

A History of Wimbledon Country Drainage

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The Wimbledon Country Section One subdivision located at Kuykendahl and Rayford Road was constructed by land developers with construction plans dated 1973. The streets and storm sewer system were accepted and therefore maintained by Harris County Precinct 4. Regulations for the construction of residential subdivisions by developers in Harris County at that time did not include any requirements for consideration of extreme storm event overland sheet flow paths until the regulations were revised later. Storm drainage systems were required to be designed to handle a 2 year frequency storm event. The current Harris County subdivision design regulations have the following requirement “events which exceed the capacity of the underground storm sewer system and result in ponding and overland sheet flow, shall be routed to drain along street rights-of-way or open areas and through the development to a primary outlet.” Unfortunately, this requirement and standard of practice did not exist for many subdivisions that had been constructed in Harris County during a development boom that occurred in the 1970s. Developed properties with low lying areas that did not have a sufficient natural path for extreme events resulted in frequent flooding of homes. The Wimbledon Country subdivision is a prime example of this. In addition, the Wimbledon Country subdivision has adjacent property to the west that drains downhill into the subdivision. The Wimbledon Country storm drainage system that was designed in 1973 did not consider most of the 174 acres of off-site area draining toward it. *Figure 1* demonstrates the situation.

In 1994, Harris County MUD 35 (the original MUD District in which Wimbledon Country was located) was merged with Harris County MUD 1 for fiscal reasons due to a sluggish economy, high taxes and high interest rates. In 1998 Harris County MUD 1 used condemnation powers to obtain a 30’ strip of property from the adjacent property owner to provide additional drainage protection for Wimbledon Country Section One. A drainage swale and berm was constructed along the western boundary as shown in *figure 2*. The project provided some additional protection, but severe storm events still resulted in flooding of some of the homes in the subdivision.

In 2003, a portion of the adjacent property that drained toward the Wimbledon Country Section One subdivision was purchased for development of the Wimbledon Falls subdivisions. A significant portion of the area redirected drainage toward a new detention basin in the Wimbledon Falls development and then to the drainage channel as shown in *figure 3*. A drainage impact analysis was performed by a hydrologist to confirm the proposed development would not have any drainage impacts on the Wimbledon Country subdivision. The drainage impact analysis and construction plans for the Wimbledon Falls development were reviewed and approved by Harris County and the Harris County Flood Control District.

In October of 2006, the Wimbledon Country subdivision and surrounding area experienced a storm event that exceeded a 10 year frequency event and neared a 25 year frequency storm

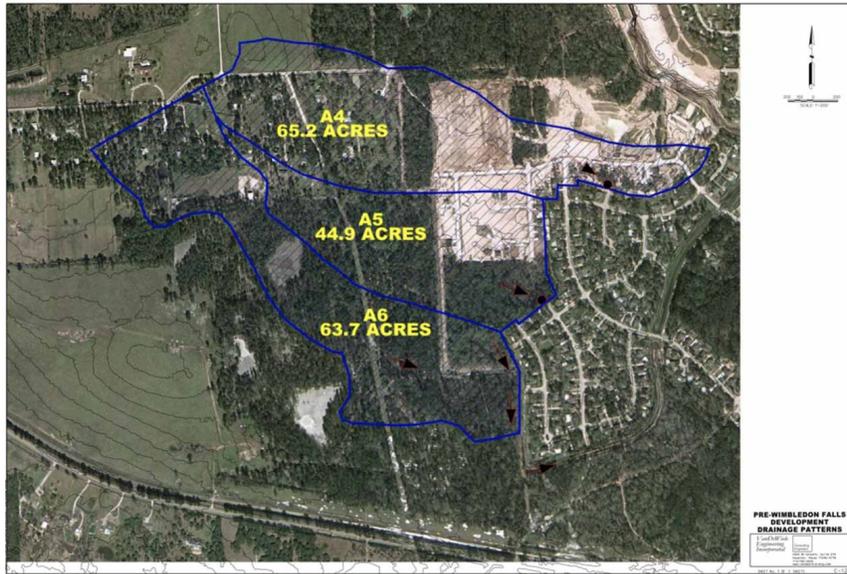


Figure 1: The Wimbledon Country storm drainage system that was designed in 1973 did not consider most of the 174 acres of off-site area draining toward it.

event. Numerous homes in the Wimbledon Country subdivision reported structural flooding. A town hall meeting was held at the Wimbledon Country clubhouse to discuss flooding concerns with the residents. At the recommendation of the District’s engineer, Harris County MUD 1 then funded a project to raise and fortify the existing berm on the west side of the subdivision with articulated concrete blocks to provide additional protection as shown in *figure 4*. This project was completed in December of 2007.

Harris County MUD 1 then also funded a drainage study by one of the most reputable hydrologic and hydraulic engineering firms to provide computer modeling simulations of storm sewer events up to the 100 year frequency storm event using XPSWMMM software. The District’s engineer obtained survey elevations of the house slabs and streets. Lidar topographic survey information was also used for the adjacent property. The following scenarios were modeled:

- existing conditions before the Wimbledon Falls development
- existing conditions as of the date of the study with the Wimbledon Falls subdivision partially developed
- seven iterations of proposed drainage improvements to the Wimbledon Country Section One subdivision along with completed final development of the Wimbledon Falls subdivision.

Harris County MUD 1 then used the study to design and construct a drainage improvement project consisting of an extension of the existing drainage channel, a storm sewer relief pipe with outfall to the extended drainage channel and larger inlets and storm sewer pipe on Rain Creek Drive as shown in *figure 5*.



Figure 2: A drainage swale and berm was constructed along the western boundary.

The computer modeling of the Wimbledon Country subdivision with these drainage improvements and the raised articulated concrete block berm indicates all homes are protected from structural flooding up to the 100 year storm event which is consistent with the current regulations of Harris County. The following is a summary of the results of the computer modeling:

100 Year Storm Existing Conditions (Pre-Wimbledon Falls development)

20 houses sustained hypothetical storm water damage

100 Year Storm Existing Conditions (October 2006 partial Wimbledon Falls development)

11 houses sustained hypothetical storm water damage

100 Year Storm Existing Conditions (After Berm Improvements)

4 houses sustained hypothetical storm water damage

100 Year Storm Proposed Conditions (Includes proposed improvements)

0 houses sustained hypothetical storm water damage

The total cost for the drainage improvements, raised articulated concrete berm, land acquisition for the drainage channel extension, drainage study, and engineering was just over \$1,500,000. The project was completed in November of 2011.

On April 18, 2016, the Wimbledon Country subdivision and surrounding area experienced a storm event that exceeded a 100 year frequency event. Several homes experienced flooding during this event. The following graphic shows the magnitude of rainfall of several historical storm events as measured by the nearest Harris County Flood Control District rain gage at Willow Creek and Kuykendahl Road. See *figure 6 & 7*.



Figure 3: A significant portion of the area redirected drainage toward a new detention basin in the Wimbledon Falls development and then to the drainage channel.

Conclusion

The drainage improvements completed by the MUD in November 2011 have resulted in the Wimbledon Country subdivision being protected up to a 100-year flood event (which is the current requirement for a development in Harris County). At this time there are no further drainage improvement plans for the subdivision.

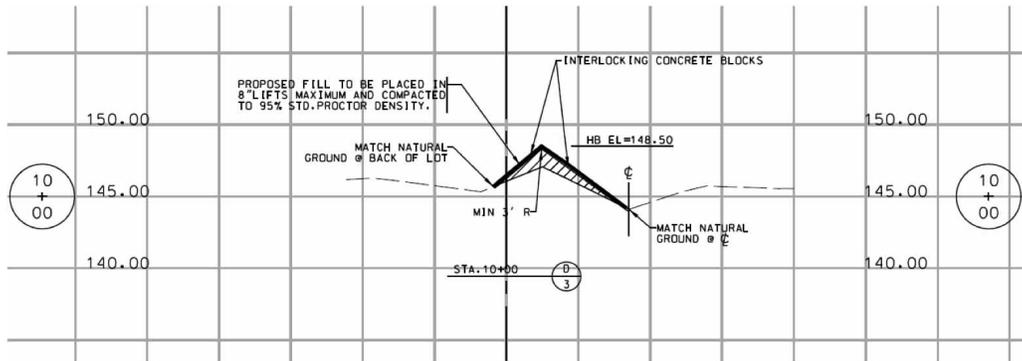


Figure 4: Harris County MUD 1 funded a project to raise and fortify the existing berm on the west side of the subdivision with articulated concrete blocks to provide additional protection.

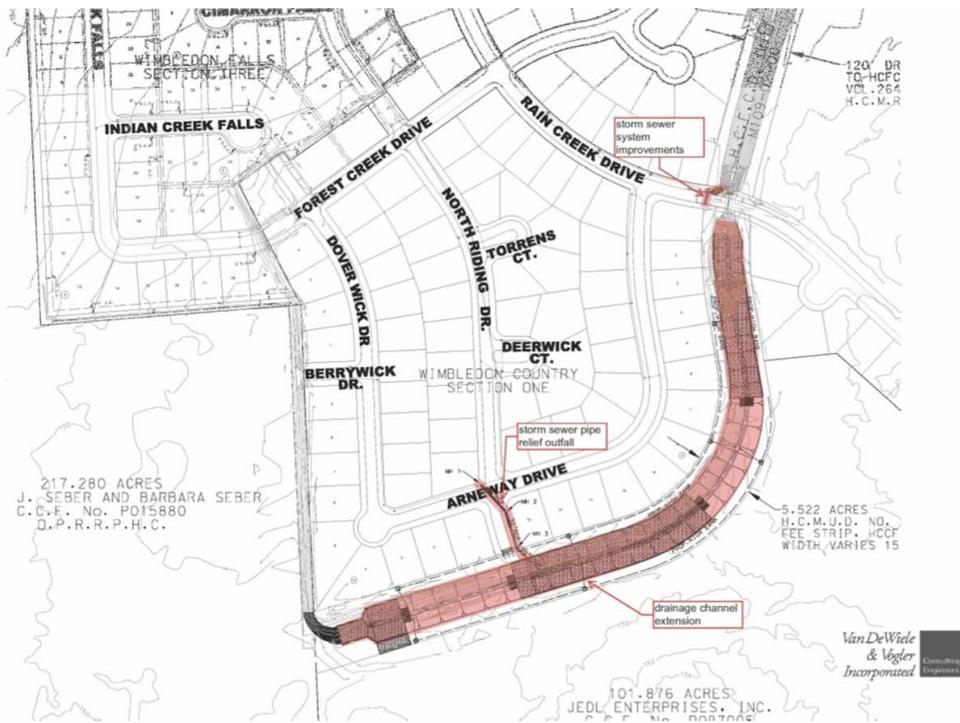


Figure 5: Drainage improvement project consisting of an extension of the existing drainage channel, a storm sewer relief pipe with outfall to the extended drainage channel, larger inlets and storm sewer pipe on Rain Creek Drive.

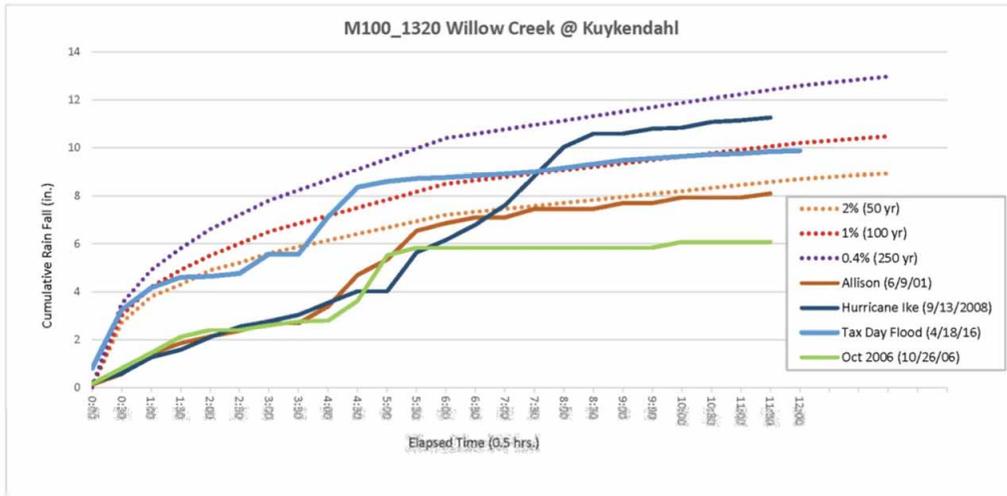


Figure 6: Harris County Flood Control District rain gage at Willow Creek and Kuykendahl

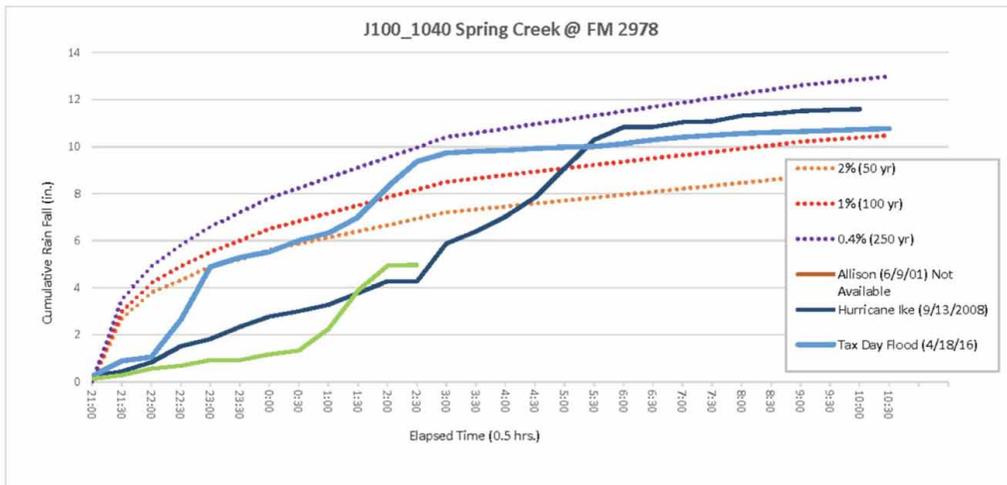


Figure 7: Harris County Flood Control District rain gage at Spring Creek and FM 2978