GREATER HOUSTON FLOOD MITIGATION CONSORTIUM

3 Fact Sheet
WHAT IS A DETENTION BASIN?

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Stormwater detention basins collect and temporarily store stormwater, while releasing lesser amounts, lowering the risk of flooding downstream. Detention is not to be confused with retention which retains stormwater indefinitely.

These basins are large excavated areas, designed to remain empty except for during large storm events, or are designed to have a permanent shallow pool of water with capacity above the normal water level to store stormwater.

Why Do We Need Detention?

Impervious surfaces, such as roads, homes, and parking lots, increase the rate and volume of stormwater runoff during storms, which can cause flooding downstream. Detention captures and stores this additional runoff. It is one of several tools that can be used to mitigate downstream flooding.

Detention in the Houston Area

In the Houston area, detention is created in two ways. **On-site Detention** is built as part of private developments, or public projects (e.g. highway expansions), to mitigate the impact of the development. On-site detention is usually required by city and county development regulations and funded by the developer. Detention basins are the most commonly used solution for detention, but oversized storm sewers or Low Impact Development (LID) practices such as bioswales, rainwater harvesting, and preserving natural habitats to capture and filter stormwater runoff on-site, at the source, can also be used. **Regional Detention** is built by flood control agencies to address flooding on a larger geographic scale, and is funded by taxes or stormwater fees paid by a number of developers. Regional detention is used to reduce existing flooding or help prevent increased flooding from new developments.

How Do Detention Basins Work?

Detention basins are designed to allow for a large amount of inflow to be captured and stored while allowing for a small amount of outflow to be released at any given time. When a storm event occurs, the detention pond fills up and stores water temporarily, reducing flooding and erosion downstream. Runoff enters the basins by flowing in from the surrounding land as overland flow or from a channel or pipe. Water is usually released from the basin by gravity, through an outfall channel or pipe. As the water in the receiving channel drops, more water is able to leave the detention basin, until it is emptied or restored to its designed pool level. Unlike most large federal flood control facilities, detention basins do not usually have adjustable gates or valves; the basins fill and empty based on the size of inlet and outlet channels and pipes.

How Do We Determine the Size of a Detention Basin?

The size of a detention basin can be determined using flow hydrographs, which show water flows in and out of an area over time. Detention basins serve to slow down runoff into a river, stream, or bayou by releasing water more slowly, thereby reducing peak flow rates which cause receiving streams to overflow.

Detention basins hold certain volumes of water, calculated for peak flowrates to match pre-development levels. They are typically designed to hold water for 24hr rainfall events, but different duration goals affect the size of the detention basin. Other factors that affect the design volume include rain intensity, size of drainage area, and Low Impact Development practices. Once required detention volume is determined, the width, length, and depth of the basin can be designed.

Figure 1 On-site Detention

Figure 2 Regional Detention

KEY POLICY QUESTIONS

Are current detention standards enough for new developments?

Where do we need more regional detention?

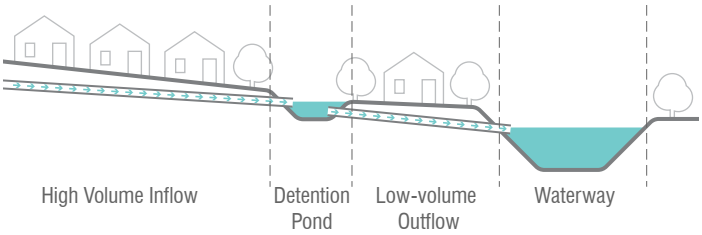

Figure 3 Detention Diagram

KEY TERMS

Stormwater Runoff is water that flows over ground surface into drainage areas. Increased pervious the land means less stormwater runoff and more rainwater absorbed. Increased development means increased impervious surface, creating more runoff and less rainwater being absorbed.

Flowrate is the volume of water that passes per unit of time (ft3 or cfs). The smoother the ground cover (e.g. concrete), the faster the flowrate.

Hydrograph is a graph of variable flowrate over time at a given location

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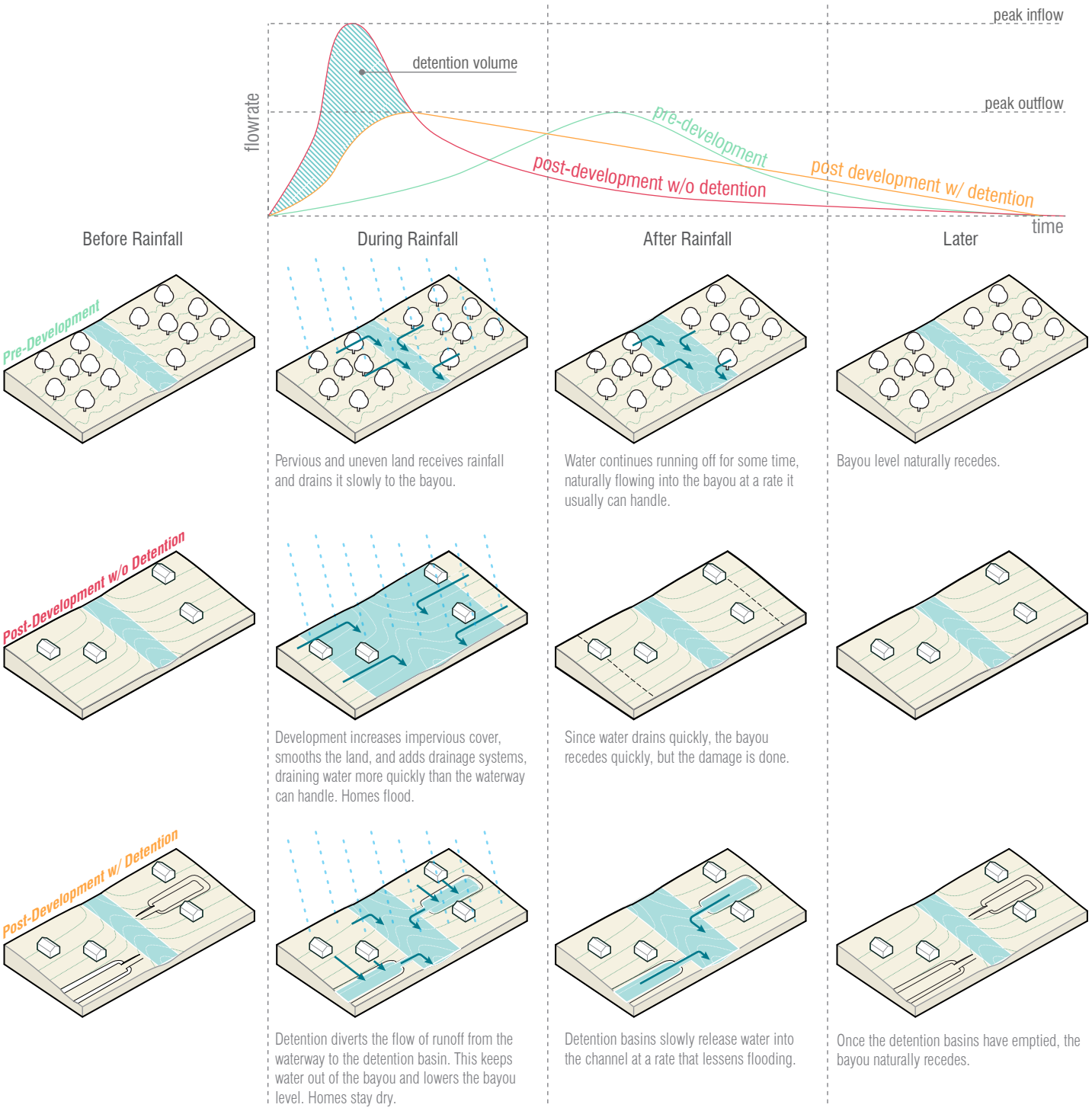

Figure 4 Flowrate Matrix

For More Information Visit

H-GAC LID Resources
h-gac.com/community/low-impact-development

Greater Houston Flood Mitigation Consortium
HoustonConsortium.com