Sustainable Water Resources Management Plan
City of Winter Haven, Florida

The City of Winter Haven has hired PBS&J to develop a Sustainable Water Resources Management Plan for the Peace Creek watershed. The primary objective of the plan is to preserve and protect the surface water and groundwater resources of the city for human and environmental use. The backbone of the plan is an interconnected, hydrologic network of lakes, canals, wetlands, aquifers, open spaces, and parks, designed to meet the long-term water resource needs of the entire community, including supply (water quantity), treatment (water quality), flood protection, and the preservation of natural resources. The plan is an investment in the City's *natural* infrastructure— preserving and enhancing the innate ability of the watershed's unique landscape to provide multiple water resource benefits—as opposed to *engineered* infrastructure. Using the natural infrastructure to provide these benefits will in the long-term result in a less costly, more efficient water storage and delivery system for all future uses. In contrast, the hydrologic system is currently operated to meet the flood protection needs of the stakeholders living along the Peace Creek Canal.

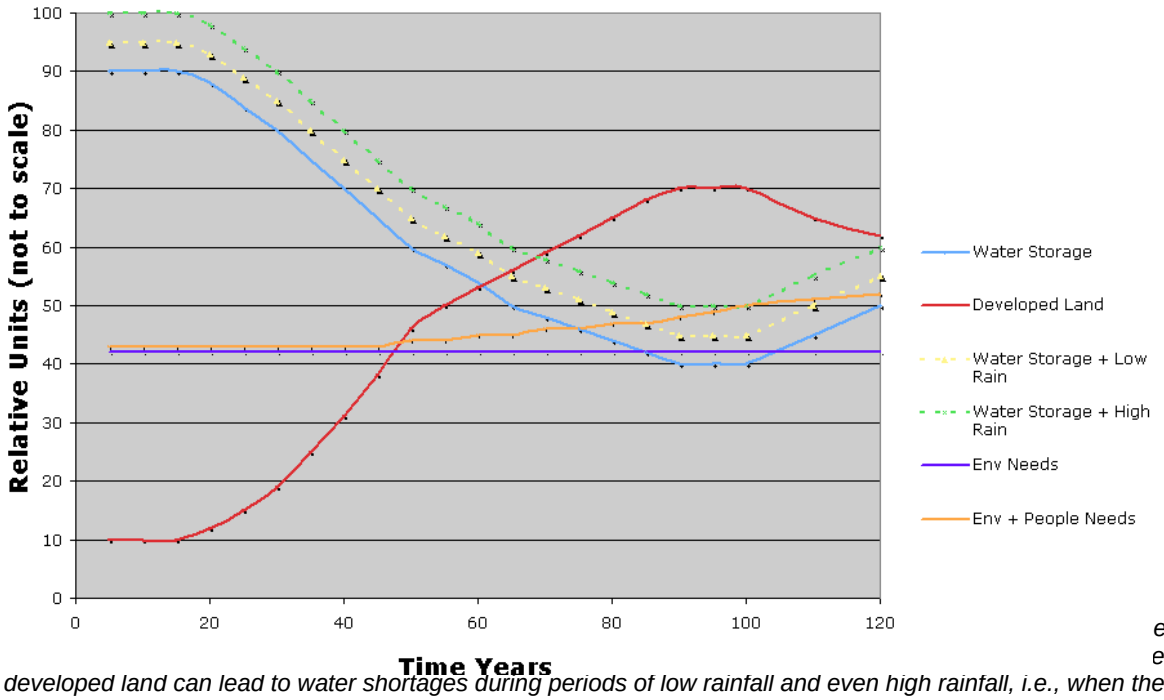
On February 18-20, 2009, PBS&J convened a number of "one-on-one" meetings with over 20 key stakeholders in the community, including Community Development and public works staff from the City and Polk County, members of the Lakes Advisory Committee, concerned citizens, and staff from the Southwest Florida Water Management District and the Lake Region Lakes Management District. The stakeholders provided key insights into a) how water historically moved through the watershed; b) how the watershed was drained by the Peace Creek Drainage Canal in 1925 for agricultural development and subsequently for improved navigation, followed by stormwater improvements associated with urban development; and c) how new development, especially in the southern third of the watershed, might result in further dewatering of the watershed.

The City is located at the headwaters of the watershed's surface water and groundwater systems. To make use of these resources, the City must capture the water before it leaves the watershed. Historically, the area south of Lake Hamilton was a wetland slough and broad floodplain, much like the Everglades, that held vast quantities of water (**Figure 1**). With the construction of the Peace Creek Drainage Canal and canals connecting many of the lakes, water levels in the lakes and the surrounding surficial aquifer have been reduced by approximately 10 feet over the last 90 years.

The ability to recharge the lakes and surficial aquifer has also been compromised in downtown Winter Haven by paving over the land for urban development. This area of high aquifer recharge historically helped maintain water levels and water quality in the lakes.

Figure 1. *1856 military map (J.C. Ives), showing Lake Hamilton and the wetland slough and broad floodplain south of the lake, flowing to Peace Creek.*

Restoring the hydrology of the watershed to increase the local storage of water is critical to meeting the long-term water needs of the city. As **Figure 2** shows, the continued drainage of the land to create more developable land decreases the storage of water, which can lead to water shortages during periods of low rainfall and even high rainfall, *i.e.*, when the water demands of humans and the environment exceed the available supply.



e) and e of developed land can lead to water shortages during periods of low rainfall and even high rainfall, i.e., when the water demands of humans and the environment (orange line) exceed the available supply.

PBS&J and the University of Florida used the information provided by the stakeholders to develop a conceptual plan for increasing water storage throughout the watershed (**Figure 3**):

- *In the upper portion of the watershed, which encompasses the downtown area of Winter Haven, rainwater will be directed to rain gardens, swales, and small isolated wetlands to recharge the surficial aquifer and provide water quality treatment. This will increase water levels in the surficial aquifer, increase groundwater flow into the lakes, and increase water levels and the water-holding capacity of the lakes.*
- *The middle portion of the watershed, currently dominated by the Peace Creek Drainage Canal and the Wahneta Farms Drainage Canal, will be transformed into a series of sloughs and floodplains intended to slow the movement of water through the system and provide sediment control. During peak rainfall events, it will be designed to discharge floodwaters very quickly.*
- *The lower, downstream portion of the watershed, encompassing the "southern loop" of the Peace Creek Drainage Canal and the downstream portions of the creek leading to the Peace River, will be transformed into large water storage areas and broad floodplains to manage very large hydraulic loads of water and provide flood attenuation.*

More detailed designs of the various elements of the conceptual plan will be presented to stakeholders in a debriefing workshop on March 27, 2009. PBS&J and the University of Florida will also present two maps identifying the opportunities and constraints for (a) water quality treatment and aquifer recharge (upstream portion), and (b) water storage and conveyance (middle and downstream portions). This information will be used to identify the water-holding capacity (net increase in water storage) of the redesigned, hydrologically restored watershed.

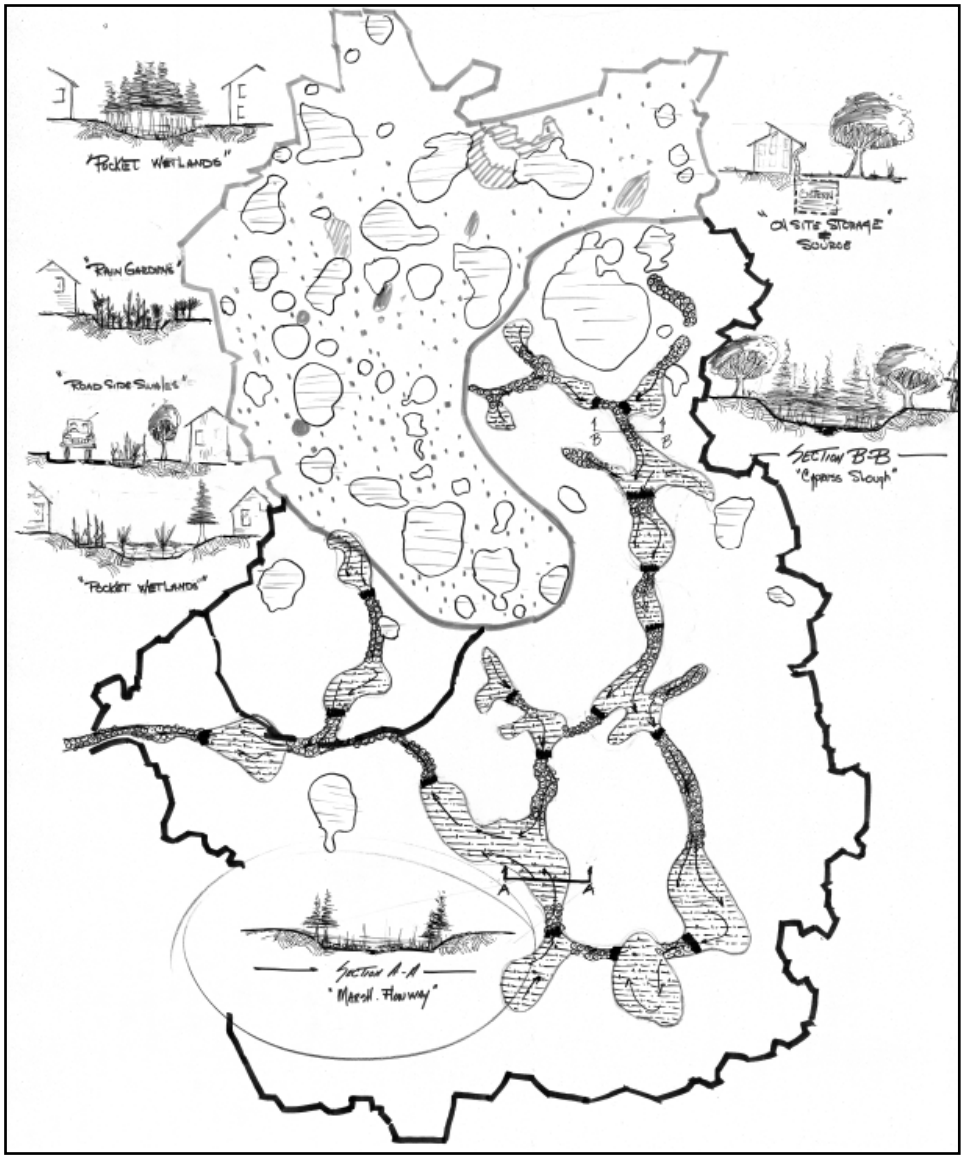


Figure 3. *Draft conceptual plan for increasing water storage throughout the Peace Creek watershed. The inset graphics show cross-sections of projects designed to increase the water-holding capacity of the watershed.*