# St. Lucie West Services District

STORMWATER DRAINAGE SYSTEM

## SLWSD Storm Water System Design

- Permitting of all South Florida development projects is governed by the South Florida Water Management District (SFWMD) under Part IV of Chapter 373, F.S., and Chapters 40E-4, 40E-40, and 40E-400, F.A.C.
- <u>Minimum Road Crown</u> The minimum road crown must be set at the minimum elevation produced by a 5 year, 1 day rainfall event which is approximately 5.5 inches in St Lucie West, or a minimum of 2 feet above the controlled water surface of the lake system, whichever is higher.
- What this means is, once the ground is saturated and runoff occurs, water begins to accumulate in the wetland and lake system within a particular stormwater basin. The lowest centerline elevation of a roadway must be set such that the total accumulation of water in the system does not rise above the center of the roadway. Under these rainfall conditions, a resident could look outside and see water standing in the curb lines. The maximum depth above the curb could be between 2 and 6 inches depending on whether the roadway was a two or four lane facility. The water in the road would extend from the curb line, up the asphalt, to the center of the road at the low points but for the most part, the center of the roadway would be above water.

#### SLWSD Storm Water System Design Cont.

- In general, the roadways in the older neighborhoods such as Country Club Estates and Heatherwood were set using the minimum 5 year, 1 day storm event criteria. Most of the newer neighborhoods used a 10 year, 1 day rainfall event of approximately 6.5" when setting their minimum road elevations. Therefore, the depth of water in the streets in the newer neighborhoods would not be as high as in the older areas given similar rainfall conditions. It should be noted that the overall St Lucie West community is large and the rainfall experienced in one area of the community can and will be significantly different across the various neighborhoods.
- <u>Design Storm</u> The design storm is the theoretical storm used in the designer's calculations to determine the size of the discharge structures and elevation of the perimeter berm to be placed between each Basin. The SLWSD water management system has numerous drainage basins and the elevations maintained in the lakes vary from 24.50 NGVD along I-95 on the west, to 18.50 NGVD along the Turnpike on the east.
- The design storm for St Lucie West is a 25 year, 3 day rainfall event which is approximately 11 inches. When subjected to this amount of rainfall over a three day period, water in the lake rises out of the lake banks and can produce elevations that cover the streets and a large portion of the yards and green space within a neighborhood. Once standing water reaches this level, it is allowed to flow offsite in whatever direction is available. In the case of St Lucie West, the flow is from Basin to Basin from west to east with water ultimately being discharged to the Turnpike along the eastern boundary of the project.

#### SLWSD Storm Water System Design Cont.

- <u>Finished Floors</u> Finished floor elevations are required to be set at, or above, the elevation produced by a 100 year, 3 day, zero discharge, rainfall event which is approximately 13 inches in this area. As can be seen from the explanation under the design storm above, once water elevations reach Basin divide berm height, water is free to exit the development, so the elevation produced by the 100 year zero discharge calculations may or may not occur depending on conditions surrounding the project site.
- The other criterion that is applied when setting the minimum finished floor is a minimum height above the road crown directly in front of the home or building. The minimum height is 18 inches on lots that have the ability to drain to the front and back such as lots that back up on lakes or wetlands, but can be higher on lots where the only way to drain is from the back to the front. If that condition exists, a minimum height of 24 inches above the road crown is generally used. Based on the different criteria, it is not uncommon to have some homes in a neighborhood that are significantly higher than others and therefore more prone to water in the street and yard around their home.
- The minimum finished floor elevation applies to habitable floors only and not to garages. If the minimum finished floor for a home located at or near the low point in the street is not set above the minimums, standing water could <u>encroach within the garage</u> and still not flood the home in the strictest interpretation of the code.

# Monday 8/27/2012 1:41 P.M.





## Emergency Management SFWMD Rainfall Predictions for Tropical Storm Isaac

- Thursday August 23, 2012 Emergency Management projects 4-8" of rain throughout the event
- Friday August 24, 2012
   Emergency Management
   projects 1-2" of rain throughout
   the event
- Sunday August 26, 2012
   Emergency Management
   projects 2-4" of rain throughout
   the event

#### Email from the SFWMD on Friday, August 24, 2012

"Thanks for the update Bill! Looks like we will get more rain out of the afternoon thunderstorms than out of Isaac this weekend"

## **SLWSD Storm Preparations**

#### **Thursday August 23**

The District received permission from SFWMD to lower water levels to control elevation at all exterior gates. This directive was based on SFWMD's forecast that the District could receive between 4-8 inches of rainfall.

- Gate #1 level was 19.7 control is 18.5.
- Gate #2 level was 19.0 control is 18.5.
- Gate #3 level was 18.9 control is 18.5.
- Gate #4 level was 20.0 control is 18.5.
- Gate #5 level was 19.0 control is 18.5.
- Gate #6 level was 18.6 control is 18.5.
- Gate #7 level was 22.0 control is 22.0.
- Gate #8 level was 25.0 control is 24.5.

#### **SLWSD Storm Preparations Cont.**

#### Friday August 24,

- The District received an advisory from the City Emergency Management office to expect 1-2 inches of rainfall and exterior gates were returned to control elevation allowing water to continue flowing, if lake levels were over control.
- Country Club internal lake levels were lowered to 1 foot below control thereby creating additional lake storage in anticipation of the storm.

#### **SLWSD Storm Preparations Cont.**

#### Sunday August 26,

- The District participated in a SFWMD Emergency Management teleconference call and was informed that we could expect 2-4 inches over the event.
- The District ultimately received 5.86" of rain on Sunday.
- Gate #1 level was 20.0 control is 18.5.
- Gate #2 level was 18.5 control is 18.5.
- Gate #3 level was 18.5 control is 18.5.
- Gate #4 level was 19.8 control is 18.5.
- Gate #5 level was 17.9 control is 18.5.
- Gate #6 level was 18.5 control is 18.5.
- Gate #7 level was 21.5 control is 22.0.
- Gate #8 level was 24.4 control is 24.5.



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# Forecast Total Rainfall Accumulations (Friday Through Monday)



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## **SLWSD Storm Preparations Cont.**

#### Monday August 27,

- By 6:30 A.M. the District had received an additional 4.9" of rainfall over what was recorded on Sunday and the system was in relatively good shape with minor road flooding in Country Club.
- All exterior gates were opened to the maximum setting of 24" below control to allow the largest volume of water to exit.
- At 9:30 AM we started receiving heavier rain that continued until 5:00 P.M. recording an additional 5.12".
- The total rainfall recorded by an electronic rain gauge for the 24 hour period was 10.02".
- The two day rainfall total recorded Sunday and Monday was 15.88".
- The Country Club Golf Course recorded 15.03" of rainfall for the two days and stated that had the electronic rain gauge not malfunctioned at 9.23" it would have collected an additional 1.5 to 2" of rainfall.

#### Monday August 27,

Gate Readings at 7:30 A.M. Monday August 27

- Gate #1 level was 20.4 control is 18.5.
- Gate #2 level was 19.8 control is 18.5.
- Gate #3 level was 19.8 control is 18.5.
- Gate #4 level was 20.1 control is 18.5.
- Gate #5 level was 19.5 control is 18.5.
- Gate #6 level was 19.1 control is 18.5.
- Gate #7 level was 23.1 control is 22.0.
- Gate #8 level was 25.4 control is 24.5.

#### **SLWSD Post Storm Activities**

#### **Tuesday August 28**,

- Staff met with the City Manager and John Dunton at 2:00 A.M. at which time the City Manager gave us word that the Elkam Canal had capacity to take additional water and we could set up pumps to expedite the removal of flood water.
- The City offered personnel to assist in the setup and worked beside our personnel to set up two pumps next to storm water Gate #2. Pumping from this location would lower the Lake Forest, Enclave and Country Club Subdivisions the quickest.
- At 9:00 A.M. Tuesday morning we received two additional pumps, one of the pumps was staged next to Gate #2 and the other was set south of Home Depot which is next to Gate #3 to assist in lowering water levels at the Cashmere and SLW Blvd intersection and also Lake Forest Pointe.
- The Turnpike Authority shut the District's pumping activities down Tuesday morning. The City worked with us to get the Turnpike Authority to allow us to continue.

# SLWSD Post Storm Activities Cont.

#### Wednesday August 29,

- The District had a portable pump installed at the triangle lake next to Cashmere Blvd which helped to lower the water in both Cashmere and Country Club. The water was pumped into the Lake Forest Pointe storm water system.
- The District set up an additional pump at Gate #6 to speed the removal of storm water from the north west side of the Cascades Subdivision.

## **Storm Comparisons**

- Tropical Storm Isaac ultimately produced over 15.88" of rain in two days and was projected by all Emergency Agencies to be a minor rain generator
- Tropical Storm Fay produced 13.1" of rain over a two day period and was projected to be a heavy rain generator.

#### **Storm Comparisons**

- During Tropical Storm Fay, 31 of the 53 District lift stations received high flows resulting in high level alarms.
- During Tropical Storm Isaac, 10 of the 53 District lift stations received high flows resulting in high level alarms.
- This reflects a vast improvement.

## **Storm Comparisons**

#### Impacts during Tropical Storm Fay

- Residential and Commercial property damage
- Impassable primary and secondary roads for 3-5 days

#### Impacts during Tropical Storm Isaac

- Minimal Residential and Commercial property damage
- Impassable primary and secondary roads for 2-3 days

#### **SLWSD Future Storm Water Recommended Improvements**

- Amend the 2009 SFWMD Permit to allow water levels in perimeter lakes to be lowered below control elevation prior to large storm events
- Create supplementary storage capacity throughout the system where possible
- Install permanent emergency pumping facilities at key locations
- Evaluate existing elevations of some of the flood prone areas
- Evaluate the benefits of changing the Turnpike ditch into a Canal



Possible expansion of storage system