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STORMWATER MANAGEMENT THROUGH LOW IMPACT DEVELOPMENT STRATEGIES

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ABSTRACT:

Stormwater is the surface water runoff in abnormal quantity resulting from heavy rainfall and snow. The management of stormwater is very important because if it is not done correctly, it may lead to water borne diseases like malaria, diarrhoea etc.As such, stormwater runoff is a huge contributor to waterway pollution, and it is the responsibility of industries and other private and commercial entities to maintain stormwater compliance in line with local laws and guidelines. Low Impact Development techniques if executed properly, may have a profound effect on the control strategies of such disaster. Stormwater management is also crucial to prevent local flooding and land erosion. LID strategies like rain garden, etc etc have been shown to reduce the stormwater runoff volume and at the same time decrease the runoff velocity.

Keywords: *Stormwater management, Low impact development, runoff volume, rainwater.*

I.INTRODUCTION:

Stormwater management has become very important these days, as nowadays, especially in urban areas, where there surface is impervious that is the rainwater cannot percolate through the surface, therefore the importance of stormwater management is of high importance. This paper covers the various techniques involved in stormwater management, specifically stressing on the **"LOW IMPACT DEVELOPMENT TECHNIQUE"**which is an alternative land development approach for managing stormwater that has been recommended instead of traditional stormwater management techniques.

LID OVERVIEW

Low impact development (LID) is a green approach for storm water management that seek to imitate the natural hydrology of a site using decentralized micro-scale control measure by achieving water balance . LID emphasizes the use of small scale, natural drainage features integrated throughout the city to slow, clean, infiltrate and capture urban runoff and precipitation, thus reducing water pollution, replenishing local aquifers and increasing water reuse.

The main principle of LID is as follows:

- Integrate stormwater management strategies in the early stage of site planning and design
- Manage stormwater as close to the source as possible with the some distributed micro-scale practice

- Encourage and implement environmentally friendly design
- Promote natural hydrological features a hydrologic multifunctional landscape
- Mainly focus for the construction and remediation
- Reduce costs for the construction and maintenance
- Empower communities and societies for environmental protection through public education and participation.

Some of the techniques involved in Low Impact Development method are as follows:

- Rain gardens
- Sand filters
- Infiltration trenches
- Bioswales
- Permeable pavement
- Cisterns
- Rain barrels
- Green roofs
- Detention ponds

Rain gardens

A Rain Garden or "bio retention basin" is a vegetated depression in an urban landscape that collects, treats, and recharges storm water into the ground. Because it is a garden as much as it is a treatment area, the basin is usually cultivated with native, ornamental plant species

Sand filters

A sand filter, or "filtration basin", is a storm water quality treatment system that works by using a two-component clarification system: the first is a sediment fore bay for settling large particles and the second is a horizontal layer of coarse grained soil that acts as a screen.

Infiltration trenches

Infiltration trenches are linear ditches that collect rain water from adjacent surfaces, and their highly permeable soils allow the water to quickly seep into the ground.

Bioswales

Bioswales are linear, vegetated ditches which allow for the collection, conveyance, filtration and infiltration of storm water. The can also be referred to as "grass swales," "vegetated swales," or "filter strips."

Permeable pavement

Permeable pavements are alternatives to traditional concrete and asphalt that allow the rain that falls on the surface of the material to pass through and infiltrate into the ground below.

Cisterns

Cisterns are large tanks that store rainwater collected from impervious surfaces for domestic uses or for consumption.

Rain barrels

A rain barrel is a small, aboveground storage tank that collects rainwater from rooftop gutter downspouts, and stores it for use in the garden

Green roofs

Green Roofs, also known as "vegetated roofs" or "eco roofs," reduce the effects of urban storm water by turning impervious rooftops into water-absorbing green space.A large percentage of urban land is covered by impervious surfaces such as roads, parking lots, and rooftops. These surfaces prevent rainwater from infiltrating into the ground, causing it to accumulate quickly on the surface. Since most of these urban land parcels do not have green space available for infiltration, there is a need to create it. One way to do this is to remove the buildings and pavement that cause the problem. This is not always practical, so the alternative is to generate green space on the roof tops by installing Green Roofs.

Detention ponds

A detention pond, or "detention basin," is a large, constructed depression in an urban landscape that receives and stores the storm water runoff from large drainage areas. Detention basins usually hold a permanent pond of water, and are sometimes called "wet basins". Similarly, a retention basin is a depression that also collects and slowly releases storm water from large drainage areas. However, a retention basin is different because it is not permanently covered with standing water. The attribute gives them the name "dry basins." A rain garden is a type of small retention basin.

II.CONCLUSION

It is therefore quite evident from the previous studies that LID strategies may have the potential to curb the stormwater problem, at least at a community level. Of all the LID techniques it can be observed that the "cistern technique" , "rain barrels" and "green roof technique", can be widely used in individual dwelling houses. Bioswales, infiltration trenches, sand filters, detention pond require a huge space therefore they cannot be used in domestic purposes but they are very popular in industries and community parks. Rain gardens can be used in domestic as well as industries. As for the permeable pavement, these may bebe practiced in open areas, as they can provide multiple purposes like a pathway for the pedestrians to walk upon. Hence. It can be concluded that

using the above mentioned techniques may be employed in order to effectively overcome the daily problems related to stormwater management in urban localities.

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