FLOODING PROBLEMS AND CAUSES IN A SPECIFIC AREA OF THE SIUC CAMPUS

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Introduction

We decided to focus our project on the common flooding problems in a specific area of the Southern Illinois University at Carbondale's campus. The purpose of our study was to identify the underlying factors causing periodic flooding to occur in the south part of campus (Site A, Figure 1). This is the only area on campus that seems to flood significantly after a large thunderstorm or significant rainfall. Many occasions after a large rain event, the south end of campus floods, which causes many problems for pedestrian traffic and car traffic. We hypothesized the flooding is due to impermeable land area. We will use ArcView, soil measurements, and slope aspects to measure the flooding. The hydrology of Site A is apparently different than other areas and has more issues since is so prone to flooding. To help us understand why the problem may be occurring, we decided to pick another area of campus that does not flood or floods little after a large rain event. To make an appropriate comparison, we chose an area with a similar slope in the north part of campus, between the North West Annex and the soccer fields (Site B, Figure 1).

Digitized satellite images of permeable land cover in the study area

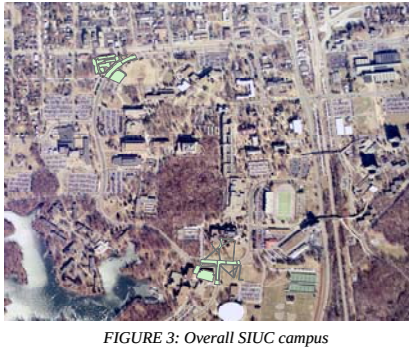


FIGURE 3: Overall SIUC campus

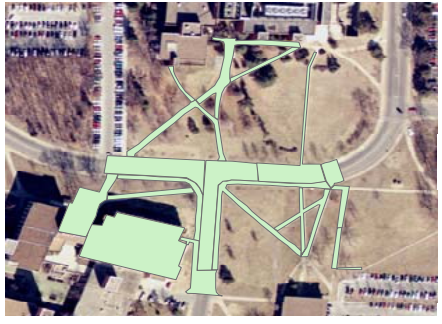


FIGURE 1: Highly flood prone area (Site A-south end of campus)

FIGURE 2: Comparable area (Site B-north end of campus)

Methodology

•We went to the physical plant and obtained a "1 foot contour" map of the entire SIUC campus. With this map, we drew in the major watersheds around our study sites, and where water would most likely flow based on the slope around our study sites.

•We obtained a high resolution satellite image of SIUC and digitized the permeable and impermeable surface areas of our study regions using ArcMap and ArcView GIS software. We now had the slope of our areas, major watersheds of our areas, and identified whether the land was permeable or impermeable.

•We calculated the total area of the polygons created that represent the impermeable surface of our study regions using the tools and short cuts in the ArcGIS software.

•We used a soil tester to measure soil moisture at Site A before a heavy rainfall and immediately after a rainfall.

FIGURE 4: Contour map (Site A-south end of campus)

FIGURE 5: Contour map (Site B-north end of campus)

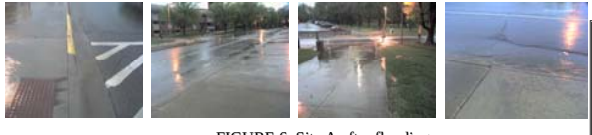


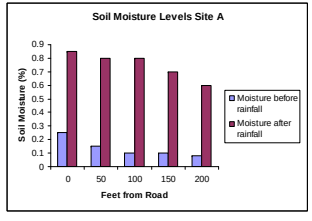
FIGURE 6: Site A after flooding

Results

We calculated the area of Site A to be 281,232 square feet with 20% of the area being impermeable. Site B, we calculated the total area to be 196,346 square feet with 84% being impermeable. Taking the rise of Site A (14 feet) over the run (250 feet), we obtained the slope for Site A to be 5.6%.

Results (continued)

Before a significant rainfall, we tested the soil moisture at Site A when the soil was relatively dry because it had not rained in about 10 days. We then tested the soil moisture after a rainfall and found the soil with the highest moisture content was closest to the road and soil moisture decreased further uphill. Soil saturation combined with previously mentioned factors may cause the flooding in that area because the soil absorbs less because it is more saturated.



Conclusions

Our original thinking was that there was a significant impermeable area in Site A that would not allow for the absorbtion of rainfall. After viewing the results Site B had a higher percentage of impermeable land, but less flooding. We were unable to thoroughly compare the two sites because of the size of the areas. Our calculations for total impermeable area of the study regions may be off slightly due to possible misconception of the satellite image. A step further in this project would be to find possibilities to help reduce the flooding in the main study region.

Acknowledgements

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