is seen that whether the drainage system is suitable for the entered data.

2.8 Analysing the results obtained from SWMM Software
The results that are obtained after simulating the drainage system in SWMM software, should be analysed and different dimensions of the drainage system for same amount of rainfall data should be tried out until and unless the drainage system does not overflow.

2.9 Providing solutions
After trial and error simulation, we will get the dimension of the drainage system from which the storm water will not overflow . that value we will provide the solution.

III.   FIGURES AND TABLES
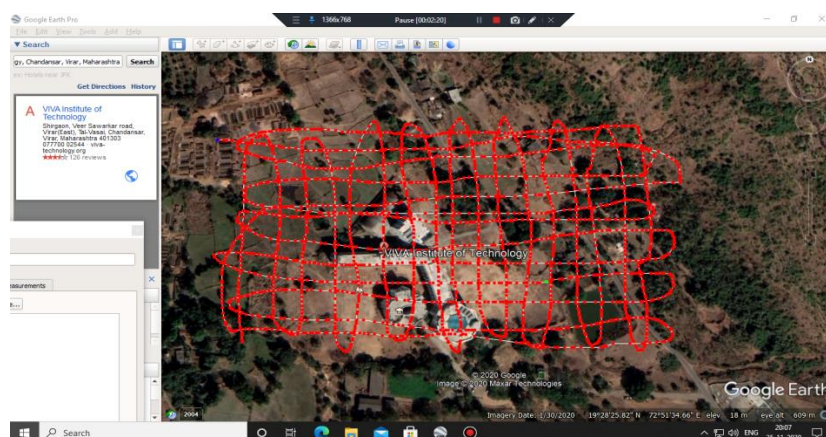

Fig3.1 vit-flooded area.

Fig3.2 Selection of elevation points.

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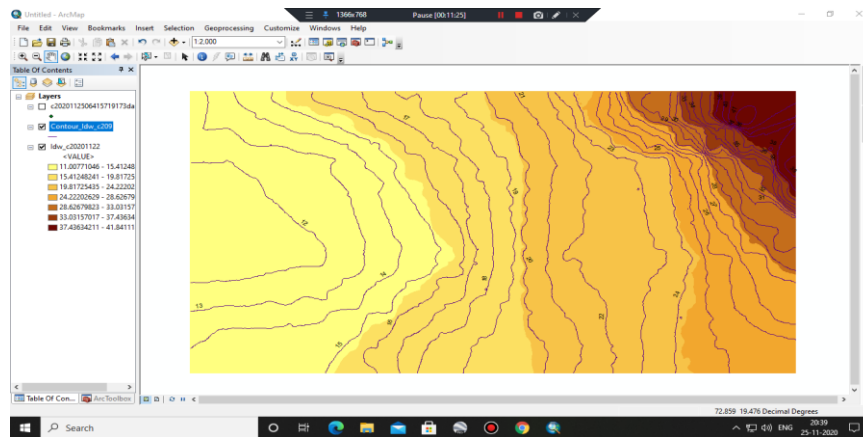
Fig3.3 contour map of the site using arc gis software.

IV. CONCLUSION

In this project, we are going to concentrate on the area of the college where the storm water is being accumulated due to low capacity of drainage system. So, with the help of SWMM software,we will find out the suitable dimensions of the drainage system using,rainfall data ,topography, and drainage plan. In short, we will provide the solutions for the flooding problems which occurs every year due to overflowing of drainage system.The only drawback is that , it will cost high.but this one time investment will prove to be beneficial for the future.

Acknowledgements

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