City of Bonita Springs Flood Reduction Project

Verbal Interim Progress Report

Jim Beever

October 25, 2017

The Southwest Florida Regional Planning Council (SWFRPC) is assisting the City of Bonita Springs in developing a **City of Bonita Springs Flooding Reduction and Hydrologic Restoration Plan** that will include proposals for projects to reduce flooding in the City of Bonita Springs suitable for legislative funding support and plans for reduction of flooding, restoration of functional healthy hydrology, and subsequent improvements in water quality and habitat. The project will encompass the Imperial River Watershed, the Spring Creek Watershed and the Coastal Island Watershed within the City of Bonita Springs

Task	Description of Outputs	Period of Performance
1	Meet with the City of Bonita Springs staff to introduce project and begin discussions of previously identified and considered restoration needs, vulnerabilities, and potential mitigation projects. Complete initial meetings.	Month 1 and then on-going
2	Confirm scope of work and selected protocol for the watersheds.	Month 1
3	Commence data acquisition, continue meetings and fact finding as needed, and coordinate data needs. Distribute any time-critical data requests. Set up site visits for project assessments. Continue data collection and management	Month 1-2
4	Develop candidate list of projects suitable for inclusion in legislative initiatives for funding	Month 2
4	Apply a variety of flood reduction tools found in the Regional Restoration Coordination Team, Southwest Florida Comprehensive Watershed Plan, and Southwest Florida Vulnerabilities Assessment to the watershed to identify vulnerabilities and restoration projects by time frame of occurrence.	Month 3 and ongoing
5	**City of Bonita Springs Flooding Reduction and Hydrologic Restoration Plan**	Month 3-4

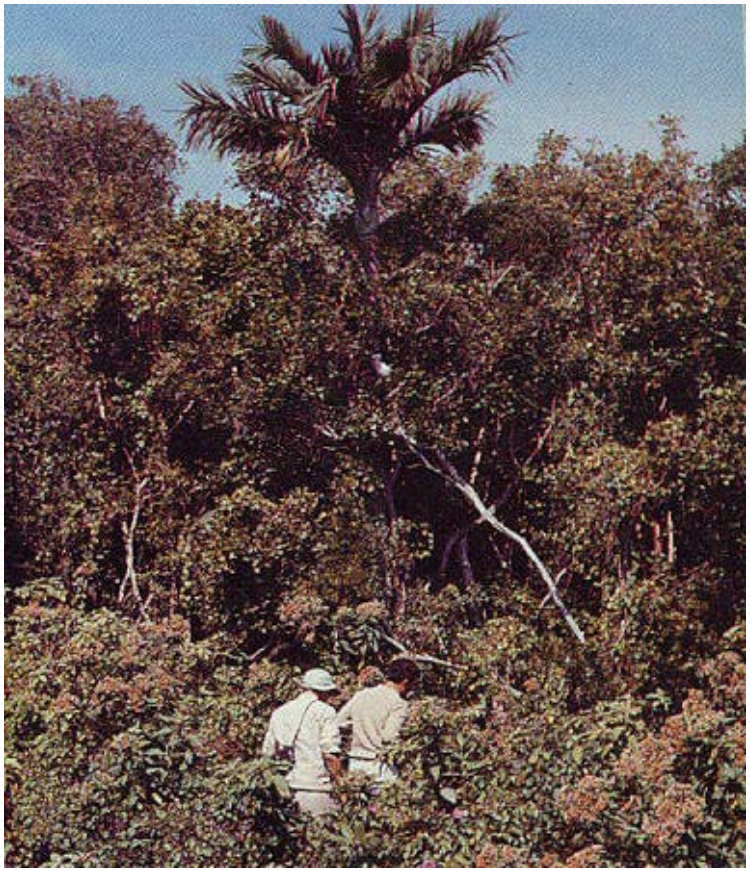
An Important Point

- This is a project with the goal of achieving flood reduction throughout the City of Bonita Springs
- It is not a total flood elimination project
- No one can guarantee the elimination of all flooding under all potential future conditions
- No one should expect that if they have a road or building located in an existing unmodified floodplain set at ground level elevation that they will not be flooded when the floodplain floods.

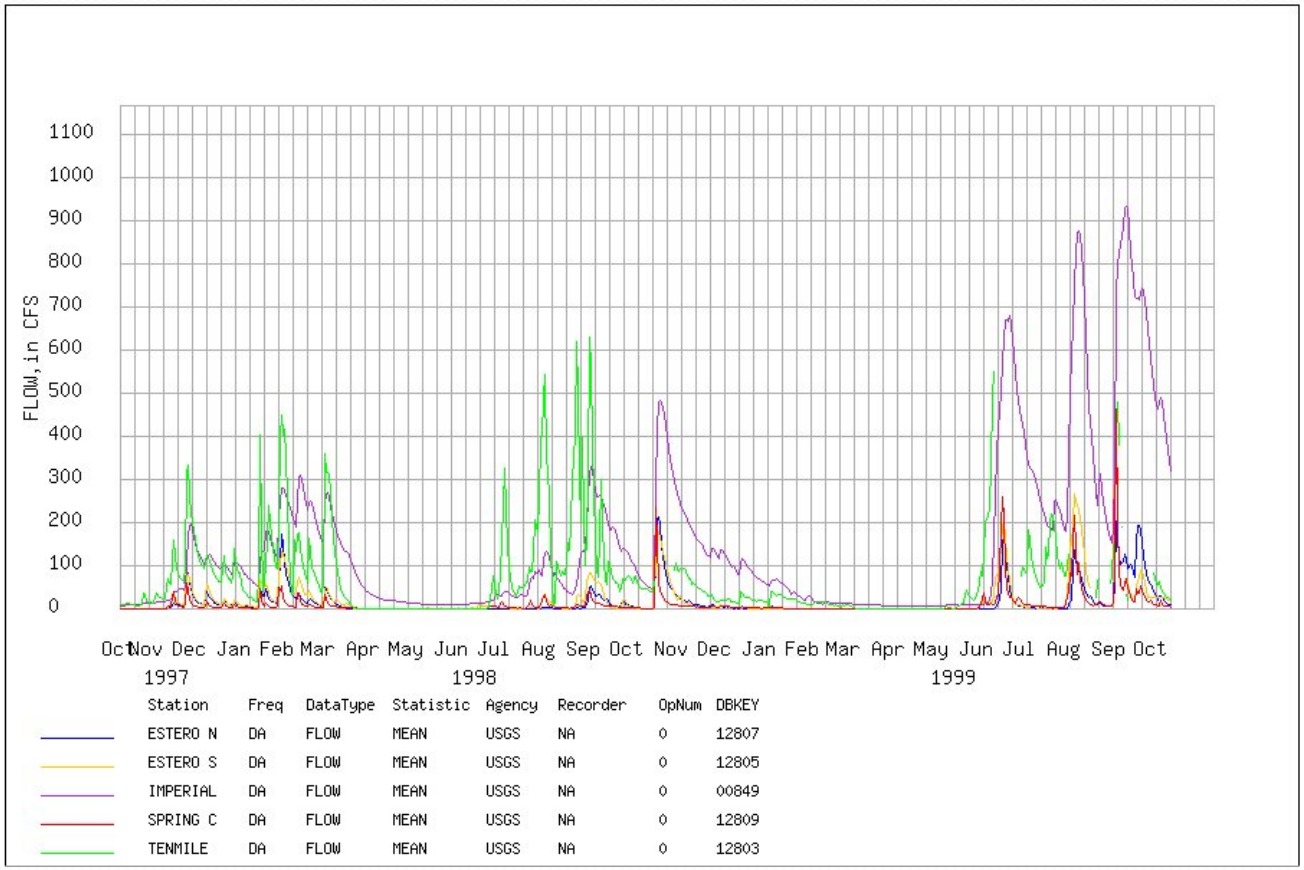
Southwest Florida is Flat

Southwest Florida is Sub-Tropical

Not Tropical, Not Temperate



Southwest Florida Rainfall is Seasonal with a Late-Winter/Spring Drought and a Summer/Autumn Monsoon



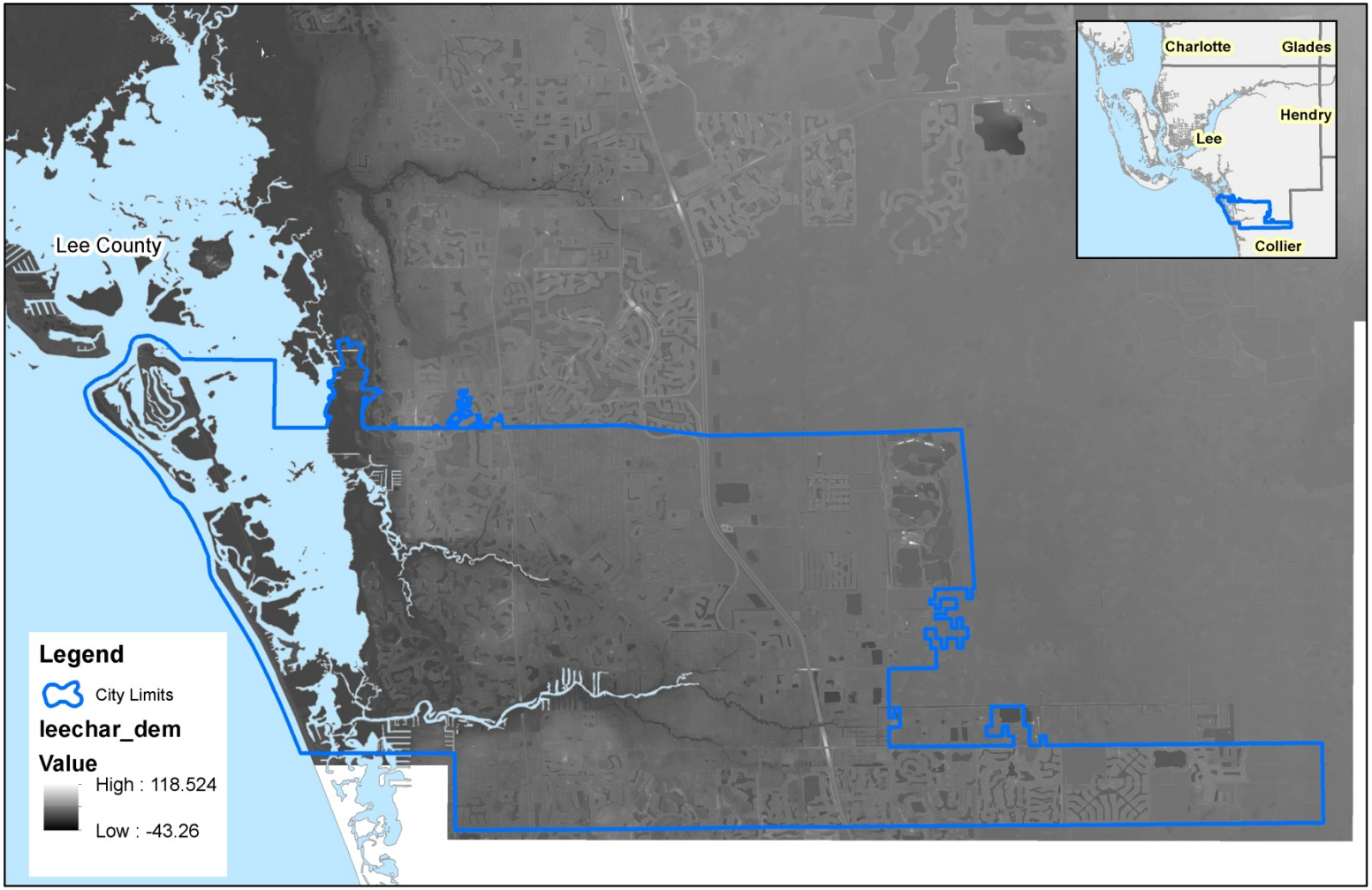
Sheet-flow Is a Normal, Natural Path of Gradual Broad-front Delivery of Precipitation Driven Freshwater to Streams and Estuaries

Blocking Sheet-flow, Collecting and Concentrating Water Flows into drainage ditches and canals creates flash water flows that alter the natural hydroperiod and enhance flooding

Contrary to some past media statements sheet-flow does not cause flooding and there is no “deadly sheet-flow”

Even in the least impact future climate change scenario:

- increased climate instability
- increased coastal erosion
- continuous sea-level rise
- wetter wet seasons
- drier dry seasons
- more extreme hot and cold events
- shifts in fauna and flora
- increased tropical diseases in plants, wildlife & humans
- destabilized aquatic food webs including increased Harmful Algae Blooms (HAB)
- increasing strains upon and costs in infrastructure
- increased uncertainty concerning variable risk assessment with uncertain actuarial futures.



City of Bonita Springs

Elevation

0 0.5 1 2 Miles

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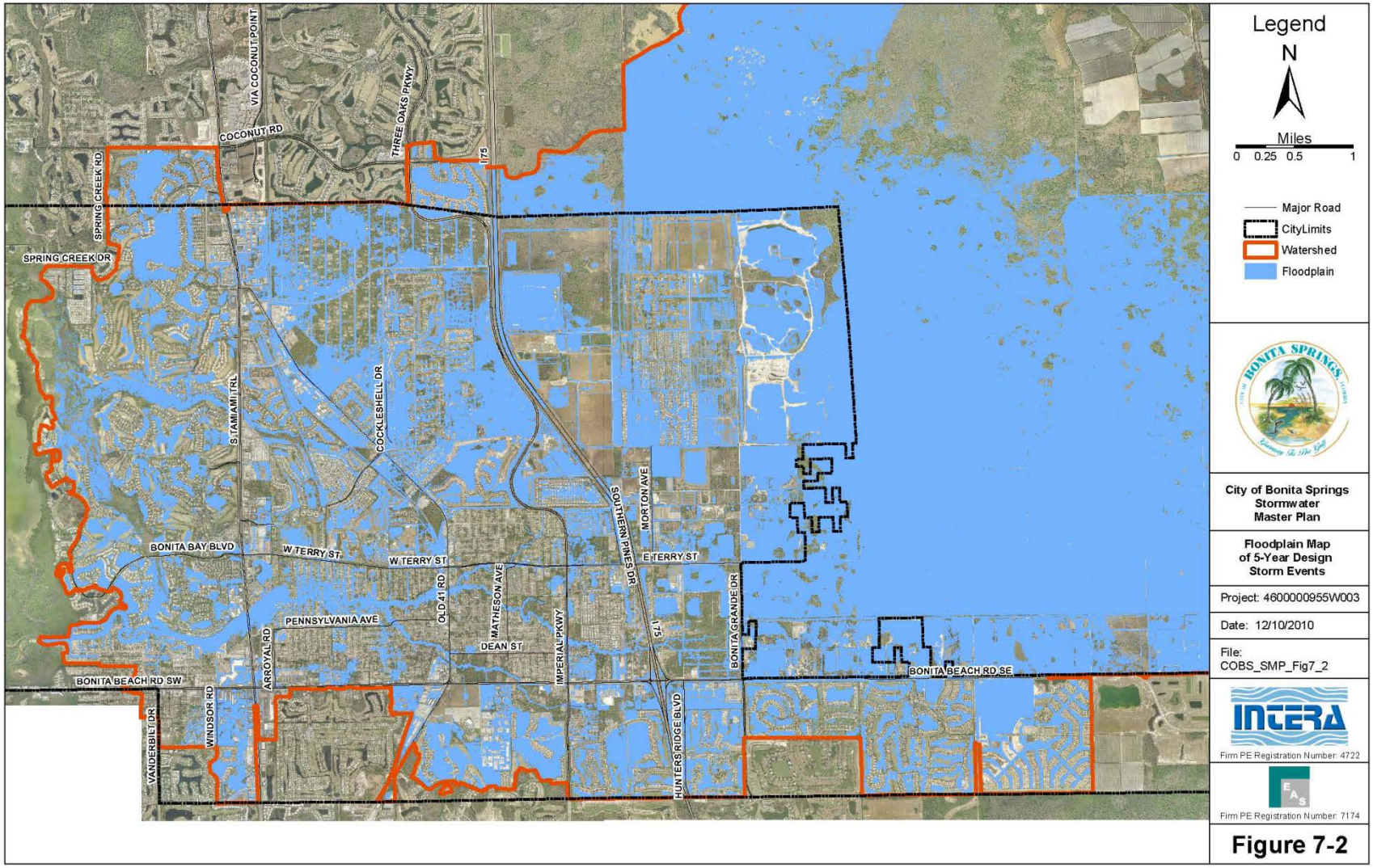
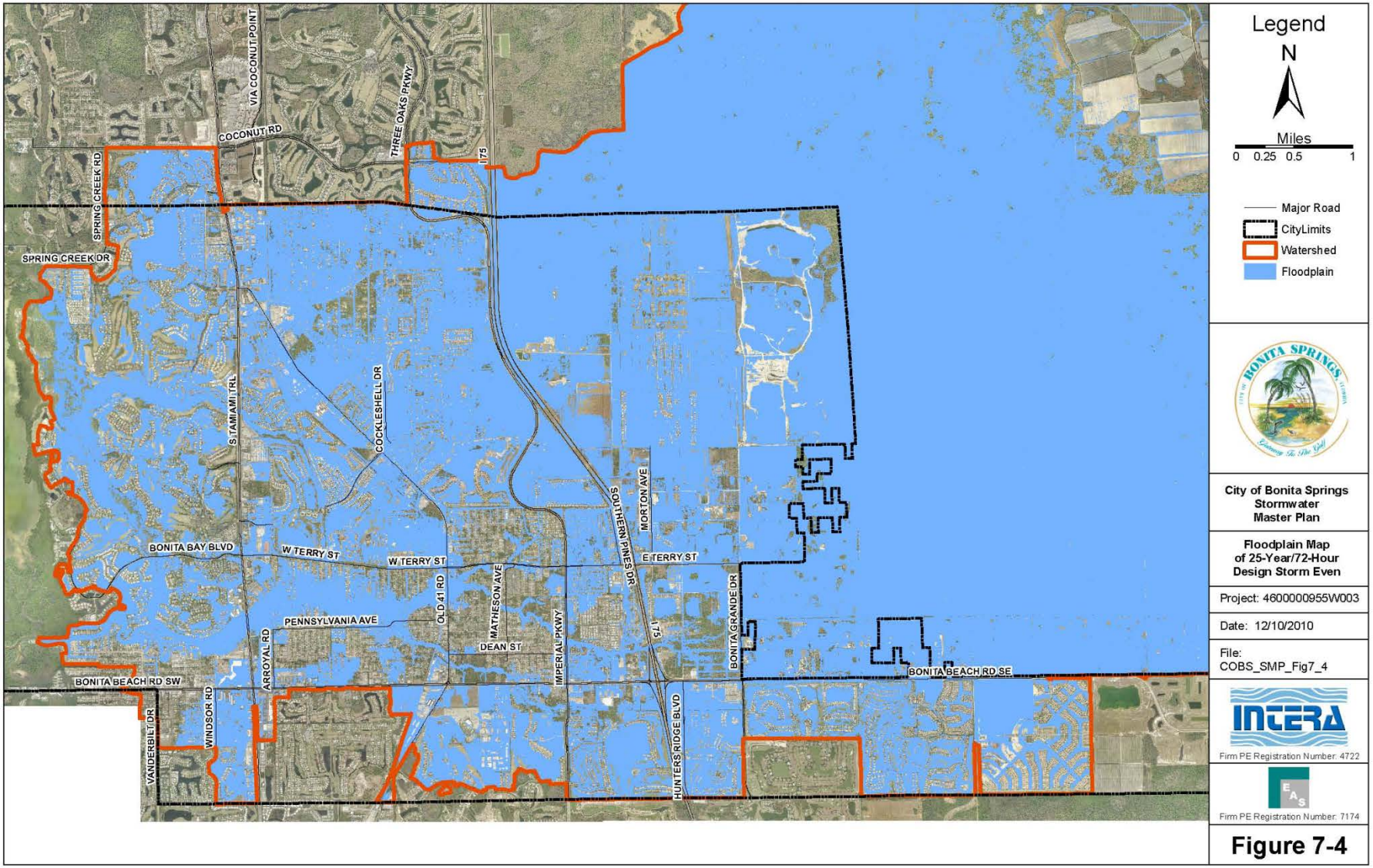
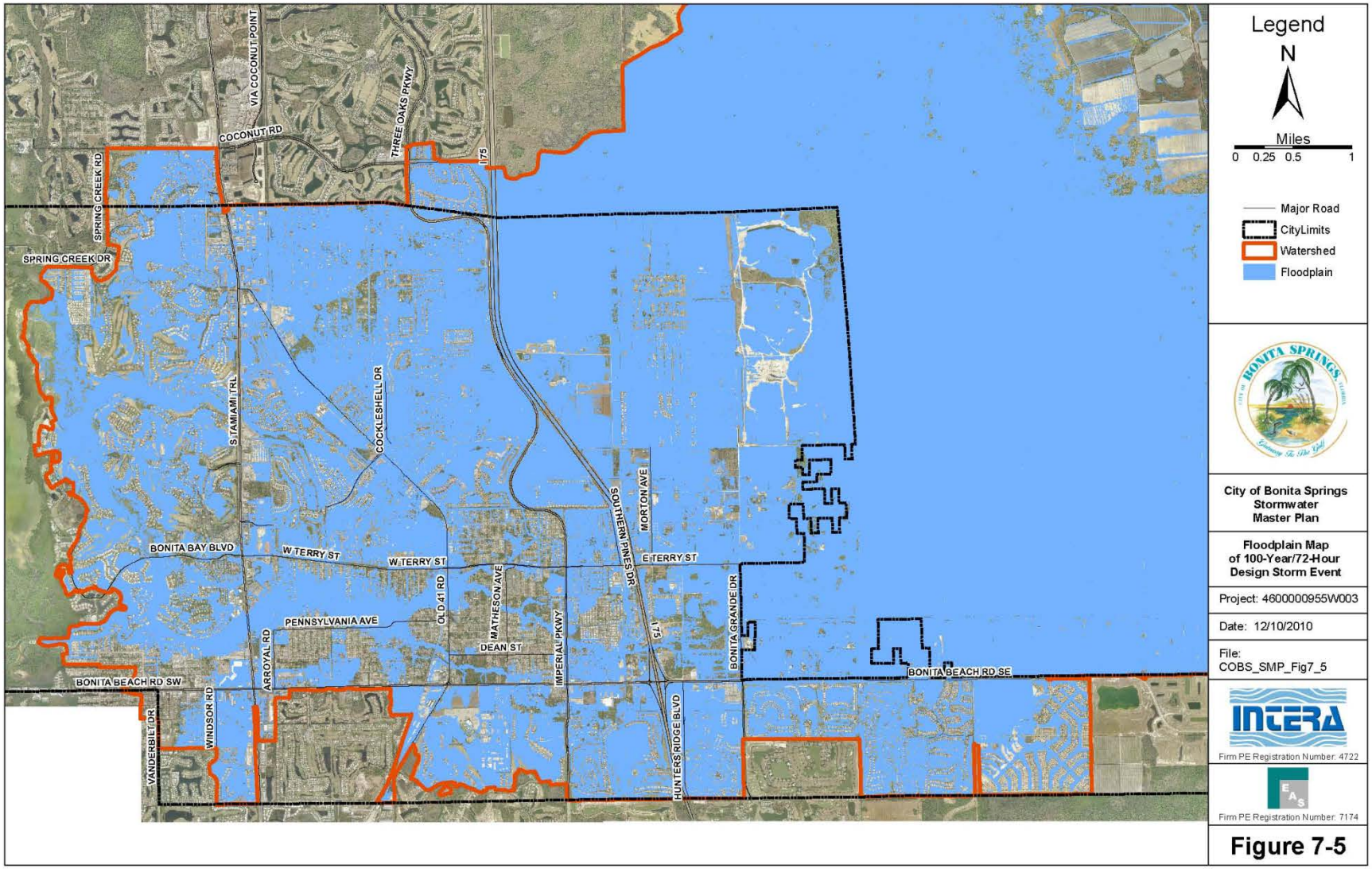
(Name: Bonita_flood_4212_elev_LIDAR) Last updated by: twalker on 10/24/2017



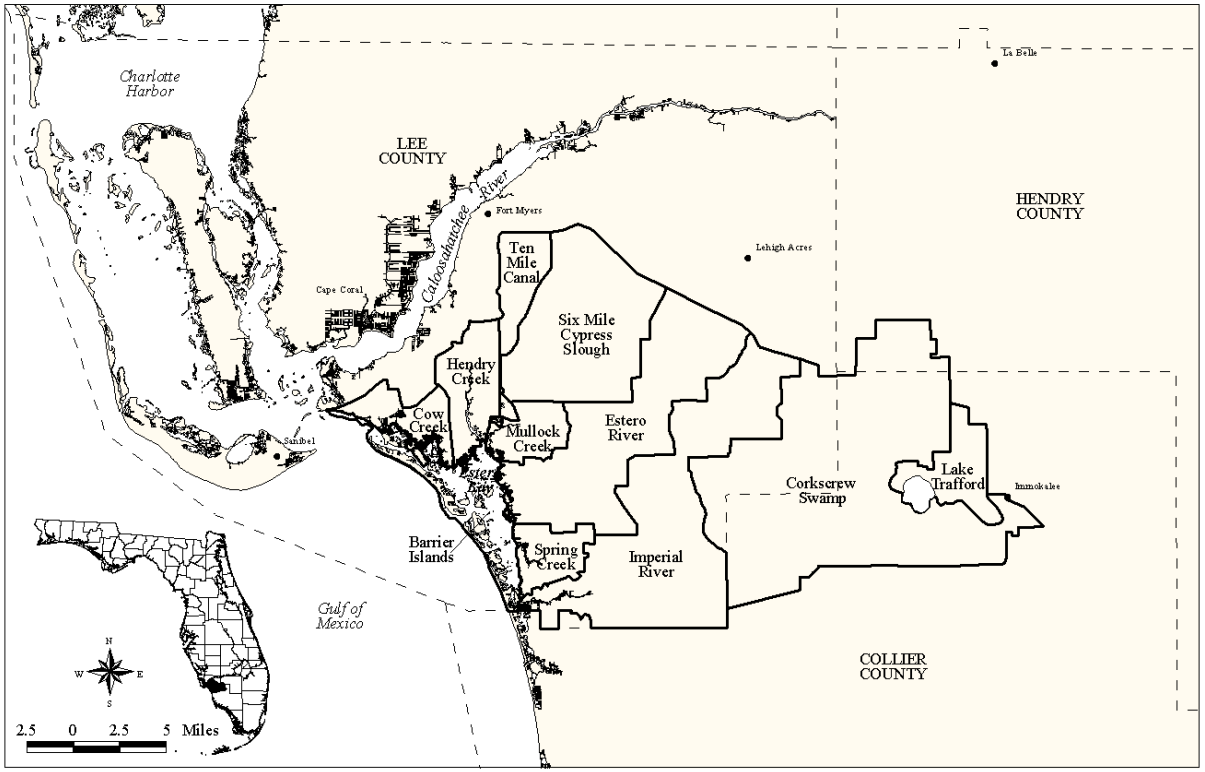
5-Year Floodplain

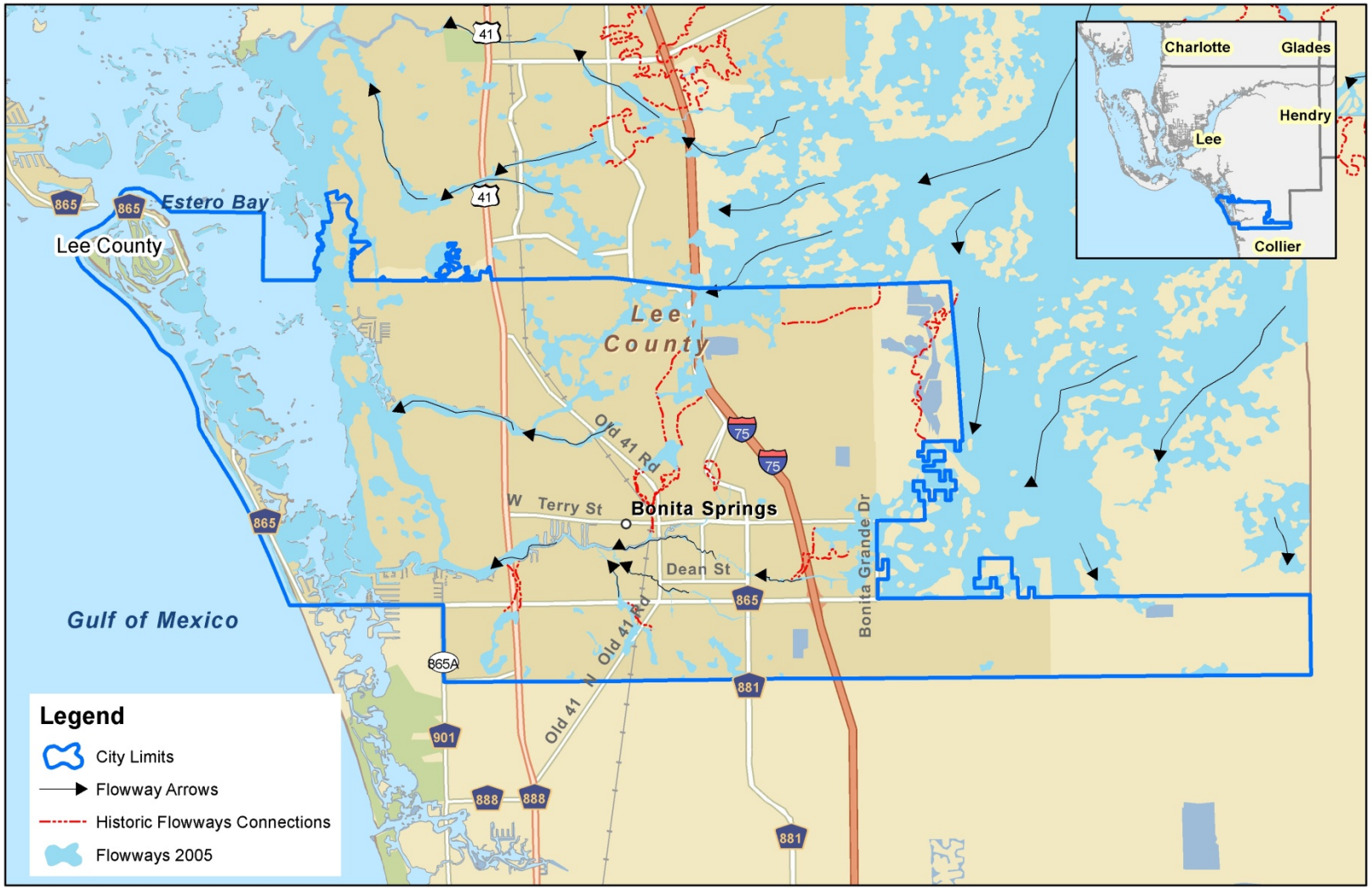


25-Year Floodplain



100-Year Floodplain


Charlotte Harbor
LEE COUNTY
Caloosahatchee River
Fort Myers
La Belle
HENDRY COUNTY
Lehigh Acres
Cape Coral
Ten Mile Canal
Six Mile Cypress Slough
Hendry Creek
Cow Creek
Mullock Creek
Estero River
Corkscrew Swamp
Lake Trafford
Immokalee
Sanibel
Barrier Islands
Spring Creek
Imperial River
Gulf of Mexico
COLLIER COUNTY
N
W
E
S
2.5 0 2.5 5 Miles



City of Bonita Springs

Major Flowways

0 0.5 1 2 Miles

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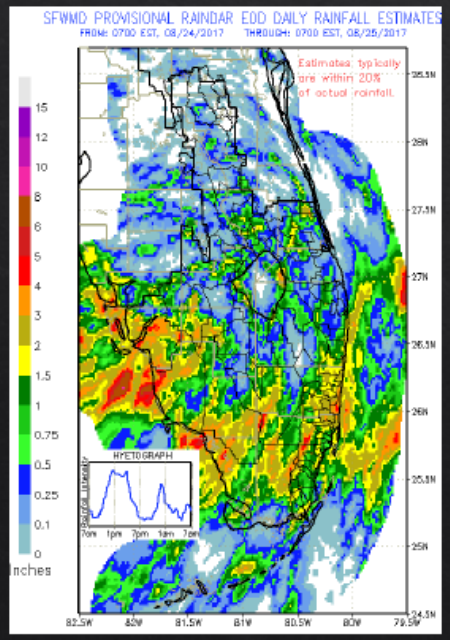
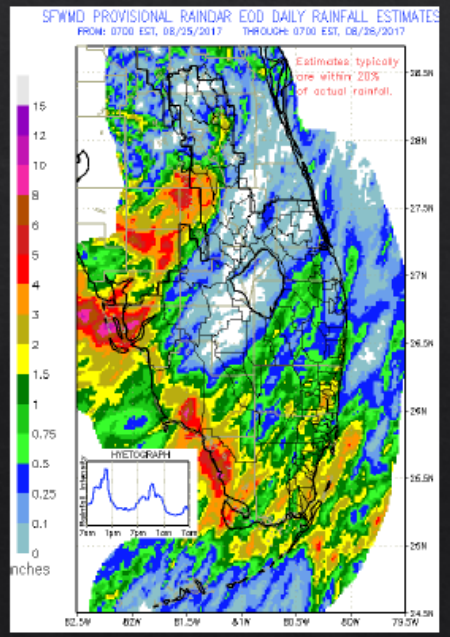
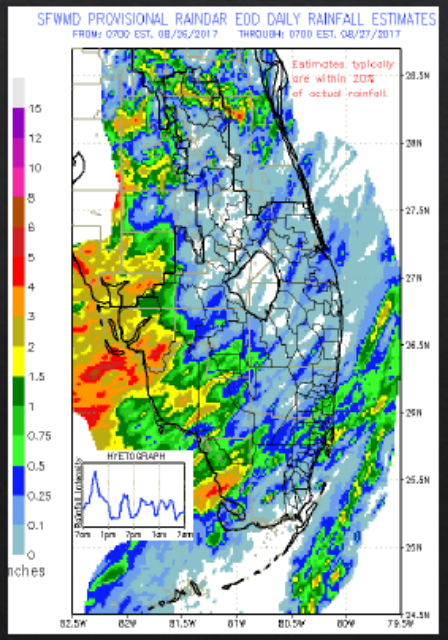
(Name: Bonita_flood_4212_flowways) Last updated by: twalker on 10/24/2017

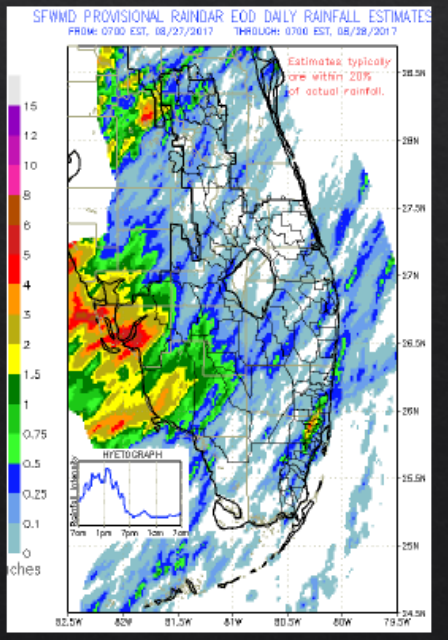
Storm Event August 24-27, 2017

- Not a forecasted tropical storm or hurricane
- Per SFWMD permit emergency sluice gates could not be opened in advance of storm
- BSU rain gauge reported 11.23" of rain during 8/24 to 8/27
- Exceeds 25-year, 3-day rainfall





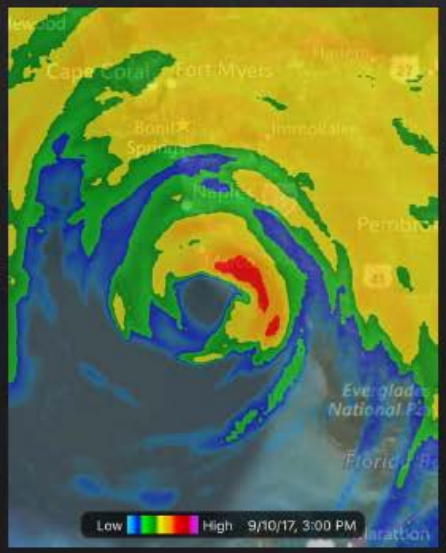




Source: Pelican Landing Community Association presentation by Wesley Kayne, P.E. , Barraco and Associates, District Engineer

Hurricane Irma September 9-11, 2017

- Forecasted hurricane
- Per SFWMD permit emergency sluice gates could be opened in advance of storm
- BSU rain gauge reported 10.11" of rain during over 24 hours duration
- Exceeds 100-year, 1-day rainfall



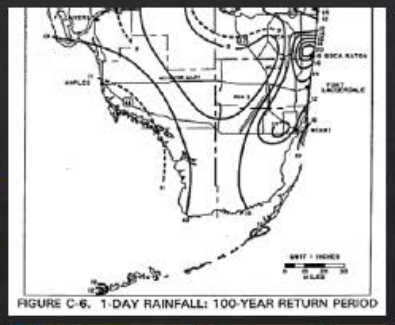
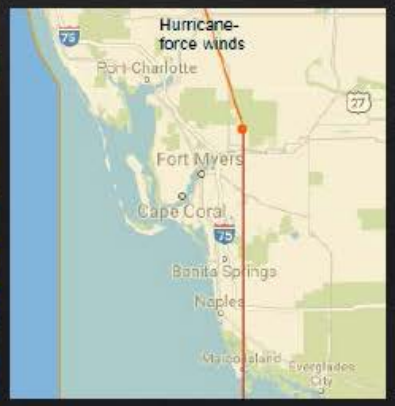
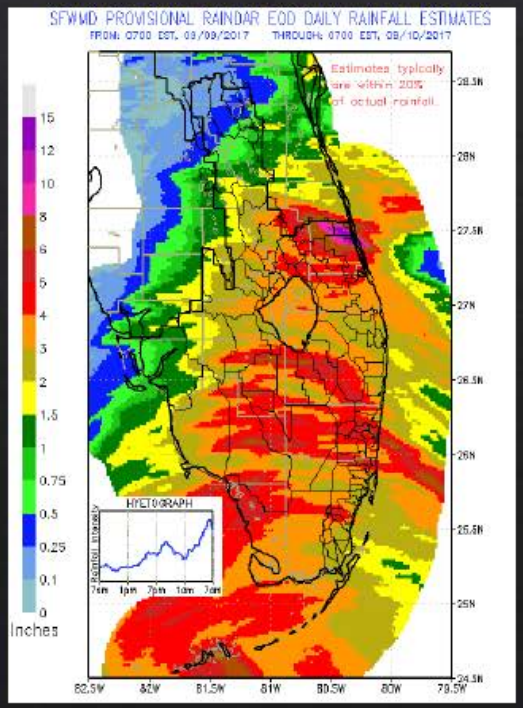
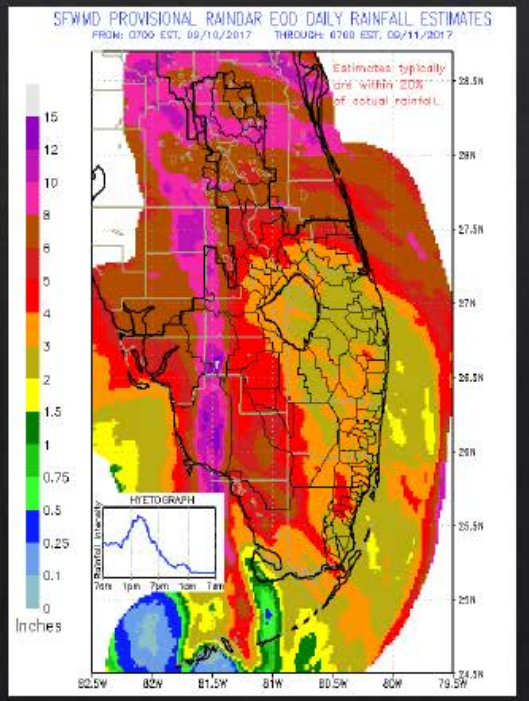


FIGURE C-6. 1-DAY RAINFALL: 100-YEAR RETURN PERIOD



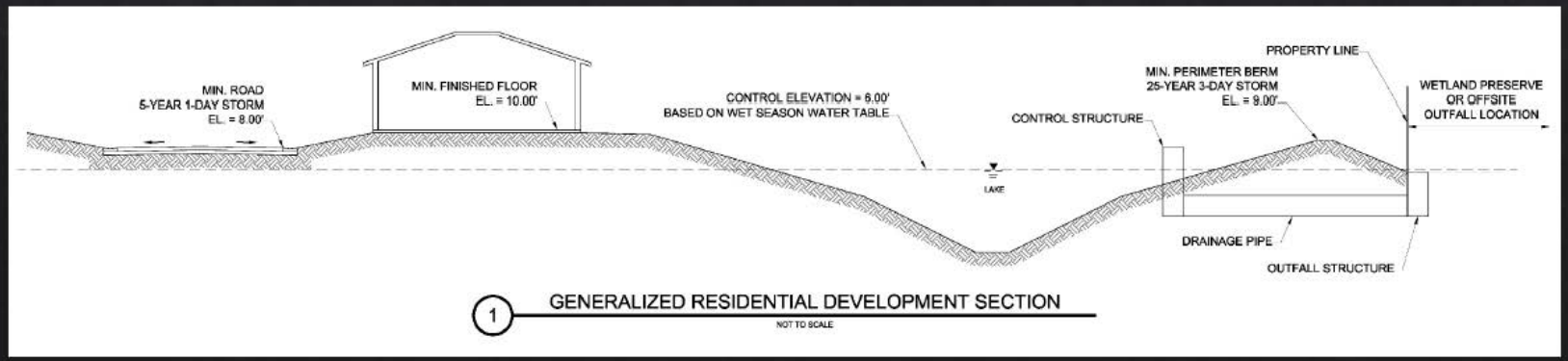




Graphic Source: Pelican Landing Community Association presentation by Wesley Kayne, P.E. , Barraco and Associates, District Engineer

Storm Water Management Systems of SWFL

- South Florida Water Management District regulates this resource (surface water and groundwater).
- Minimum road elevations 5-year, 1-day storm event stage (5.5" over 24 hours)
  - Higher level of service 10-year, 1-day storm event stage (6.8" over 24 hours)
- Minimum perimeter berm elevations 25-year, 3-day storm event stage (11.1" over 72 hours)
- Minimum finished floor elevations 100-year, 3-day storm event stage (13.5" over 72 hours)
- Basins required to recover from a storm event within 12 days following completion of storm event.

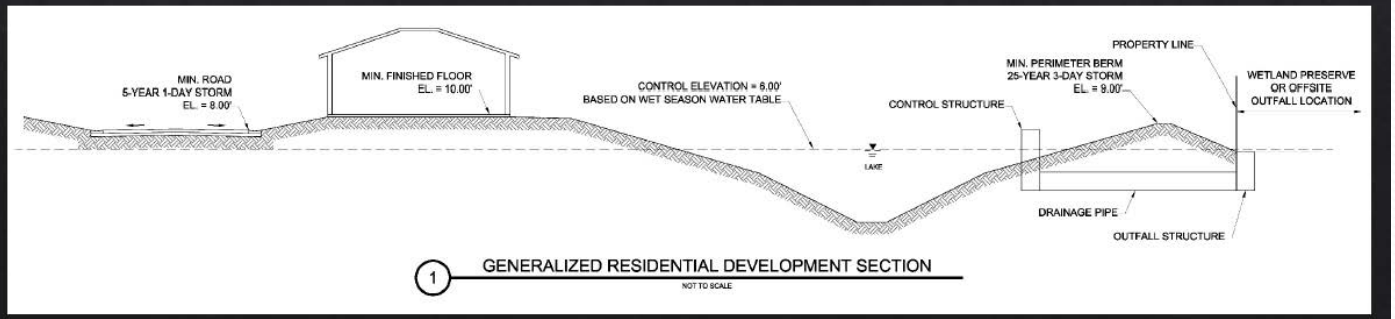


Four-Day Storm Event exceeded the first two standards
Hurricane Irma exceeded all of these standards
The two storm events combined exceed all previous documented floods in the area

Graphic Source: Pelican Landing Community Association presentation by Wesley Kayne, P.E. , Barraco and Associates, District Engineer

Storm Water Management Systems of SWFL

- Basin control elevations are established based on wet season water table in order to support wetlands and recharge groundwater.
- Allowable discharge rates and directions of flow are based on historic conditions of the basin.
- Storm water is contained within basins up to perimeter berm elevation and discharged through a control structure above control elevation at the allowable discharge rate.
- The volume provided above control elevation in a lake is considered storage and considered in modeling storm water management systems.
- Roadways provide a volume of storage in certain storm events.



- Historic Period of Record for discharge rates does not account for climate change in precipitation rates and delivery.
- Control structure size and inverts do not account for climate change considerations
- Note the "pond/lake borrow pits", golf courses (if any) and road system are expected to provide flood storage during the most extreme storm events. Under such conditions road flooding is planned for.

Graphic Source: Pelican Landing Community Association presentation by Wesley Kayne, P.E. , Barraco and Associates, District Engineer

Projects already started

- Spring Creek Shoal Dredging (Spring Creek Restoration Plan)
- NOAA Grant for Spring Creek Culvert Improvements at the CSX Railroad and Milagro Road (Spring Creek Restoration Plan)
- Bloomberg Grant (Taking Back the Watersheds)
- Selection of Atkins as Engineering Firm to assist in Flood Reduction Plan technical engineering assistance.
- List of legislative initiative funding projects for the next upcoming legislative session

Legislative Initiatives for the Next Florida Legislative Session

1. Inspection of all culvert and tributary systems, snagging and clearing of all systems and replacement of crushed and/or substandard culvert conveyances on all flow-ways including residential yard conveyances.
2. Begin land acquisition for more retention In the Bonita DR/GR for a regional scale retention treatment and at smaller scales along the course of the Imperial River and Spring Creek. Initially target parcels identified in the C2020 program, Lee County Master Mitigation Program and Southwest Florida Watershed Study. Partner with adjacent jurisdictions and NGOs -- Pine Lake Preserve Conveyance and Restoration with retention opportunities.
3. Construct the Logan Boulevard and other potential conveyance systems from Bonita Beach Road south to the Cocohatchee.

Potential Flood Reduction Solutions

These can be:

Short-term, implemented or started in this year and relatively immediate.

Moderate-term already planned and ready for funding for design and build.

Longer –term with planning needed in the two to five year time frame for design and build.

On-going and paradigm changing into the foreseeable future including changes in building codes, land use plans, and climate change adaptation.

Potential Solution 1

- Remove impediments to flows within the existing system.
- This includes debris, sediments, and trash that has accumulated or that is storm related
- Evaluate existing constrictions in flow in the system including lack of drainage features; small culverts; culverts with inverts set too high; causeways constructed across floodplains; unpermitted intrusions into the floodplains; and locations where variances allowed intrusions into the floodplains.

Potential Solution 2

- Replace substandard culverts and bridges with new structures of increased size, correct inverts, and a design the plans for future sea level rise and increased future storm surge.
- Where possible and feasible replace multiple culverts with a open span of box culverts or a bridge. Improves flows and may enhance recreational navigability.
- Repair damaged, degraded and vandalized permitted dikes and berms

Potential Solution 3

- Retrofit older communities which lack any true surface water management system to have a basic system of swales with collection in stormwater retention systems with a point or points of positive discharge to a larger receiving flowway
- These systems need not be restricted to a single named neighborhood but may best be constructed in several adjacent neighborhoods that all feed a regional stormwater collection and treatment system.

Potential Solution 4

- Collect flows in the watersheds east of I-75 into a very large Regional Stormwater Management System (RSMS) with associated filter marsh water quality treatment located in the eastern area of the Bonita Springs DRGR on mine lands and agricultural lands
- This will serve neighborhood flows east of I-75 and collect flows from the north into a new flow way connection across native lands for discharge to correct watershed destination (Spring Creek, Imperial River, Cocohatchee River).

Potential Solution 5

- Change the design of the Kehl Canal to retain and treat more water rather than quickly discharge it to the Imperial River proper.
- Add adjacent water storage features to collect flows form the Kehl Canal that incorporate filter marshes (examples: Ten-Mile Canal filter marsh; North Colonial Waterway; Freedom Park filter marsh)
- Install a series of step up weirs to hold additional water within with increasing control elevations form west to east (this will aid storage and provide improved groundwater levels during dry season in the DRGR)

Potential Solution 6

- Reconnect and/or improve the connection of the upper watersheds of Half-Way Creek, Spring Creek, and the Cocohatchee River to carry their original natural flows and not unnaturally contribute excess flows to the Imperial River.
- The Bloomberg Grant application is for the beginning of this.
- The reconnection design will be designed to restore the natural hydroperiod and capacity of Half-Way Creek, Spring Creek, and the Cocohatchee River and not exceed their carrying capacity. Imperial River flooding will not be reduced by transferring flooding t another watershed (as has been done by other to the Imperial River.

Potential Solution 7

- Where available obtain unoccupied lands including native lands, exotic infested lands, mine lands, agricultural lands, ruderal lands, and otherwise vacant lands that are in existing floodplains or immediately adjacent to existing floodplains. This includes SFWMD “Surplus Lands” currently available in the DRGR. Request that the SFWMD not auction these lands but transfer them to the City of Bonita Springs for water management projects or sell them at simple cost to the City.

Potential Solution 8

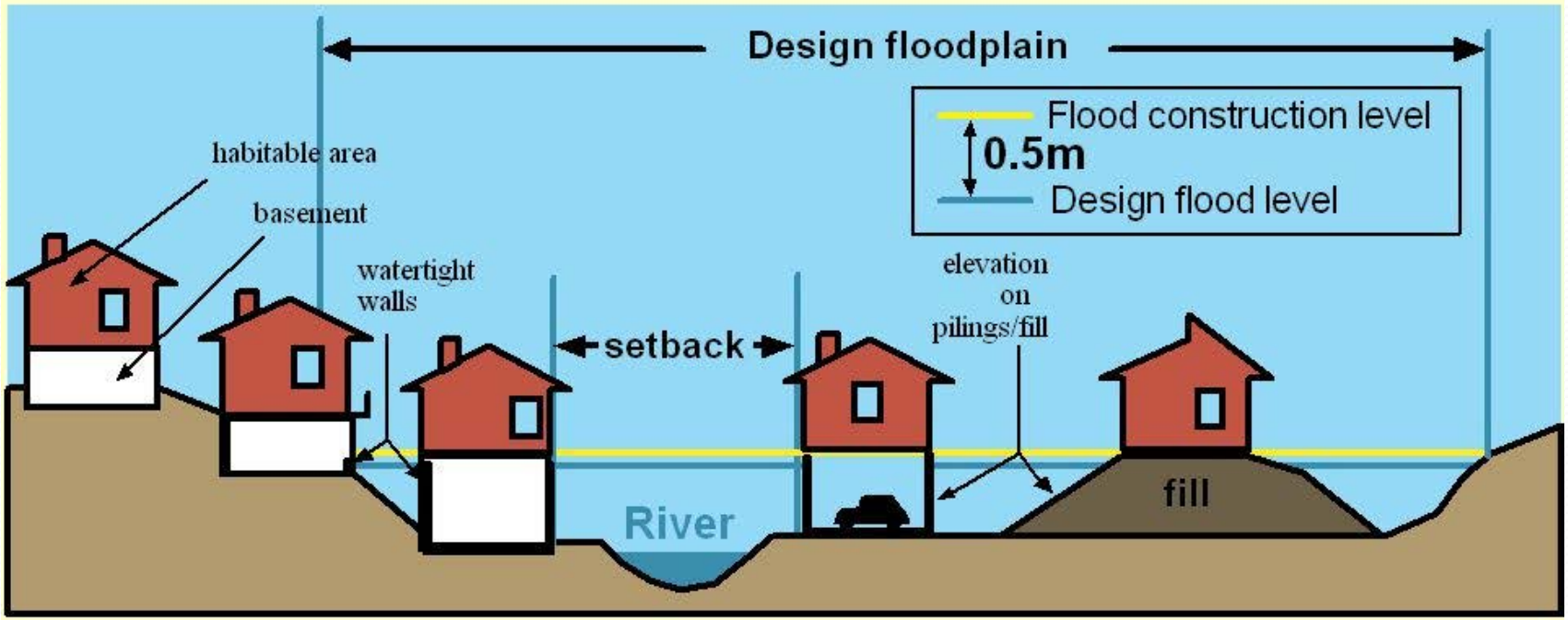
- Establish a better/higher stormwater retention standard for all new development including residential, commercial, industrial, recreational, and agricultural in the City of Bonita Springs.
- These standards will retain and management more water on-site and provide for a gradual release in a natural hydroperiod; not a system of no discharge and then sudden high volume discharge.

Potential Solution 9

- If a existing building in a floodplain is to be replaced or retro-fitted to more than 50% of its above foundation area then the building would have to meet the current flood elevation standards (no exemptions).
- Given the on-going rate of sea-level rise for the City of Bonita Springs an additional 3 feet over current elevations would be recommended for building expected to last for more than 100 years.

Flood-proofing residential buildings on an idealized floodplain.

Note: no construction allowed in floodway (=setback)



Floodplain = 1% annual flood probability
Floodway = 5% annual flood probability

Potential Solution 10

- If a area has been intentionally designed in its Surface Water Management System, (SWMS) and permitted to use its roadways as flowways during temporary flow events this information must be legally disclosed to the community and all new buyers and/or renters.
- Such roads should be posted that they will function that way with appropriate signage as is done in the western United States.

Potential Solution 11

- Emergency Sluice Gates proved effective in communities like Pelican Landing
- Determine where existing modern SWMS do not have them but could be redesigned for their use
- Assist those communities in putting in Emergency Sluice Gates
- Work with the SFWMD to allow greater flexibility in operating exiting and future emergency sluice gates in response to storms occurring in a changing climate

Potential Solution 12

- Establish a Stormwater/Flood Reduction Utility Fee to assist in funding the necessary projects
- Fee would include a base city-wide assessment to cover City-Wide projects and activities and as needed an additional MSTU assessed for specific developments/neighborhoods when a retro-fit or project only affects it.

Specific Areas that are being examined for specific projects, benefits from larger city-wide projects and land-us recommendations

- Dean Street, Tangelo and Pierce west of Imperial River Parkway
- The area bounded by Bonita Beach Road, Imperial River Parkway, Terry Street and I-75 including Quinn Street, Pine Crest, Downs, etc.
- Areas north and south of Terry Street east of I-75 including Morton Grove, Citrus Park and Sans Souci;
- Areas on the Imperial River between Old US 41 and new US 41
- The developments along Bonita Beach Road east of I-75
- Areas in the headwaters of Spring Creek (Shangri-La, Corzine, Divot , Paradise)
- The area northeast of Woods Edge and Vanderbilt
- Coastal areas on the Bonita Beach and other Islands that have experienced flooding

Other Suggested Ideas Being Looked At That Have Significant Problematic Issues Due to a Variety of Factors

- Reduce and/or eliminate problems with agricultural and mine off-pumping
- Partial riverside barrier/dike/levee constructions adjacent to the Imperial River

Other Suggested Ideas Not Being Considered in This Project Due To the Great Damage They Would Cause.

- Channelizing the Imperial River like the C-43 project of the Caloosahatchee River
- Riverside barrier/dike/levees along the full length of the Imperial River
- Sending floodwaters to distant watersheds like the Caloosahatchee or Big Cypress.
- Building a giant dike around the CREW
- Solving one neighborhood/development flood problems by off-pumping and transferring the flood to an adjacent neighborhood/development that would flood or have additional flooding

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