# *Simulating the Effects of Low Impact Development Features in the Little River Watershed for Flood Mitigation*

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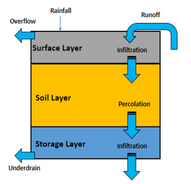
## BACKGROUND

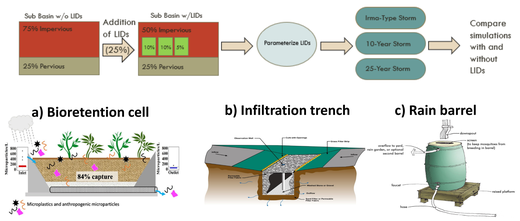
Floods are not an uncommon occurrence in Miami. With the addition of sea level rise, hurricanes, and low elevation, stormwater management is becoming critical. Low Impact Developments (LIDs) have been considered as a solution to reduce runoff. LIDs use man made natural environments to reduce impervious areas and increase water infiltration. The Little River Watershed (C-7) is one of the most flood prone areas in Miami, so this is where LID implementation will be focused. My objective is to simulate the effects of LID features in flood prone sub basins in the Little River Watershed and determine their impacts on flood control for stormwater management.

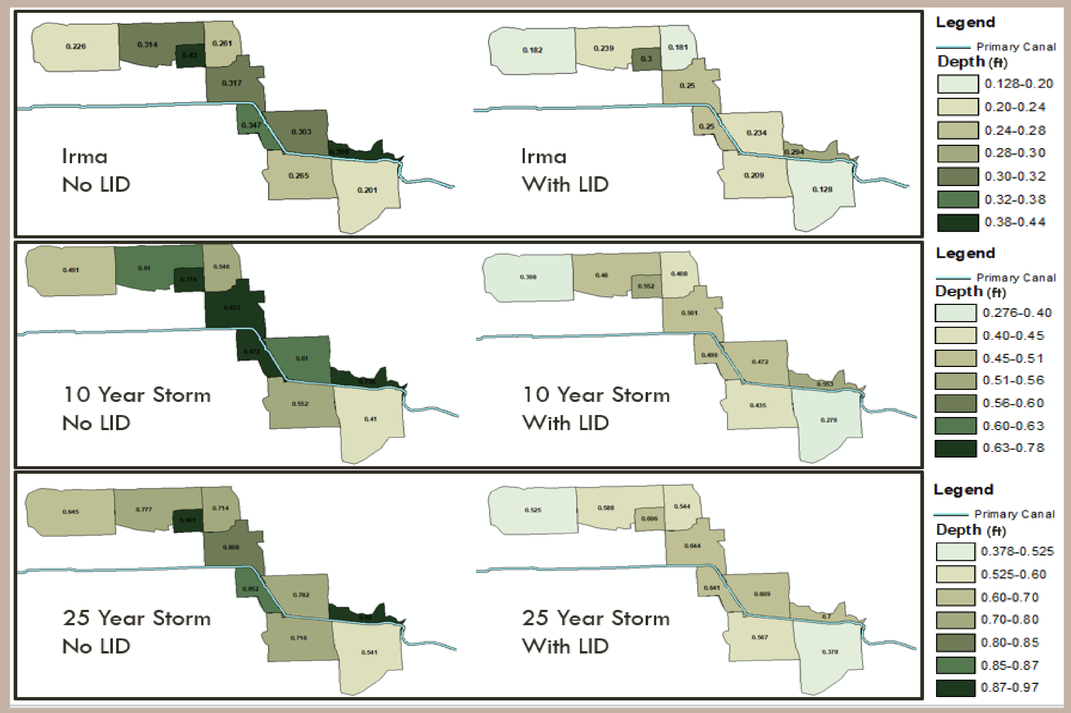
Flooding around Miami
Sources: redcross.org; weather.com

## METHODS

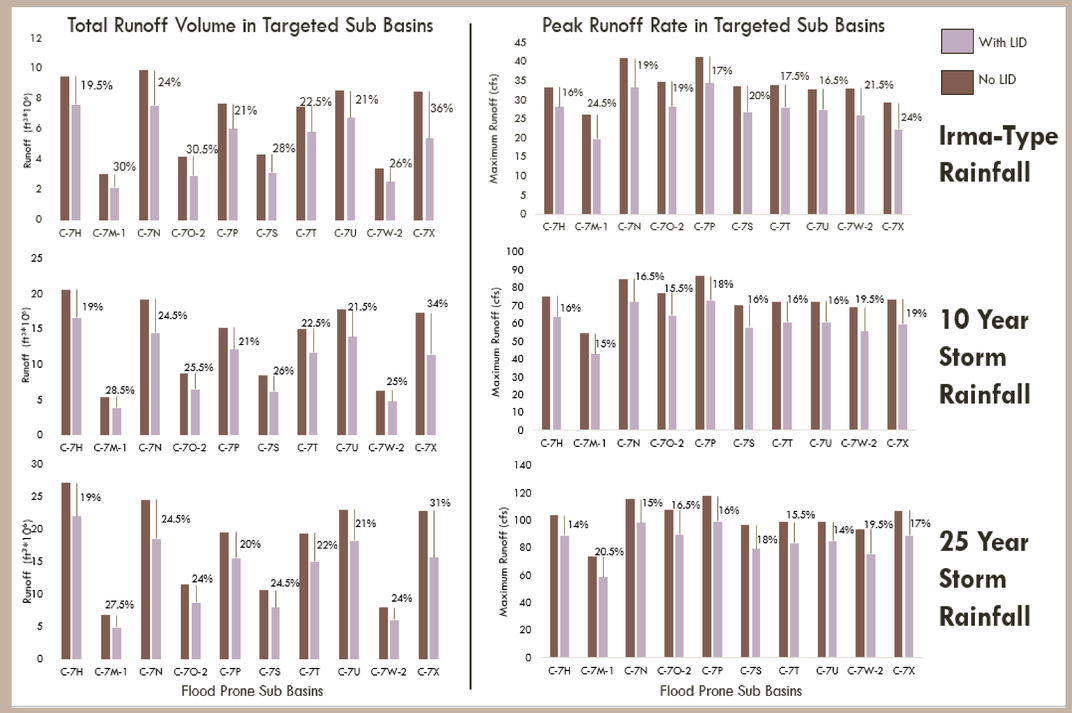
LIDs were simulated in a calibrated 2017 Little River model in PCSWMM.
Before modeling, different LID designs and elements were reviewed via literature. a) Bioretention cells, b) infiltration trenches, and c) rain barrels were chosen to be implemented in the flood prone sub basins of the model and simulated with 3 different storm scenarios to test the effectiveness of LIDs during varying amounts of rainfall.



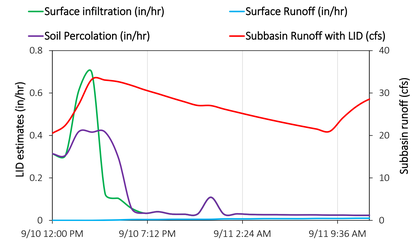




**LIDs showed a 20-30% reduction in total runoff and a 15-25% reduction in peak runoff in flood prone sub basins**




## How do LIDs work?

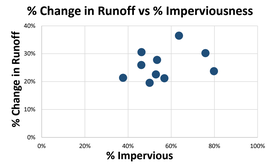



The graph above comes from a bioretention cell modeled during the Irma rainfall scenario. Each layer in the LID plays an important role in mitigating runoff. The surface layer is infiltrated first, then the soil layer. Lastly, runoff is produced from the LID after both layers have been filled.

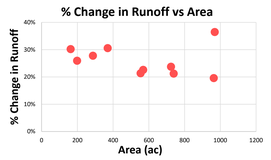
## What drives the variation in runoff reduction between sub basins with and without LIDs?

A sensitivity analysis was conducted to determine if the following variables had an impact on runoff reduction in flood prone sub basins.

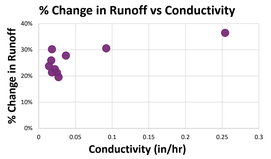
- Area
- Percent Imperviousness
- Conductivity




% Imperviousness showed slight correlation to % change in total runoff.




There is slightly negative correlation between area and % change in runoff.




There appears to be no correlation between conductivity ($K_s$)and % change in total runoff.

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