Lemon Bay

WATERSHED MANAGEMENT PLAN

Sarasota County

Southwest Florida Water Management District

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Chapter 6

Flood Protection

August 2010

Sarasota County

Southwest Florida Water Management District

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6.0 FLOOD PROTECTION

The relatively flat and low-lying topography of Sarasota County is inherently flood prone. The Lemon Bay watershed was historically a collection of isolated wetlands and pine flatwoods. This land condition allowed excess water in the wetlands to flow into the pine flatwoods during the cyclical wet season. The creeks likely acted as tidal extensions, receiving minimal freshwater inflows.

Development has changed the natural environment within the Lemon Bay watershed. Increased impervious surfaces throughout the watershed, especially in the heavily urbanized Alligator Creek, Woodmere Creek, and Coastal basins, have decreased the infiltration of rainwater and gutters and storm sewers speed runoff to the channels. As a result, more water runs off more quickly, and drainage systems, including creeks, can become overloaded. The combination of heavy precipitation and an overloaded drainage system can result in flooding. In addition, the Lemon Bay Coastal basin, including Manasota Key and the coastal mainland, is tidally influenced constituting the area a storm surge zone.

The County's goal with regard to flood protection is to minimize flood risk to protect human safety and property in existing developed areas while protecting natural and beneficial functions of the remaining floodplain. This Watershed Management Plan (WMP) does not contain new analyses of flood conditions; instead it provides an overview of flood-protection-related activities. This overview includes a background section followed by a description of the two most significant flood-protection-related policies and programs in the County: the Sarasota County Comprehensive Plan and the Sarasota County Land Development Regulations (LDR).

6.1 BACKGROUND

Historically, the Lemon Bay watershed consisted of pine and palmetto flatwoods with scattered isolated wetlands that sometimes connected during the rainy season. This diverse landscape provided significant flood storage capacity as well as a slow meandering natural flow of water from land to Lemon Bay. Alligator, Woodmere, Forked, Gottfried, Ainger, Oyster, and Buck Creeks acted as tidal extensions of the Lemon Bay estuary. Freshwater inflows were likely limited to surficial groundwater during the rainy season and sheet flow during extremely wet conditions or flood events.

Those natural patterns began to be interrupted and altered during the early 20th century, as the area's population grew and more development occurred. Early residents of the Lemon Bay watershed were plagued by mosquitoes. To alleviate the problem, many ditches were created in the coastal mangroves to extend the natural creeks inland and to connect many of the larger isolated wetlands to the creeks. In addition, many wetlands were filled and impervious surfaces were created to accommodate development. As a result, flood storage capacity was reduced and

flood flows increased in magnitude, raising flood stages and decreasing water quality in our creeks and bays. Since much of the watershed is now densely populated, flooding affects homes, businesses, and agriculture located in the flood plains, especially those areas developed before the adoption of County LDRs in 1981 (Figure 6-1).

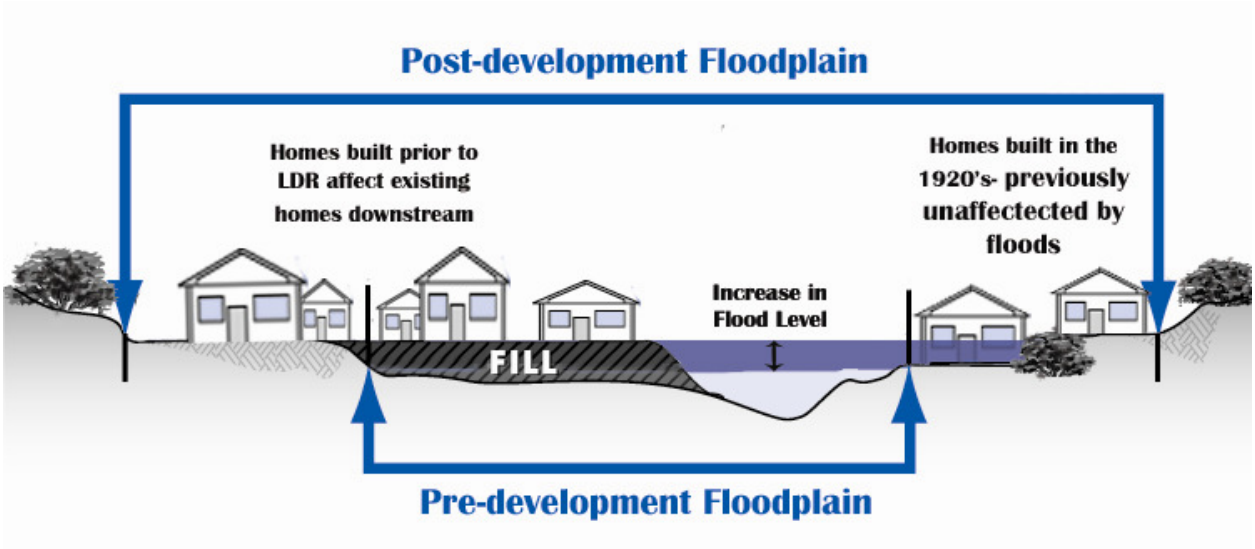

Figure 6-1 Floodplain Changes Schematic
(adapted from *www.dnr.sc.gov*)

Sarasota County recognizes its flooding problems and the need for improvements to the existing system. The County took the first step toward developing a stormwater program in 1981 with the creation of the Stormwater Management Division. The first LDRs were also implemented, requiring stormwater controls to be designed for a 25-year storm (8 inches of rain in 24 hours). In 1987, the Sarasota County Stormwater Master Plan was adopted. The Sarasota County Stormwater Environmental Utility (SEU) was established in 1989 to implement the plan.

By the early 1990s, Sarasota County SEU initiated a countywide basin master planning project to develop hydrologic and hydraulic models to identify problematic flooding areas for all of the County's major watersheds. These models are also used to evaluate possible drainage improvements to the County's stormwater system. The Basin Master Plans for the Alligator, Woodmere, Forked, Gottfried, and Ainger Creek basins were completed between 1987 and 2000 (Appendix A).

In the mid 1990s the LDR were modified to require storm systems designed for a 100-year storm (10 inches of rain in 24 hours). The County also started the first stormwater capital improvement assessments. The County then completed feasibility analyses for projects in problem areas identified in the Basin Master Plans. Several of these projects are included in the County's Capital Improvement Element. By the late 1990s, the SEU Strategic Plan was adopted and revenue bonds were issued to fund stormwater improvement projects. Today, several capital

improvement projects, such as stormwater control structures, retrofit projects, and retention and detention ponds, are occurring throughout the watershed (Figure 6-5).

6.2 FLOOD PROTECTION STATE LEGISLATION AND LOCAL ORDINANCES

The following sections contain excerpts from the Sarasota County Comprehensive Plan. The Sarasota County Comprehensive Plan is an official public document adopted by the Board of County Commissioners to guide decision making related to the physical development of the County. The plan covers legislation that has been adopted, planning studies and mitigation efforts, and levels of service for stormwater quality and quantity.

6.2.1 Legislation

The five Water Management Districts, including the Southwest Florida Water Management District (SWFWMD) were initially created by the State of Florida to control flooding. The Governing Board of the SWFWMD is authorized in Chapter 373 and other chapters of the Florida Statutes to direct a wide range of programs, initiatives, and actions. These programs include such things as flood control, regulatory programs, water conservation, education, and supportive data collection and analysis. SWFWMD's goals flood protection, water quality, and natural systems are:

- To minimize the potential for damage from floods by protecting and restoring the natural water storage and conveyance functions of flood prone areas.
- To protect water quality by preventing further degradation of the water resource and enhancing water quality wherever possible.
- To preserve, protect, and restore natural systems to support their natural hydrologic and ecologic functions.

Sarasota County supports the following state regulations through its Comprehensive Plan and a series of ordinances.

- Chapter 40D-2, Florida Administrative Code, includes stormwater system design criteria.
- Chapter 40D-4 and Chapter 40D-40 FAC, state that the SWFWMD governs surface water permitting and stormwater runoff.
- Chapter 40D-4 limits peak discharge rates for new development. Rules also stipulate that activities affecting floodplains and floodways will not cause adverse impacts, such as increased flooding.

6.2.2 Ordinances

Sarasota County Ordinance No. 81-12, "Land Development Regulations," as amended, provides regulations that guide development as it pertains to the force of flowing water and drainage of runoff. These regulations require that post-development conditions, such as peak stage and discharge, do not exceed those under pre-development conditions for the 100-year storm. Additionally, Ordinance No. 81-12, as amended, requires that new development provide for the treatment of the first 1 inch of runoff. The Water Pollution Control Code, Ordinance No. 96-020, as amended, provides regulations to prohibit discharge to surface water, groundwater, or the stormwater conveyance system that causes pollution.

Sarasota County established an SEU in 1989 (Ordinance No. 89-117, as amended). The SEU is responsible for funding, planning, constructing improvements, and maintaining the County's storm and surface water management facilities.

The Ordinance provides funding for the operation of the Utility by enacting a "user fee." Each parcel of land is charged an annual fee based on the characteristics of the parcel and its relative contribution to stormwater runoff. An associated "credit" program was enacted that enables "credits" to be granted against the "user fee" for properties that maintain their drainage facilities in full-functioning condition. The SEU is also responsible for permitting proposed changes in the watershed.

Sarasota County adopted a floodplain management ordinance (Ordinance No. 2003-085, as amended). This ordinance adopts the current Federal Emergency Management Agency (FEMA) Flood Insurance Study and the Sarasota County Flood Studies. Minimum lowest finished floor elevations for new construction and substantial improvements are required to be either at or above the base flood elevation (BFE) as determined by FEMA or 1 foot above the 100-year flood stages established by Sarasota County.

6.2.3 Flood Protection and Floodplain Management

To protect existing structures with the first habitable floor elevation at or just above the estimated 100-year flood elevation, as required by FEMA and Ordinance No. 92-055, as amended, new developments are required to consider the impacts of a 100-year storm event. Unless properly managed, the increased volume and rate of runoff, as well as the change in timing from upstream new developments, can increase 100-year flood elevations, thus impacting structures built to previously lower flood elevations.

Sarasota County LDR, Ordinance No. 81-12, as amended, regulates development activities within the 100-year floodplain by withholding approval "unless the developer submits substantial and competent evidence that all lands intended for use as building sites can be used safely for building purposes, without undue hazard from flood or adverse soil or foundation conditions." In

addition, the LDR requires that the applicable basin flood prediction model be used as the basis of review to ensure that development proposals of 35 or more total acres or 8 acres or more of impervious surface will not result in an adverse increase in off-site flood stages.

Since Fiscal Year 1993, the Capital Improvement Program (CIP) contained funding for projects throughout the County. This program is well underway and is directed at addressing flood protection level of service (FPLOS) deficiencies. FPLOS deficiencies include flooded homes and businesses as well as flooded streets. To date, the primary focus of the stormwater improvement program has centered on flooded homes and businesses, with a secondary focus on street flooding. As this program reaches a point of diminishing returns in terms of addressing flooded buildings, it is likely to focus more on remaining street FPLOS deficiencies.

6.2.4 Planning Studies and Efforts

The drainage plans and programs from the early 1920s through the 1960s emphasized the removal of surface waters from the land, primarily for mosquito control and agricultural uses. Concern for water quality did not begin emerging as a major concern until the late 1960s.

In 1972, U.S. Public Law 92-500, the "Federal Water Pollution Control Act," was enacted to focus on non-point pollution. The program, managed by the Southwest Florida Regional Planning Council, made recommendations for improving surface water quality of the County

In 1984, the Board of County Commissioners recognized major inadequacies in the existing stormwater management system and authorized the preparation of a Stormwater Master Plan. The purpose of the Stormwater Master Plan was to assess the need for improving major drainage systems in the developed portions of the County. The objectives of the plan included:

- Assessing the adequacy of primary stormwater conveyance systems in developed or developing basins.
- Estimating the cost for public stormwater improvements as watersheds are developed to ultimate use.
- Prioritizing stormwater management needs of each basin within a framework of the needs within the entire County.
- Developing a plan or identifying options available to the County for financing the cost of construction, operation, and maintenance of stormwater management facilities.

The report, released in February 1987, analyzed selected portions of Alligator and Phillippi Creeks. The analysis of these two basins included identifying problem areas, describing alternative solutions, and recommending actions. This information was extrapolated to the 14 remaining basins within the study area to provide cost estimates for stormwater improvements that could be implemented in these watersheds.

The County began the Basin Master Planning Program in 1991 when the Board of County Commissioners authorized the preparation of detailed basin master plans for Phillippi Creek and Hudson Bayou. The planning process include developing runoff hydrographs and water surface profiles for existing and future (2010) land uses for 2-year, 5-year, 10-year, 25-year, and 100-year/24-hour storm events for each basin. Each Basin Master Plan also identifies improvements needed to the County drainage systems to meet the adopted level-of-service (LOS) standards within the basin.

As of December 2004, the following studies have been completed or are under contract (Figure 6-2):

1. Whitaker Bayou – approved December 2003
2. Hudson Bayou – approved September 1994
   Business District – approved March 2002
3. Phillippi Creek – approved December 1994
4. Matheny Creek – approved September 1994
5. Elligraw Bayou – approved August 1994
   Holliday Bayou – approved August 1997
   Clower Creek – approved March 1994
6. Catfish Creek – approved July 2001
7. North Creek – approved April 1999
8. South Creek – approved June 2001
9. Shakett Creek – approved October 2001
   Fox Creek – approved June 1999
   Cow Pen Slough – approved October 2001
10. Curry Creek – approved July 2001
11. Hatchett Creek – approved July 2001
12. Alligator Creek – approved March 1987
13. Woodmere Creek – approved January 1999
14. Forked Creek – approved March 1996
15. Gottfried Creek – approved March 1996
16. Ainger Creek – approved July 1999
17. Braden River – under contract
18. Lower Myakka River – approved February 2004
    Upper Myakka River – under contract
19. Deer Prairie Slough – under contract
20. Big Slough – under contract

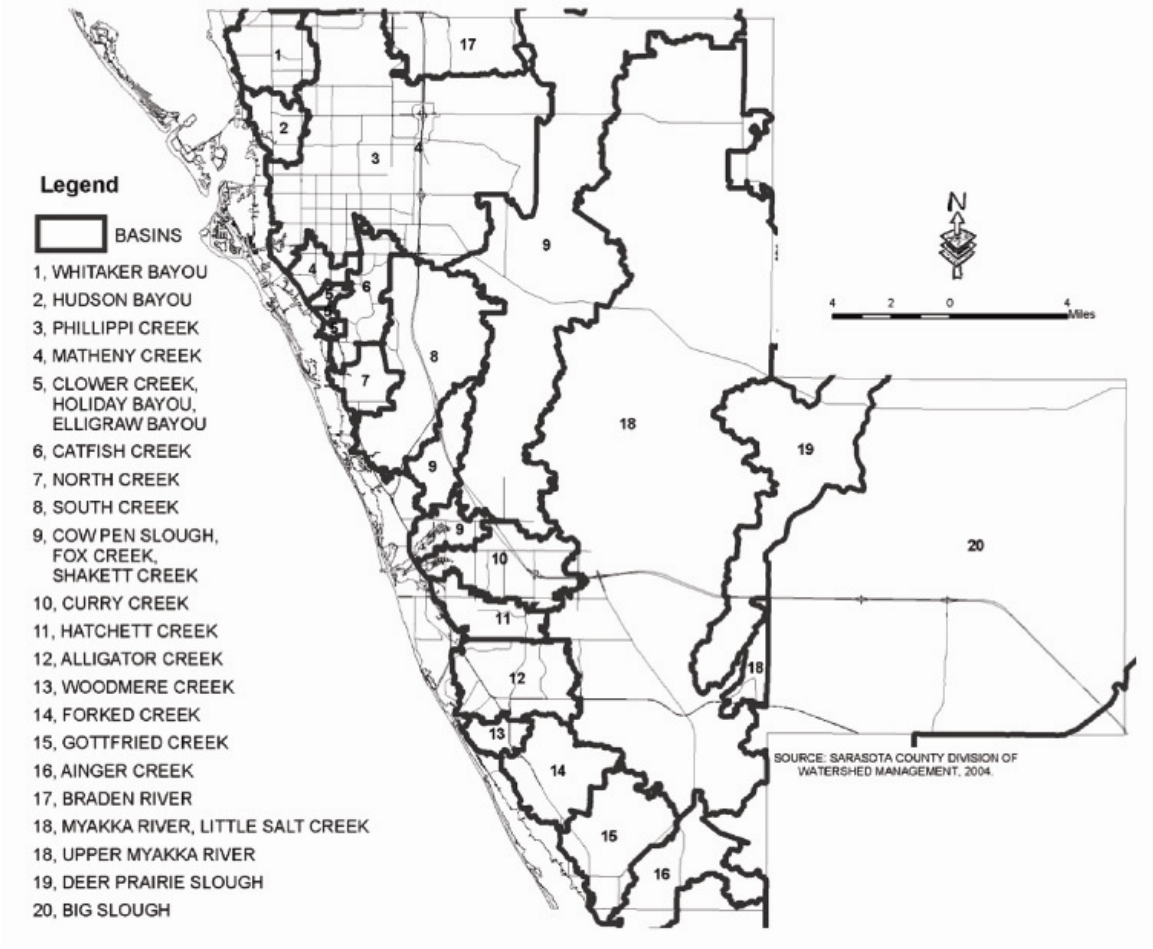

Figure 6-2 Sarasota County Drainage Basins
(Sarasota County Comprehensive Plan Figure 4-4)

Figure 6-3 presents an important product of the basin master plan effort: the horizontal limits of the riverine, 100-year floodplain. Much of the county riverine floodplain map to be used for local stormwater management planning has been completed. These maps and the detailed flood prediction models must, however, be kept up to date to reflect changes occurring in the watershed, such as land development and stormwater projects, or they will become obsolete.

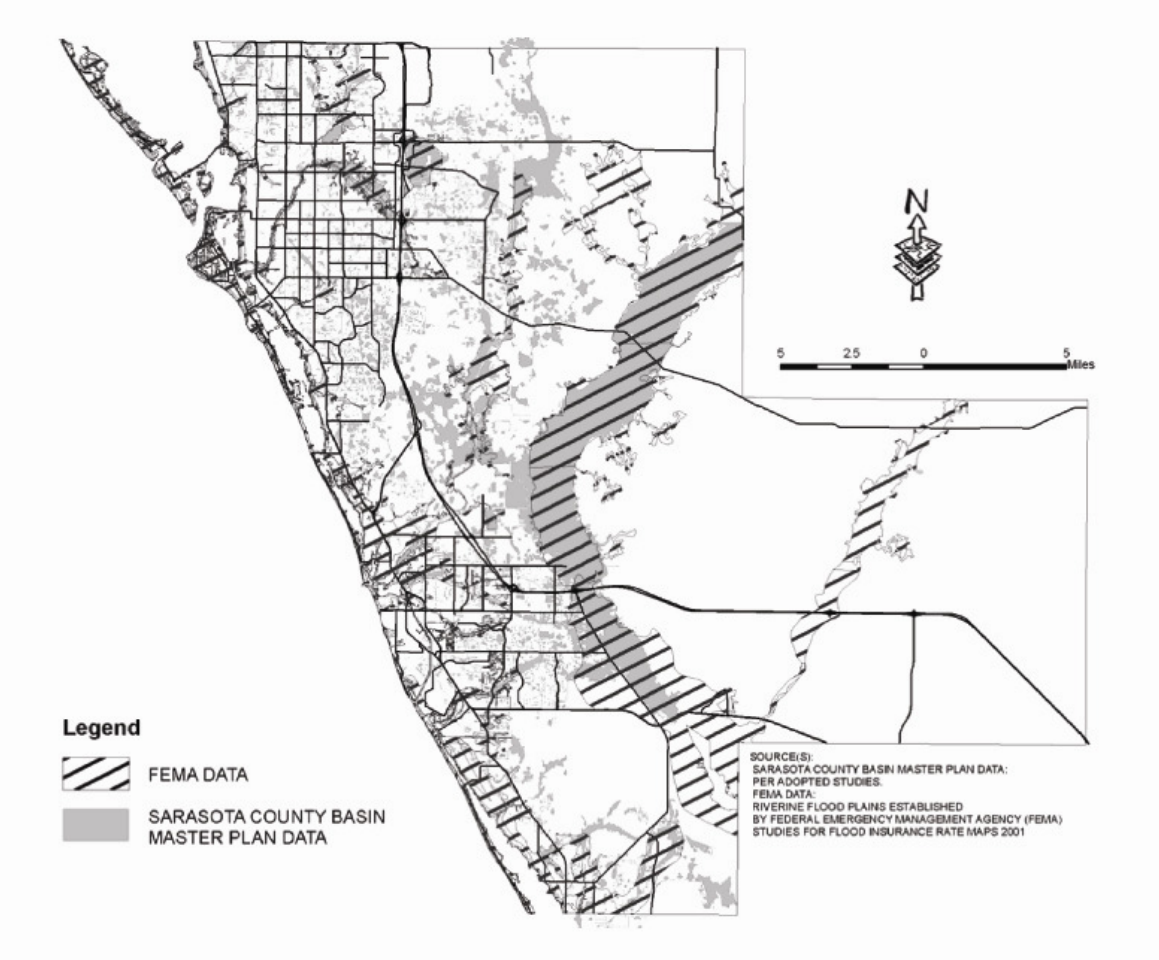

Figure 6-3 Areas of Special Flood Hazard
(Sarasota County Comprehensive Plan Figure 4-5)

6.3 WATERSHED MASTER PLANNING

Numerous hydrologic studies dating back to the late 1950s have been completed throughout Sarasota County. The Alligator Creek (March 1987), Woodmere Creek (May 2000), Forked Creek (March 1996), Gottfried Creek (March 1996), and Ainger Creek (July 1999) Basin Master Plans were based on a detailed analysis of these studies, the existing and projected land uses, existing drainage facilities, and projected stormwater management needs. This information was used to develop hydrologic and hydraulic models to simulate runoff, conveyance, and flooding conditions for these Lemon Bay subbasins. Model results were used to identify the location and magnitude of existing flooding problems in the basins, to recommend a water quantity level of service, and to evaluate best management practices (BMPs) that could be developed into recommend Capital Improvement Projects to bring stormwater conveyance systems within the basins into compliance with the recommended FPLOS criteria.

6.3.1 Flood Protection Level of Service (FPLOS)

The stormwater quantity FPLOS requires that stormwater management systems, public and private, provide adequate control of stormwater runoff. The Stormwater Quantity or FPLOS and Design Criteria used throughout the Basin Master Plan program are defined in the Sarasota County Comprehensive Plan and LDR (Table 6-1).

Table 6-1 Stormwater Quantity Level of Service Design Criteria

Category		Flooding Reference	Level of Service (flood interval, years)
I.	Buildings	Emergency shelters and essential services	>100
		Habitable	100
		Employment/Service centers	100
II.	Roads Access	Evacuation	>100
		Arterials	100
		Collectors	25
		Neighborhood	10
III.	Sites	Urban (>1 unit/acre)	5
		Rural	2

*The above FPLOS criteria can be adjusted to allow greater amounts of flooding of roads and sites if the flooding is provided for in a Basin Master Plan or as part of a Stormwater Management system design. Increased flooding should not adversely impact public health and safety, natural resources, or property.

The highest goal of these criteria is to prevent flooding of emergency shelters and structures providing essential services from storms equal to or exceeding the 100-year event (10 inches in 24 hours). The FPLOS goal for habitable structures and employment/service centers is no flooding from storms up to and including the 100-year storm. Flooding of garages, barns, sheds, and other out-buildings is not considered structure flooding. The FPLOS established for roadways varies depending on the classification of the street or roadway. The objective of these criteria is to prevent flooding of evacuation routes and major arterial roadways during storms up to and including the 100-year event. Flooding of agricultural land, developed open or green space, and undeveloped lands designated for future development is acceptable in storms greater than 5-year events (7 inches in 24 hours) for urban areas (>1 unit/acre) and storms greater than the 2-year event (5 inches in 24 hours) in rural areas. This does not include flowways, floodplain, or flood storage areas.

Acceptable flooding for a 100-year storm is shown in Figure 6-4. FPLOS deficiencies consist of flooded homes and businesses as well as flooded streets. To date, the primary focus of the County's stormwater improvement program has been to address flooded homes and businesses, with a secondary focus on severe street flooding.

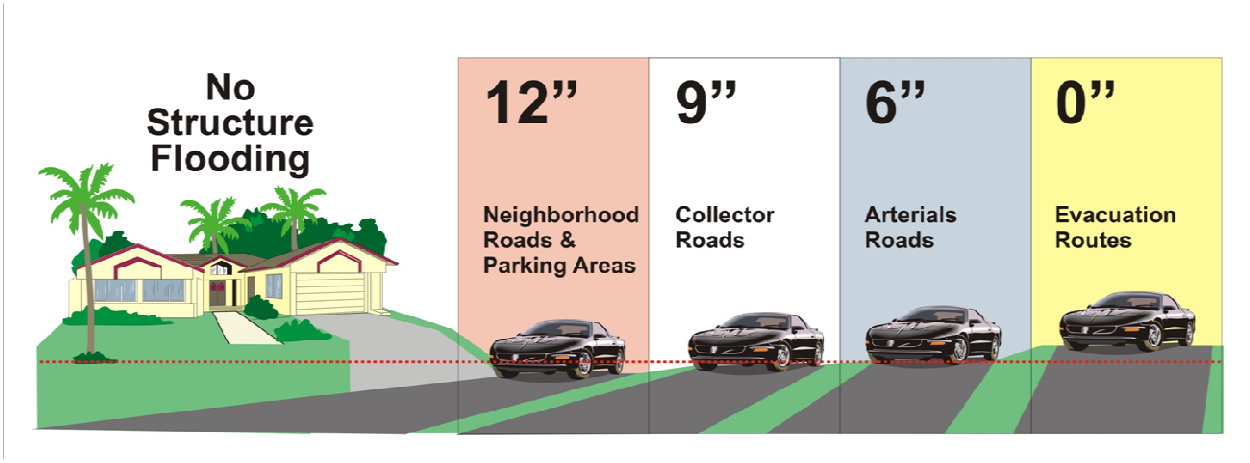

Figure 6-4 Acceptable Flooding for a 100-Year Storm

6.3.2 Watershed Modeling and Map Modernization

The County uses and maintains hydrological and hydraulic watershed specific models for most of the county. These models are used for development and CIP purposes to ensure no adverse impact offsite due to additional impervious area, per the LDR. Over time, land development, stormwater projects, erosion, and natural forces change water flow and drainage patterns. The risk of flooding in certain areas changes along with these factors. The detailed flood prediction models and county floodplain maps must therefore be updated regularly to be used for local stormwater management planning.

As with the County maps, the FEMA maps, which were created in the 1970s, also need to be updated. Sarasota County is partnering with SWFWMD to provide model and flood map updates. SWFWMD became a Cooperative Technical Partner with FEMA in 2001 to:

- Digitize the current paper flood maps, which were most recently updated in 1992.
- Input up-to-date flood data from more current Flood Study Updates for the County’s 28 watershed basins.

The digital maps will reflect current flood risks, including areas of recent growth, replacing older paper maps produced many years ago. New digital mapping techniques provide more detailed, reliable, and current data on flood hazards. The new digital maps will provide up-to-date, reliable information on a property-by-property basis electronically. Once the models and digital maps are completed, they will be used to produce new Digital Flood Insurance Rate Maps (DFIRMs). After an adoption period, the maps will become the effective flood information for the National Flood Insurance Rate Program (NFIP). The County will also continue to update the floodplain maps and models for local stormwater management planning needs.

The map modernization process is a concurrent work effort with this WMP and will bring Alligator Creek basin floodplain mapping up to 2007 LiDAR standards.

6.3.3 Capital Improvement Projects

CIPs address water quantity FPLOS deficiencies for structures and roadways. The SEU started its first capital improvement projects in 1994 to address structure flooding and severe street flooding. Stormwater Improvement Assessments were initiated in 1995. A revolving 5-year plan of CIPs, as required by the Comprehensive Plan, was then established to prioritize the initiation and implementation of the projects. CIP projects in the Lemon Bay Watershed are presented in Figure 6-5 and Table 6-2.

6.4 CONCLUSION

Sarasota County has flood-protection-related policies and programs in place to minimize flood risk to protect human safety and property in existing developed areas while protecting natural and beneficial functions of the remaining floodplain. In addition, the County LDR provides regulations that guide new development as it pertains to the force of flowing water and drainage of runoff. Several capital improvement projects, such as stormwater control structures, retrofit projects, and retention and detention ponds, are currently occurring throughout the watershed. Chapter 8 of this WMP includes proposed projects and recommendations to further mitigate flooding, such as increased buffers around water courses for future development, rain gardens aimed at restoring some of the isolated wetland loss functions of attenuation, and LID to reduce freshwater discharges.

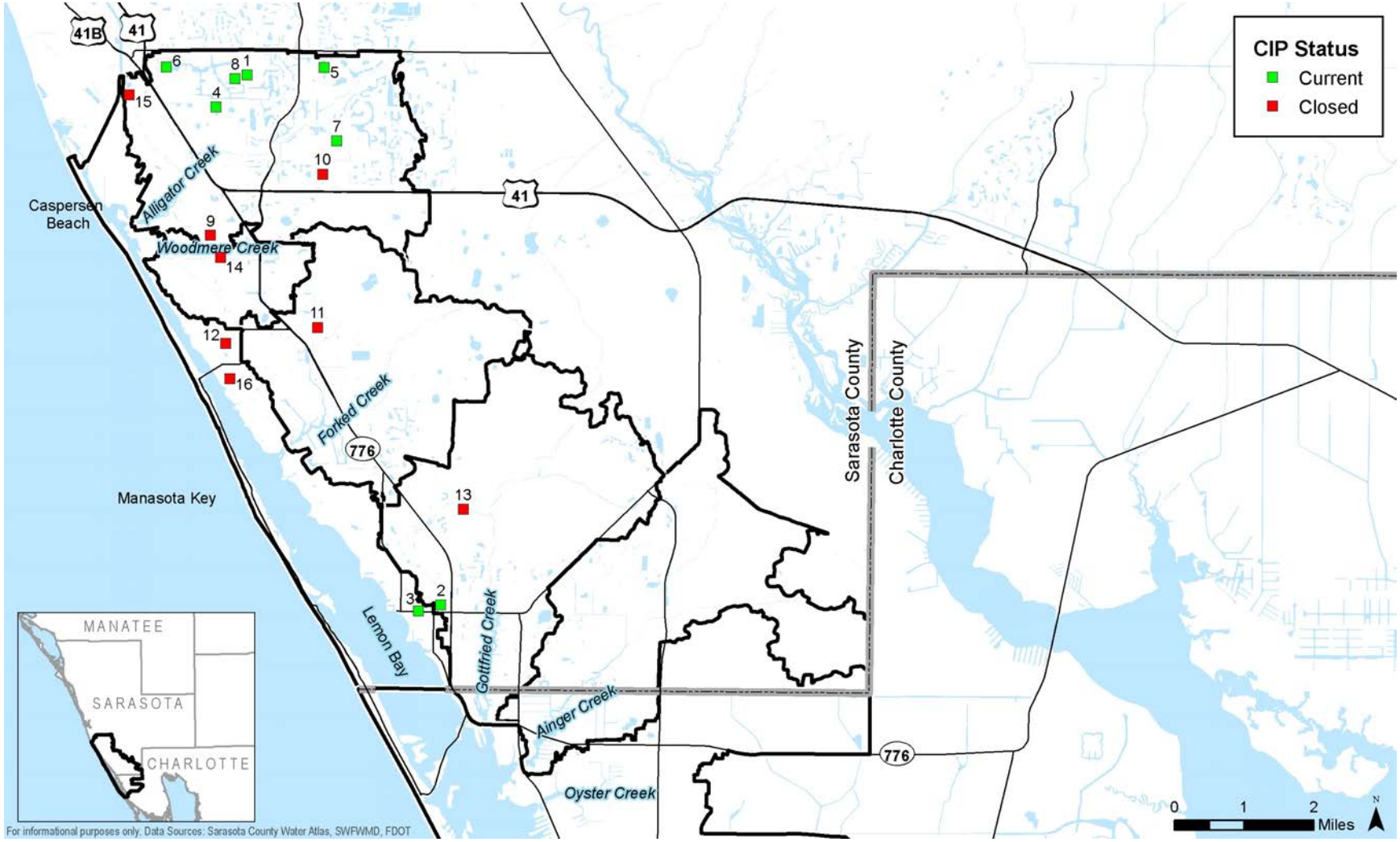

Figure 6-5 Lemon Bay Watershed 2009 CIP Projects

Table 6-2 Lemon Bay Watershed CIP Projects

Map ID	Project ID	Project Title	Project Description	Project Status
1	85872	Bal Harbour Dr	This project will provide Banyan Drive culvert replacements and ROW storage, Briarwood area conveyance improvements, Bal Harbour/ Shamrock Blvd. drainage improvements, and Quail Lake control structure modifications. The project also expands and conve*	Current
2	75828	Coconut Avenue/Elsie Quirk	This project will secure easements and construct an outfall control structure in the lake between Coconut Avenue and Perry Lane to improve the conveyance of water into Gottfried Creek. Currently updating the model to better define the floodplain.	Current
3	Englewood	Englewood CRA Stormwater Treatment	*	Current
4	85872	General Neighborhood Briarwood	This project will provide Banyan Drive culvert replacements and ROW storage, Briarwood area conveyance improvements, Bal Harbour/ Shamrock Blvd. drainage improvements, and Quail Lake control structure modifications. The project also expands and conve*	Current
5	85872	Quail Lake Pond Area	This project will provide Banyan Drive culvert replacements and ROW storage, Briarwood area conveyance improvements, Bal Harbour/ Shamrock Blvd. drainage improvements, and Quail Lake control structure modifications. The project also expands and conve*	Current
6	85872	Shamrock and Banyan Intersection	This project will provide Banyan Drive culvert replacements and ROW storage, Briarwood area conveyance improvements, Bal Harbour/ Shamrock Blvd. drainage improvements, and Quail Lake control structure modifications. The project also expands and conve*	Current
8	85872	Venice East Blvd – Gulf Breeze Blvd	This project will provide Banyan Drive culvert replacements and ROW storage, Briarwood area conveyance improvements, Bal Harbour/ Shamrock Blvd. drainage improvements, and Quail Lake control structure modifications. The project also expands and conve*	Current
9	Venice Gard	Venice Gardens Stormwater Infrastructure	*	Current

Table 6-2 Lemon Bay Watershed CIP Projects

Map ID	Project ID	Project Title	Project Description	Project Status
10	85874	Golf Club Lane	This project was identified in the Sarasota County Stormwater Master Plan. The area experiences frequent roadway and structure flooding due to insufficient channel capacity downstream of Lake Marlin and Dolphin Lake. Maintenance of the existing chann*	Closed
11	85878	Gulf View Estates Outfall	This project, located in the Venice East area, involves an existing canal along Golf Club Lane requiring redesign to reduce erosion and encroachment onto private property.	Closed
12	Manasota	Manasota Gardens	The project consists of widening and improving conveyance within the Forked Creek channel including replacement of two wooden bridges with box culverts, and some ditch work in the area.	Closed
13	75802	North Englewood Lateral	*	Closed
14	75819	Northern Branch	The proposed improvements have been identified in the Gottfried Creek Basin Study. Phase I improvements, replacing existing pipes under SR776 with a triple barrel box culvert, have already been completed. Phase II improvements include ditch widening, c*	Closed
15	Scenic Drive	Scenic Drive Stormwater Improvements	Woodmere Drainage Improvements project proposes to replace the existing culverts under Heron Road, Kent Road, Pompano Road, and Florida Road with 8-foot x 12-foot box culverts for a total length of 289 feet. Also, this project includes water quality enhancement*	Closed
16	75801	South Manasota Beach Road		Closed

* Information provided by Sarasota County. Please contact the County office for additional details.