PMLevyCOLPEm Resource

From: Snead, Paul [paul.snead@pgnmail.com]
Sent: Thursday, September 17, 2009 6:42 PM
To: Bruner, Douglas
Cc: Moser, Michelle
Subject: FW: April, 2008 FES presentation on Flood Plains & Historic Basin Storage
Attachments: Flood Plains & Historic Basin Storage as of 04-04-08.pdf

Doug:

Below is the contact information for Hank Higginbotham with SWFWMD as requested today. We checked the SWFWMD website and they do not maintain permits which are accessible from the website, but all their e-mails are considered public records. In the e-mail below, which contains the attached presentation made by Mr. Higginbotham to the Florida Engineering Society on 04/04/2008, your team can find information that summarizes the process that SWFWMD uses for evaluating Flood Plains and Basin Storage.

Hope this helps.

Paul Snead
Lead Environmental Specialist
Nuclear Plant Development
Progress Energy
paul.snead@pgnmail.com
(919) 546-2836

From: Hank.Higginbotham@swfwmd.state.fl.us [mailto:Hank.Higginbotham@swfwmd.state.fl.us]
Sent: Thursday, May 14, 2009 4:19 PM
To: Windom, Amy/ORL
Cc: Monte.Ritter@swfwmd.state.fl.us
Subject: RE: April, 2008 FES presentation on Flood Plains & Historic Basin Storage

Amy,

Attached is the file you requested.

Call me if you have any questions regarding the presentation, and good luck on your project in Levy County.

Thanks,

Hank Higginbotham, P.E.
Senior Professional Engineer
Southwest Florida Water Management District (SWFWMD)
Resource Regulation Division,
Strategic Program Office
7601 Highway 301 North
Tampa, Florida 33637-6759
800-836-0797, x2001 (Florida only) or
813-985-7481, x2001
Fax: 813-987-6746, SunCOM: 578-2001
e-Mail: hank.higginbotham@swfwmd.state.fl.us
http://www.swfwmd.state.fl.us

Hearing Identifier: Levy_County_COL_Public
Email Number: 467

Mail Envelope Properties (2F550AA5C53B794C8D80578767411C03060F82E5)

Subject: FW: April, 2008 FES presentation on Flood Plains & Historic Basin Storage
Sent Date: 9/17/2009 6:41:47 PM
Received Date: 9/17/2009 6:42:15 PM
From: Snead, Paul

Created By: paul.snead@pgnmail.com

Recipients:
"Moser, Michelle" <Michelle.Moser@nrc.gov>
Tracking Status: None
"Bruner, Douglas" <Douglas.Bruner@nrc.gov>
Tracking Status: None

Post Office: NT000833.oak.zone1.progress-energy.com

Files	**Size**	**Date & Time**
MESSAGE	1920	9/17/2009 6:42:15 PM
Flood Plains & Historic Basin Storage as of 04-04-08.pdf	4807985	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Flood Plains (FP) and Historic Basin Storage (HBS)

Their Importance to Flood Control, Storm Water Quality and the District's Regulatory Program

Presented by
Hank Higginbotham, P.E.
Regulation Performance Management Department,
Resource Regulation Division
Southwest Florida Water Management District
Tampa Service Office, 800-836-0797 (Florida only)
813-985-7481, x2001 (Local) or SunCom 578-2001
hank.higginbotham@swfwmd.state.fl.us

florida engineering society

National Society of Professional Engineers®

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Slide #1
As of 04/04/08

Power Point© file name: Flood Plains & Historic Basin Storage as of 04-04-08.ppt

Disclaimer

For Today's Presentation

This slide show presentation (and it's associated handout materials) must not be considered as District policy, and is provided for future reference and study. Permit applications are issued or denied based on District Rule criteria and State Statute authority.

The purpose of these documents is to provide general guidance and training for District and staff (including their consultants) in order to meet their mission to the people of the State of Florida.

The guidance presented today may be modified in the appropriate circumstances.

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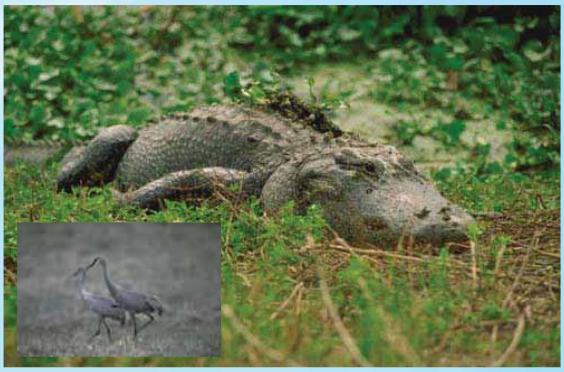
Benefits of Flood Plain & Historic Basin Storage areas

- Provides a temporary natural storage area for floodwater. This minimizes flood damage to adjacent upland areas.
- Serves as recharge areas for the aquifer.
- Improves water quality — sediments settle out of floodwater as it flows across a flood plain.
- Provide important natural habitats for animals and plant life.

http://www.swfwmd.state.fl.us/documents/publications/files/floodplainfacts.pdf

Flooding impacts



Natural habitat protection

Storm Water Pollution

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The Hazards of Building Within a Flood Plain

Residential development within flood plains has increased over the years due to the flood plain's rural character, attractive native landscapes, abundance of wildlife, the unavailability of higher ground and low land costs. At a minimum, residents who move into a flood plain will experience significant and prolonged nuisance flooding consisting of "bank full" roadway swales, drainage ditches and yard / driveway inundation. During more significant flooding events public access roadways are overtopped, conveyance systems are damaged, septic tank drain fields are stressed, and floor slab elevations are threatened.

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The Floodplain Facts

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Building in a Flood Plain effects everyone.

Slide #4
As of 04/04/08

Cumulative Impacts

How do you answer your client when s(he) states their project is so small that that it will not impact the Flood Plain?

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Cumulative Impacts

Potential Questions, Analogies and Answers

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Cumulative Impacts

http://en.wikipedia.org/wiki/Camel_(cigarette)

- If a non-smoker smokes just one cigarette, it will not effect their health (it may however make them turn green).
- If a teenager starts smoking cigarettes at age 16, but quits at age 17, it will typically not kill them.
- How many cigarettes must a person smoke to develop emphysema or lung cancer?

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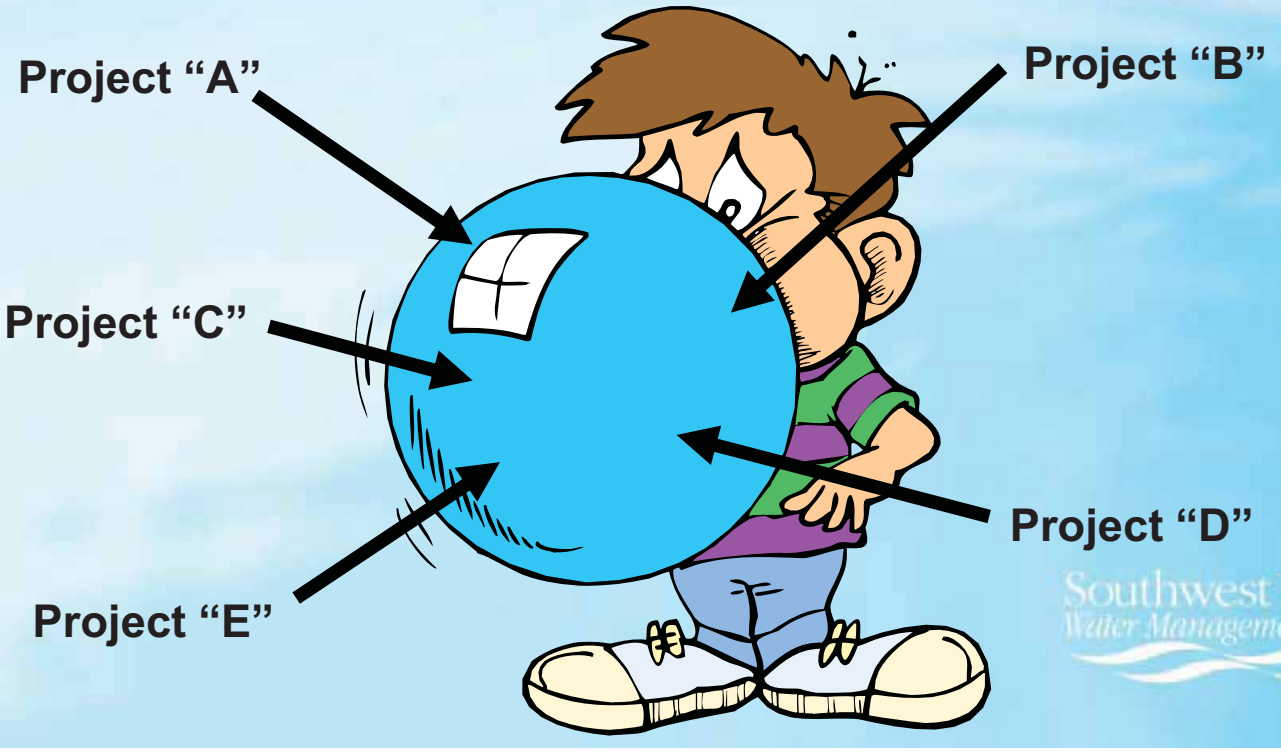
Analogy of "cumulative impacts" within the Flood Plain

Imagine that the balloon is a Flood Plain. When a major storm event occurs, it is like the little boy blowing up the balloon to capacity. If development occurs within the Flood Plain (without compensation) it is like pushing on the balloon from many directions. The balloon (Flood Plain) will change shape as impacts occur (potentially flooding existing property owners that may have been in adjacent uplands). Eventually, cumulative impacts will "burst" the balloon, and everyone adjacent to the Flood Plain may experience **higher flood stages for longer durations**.



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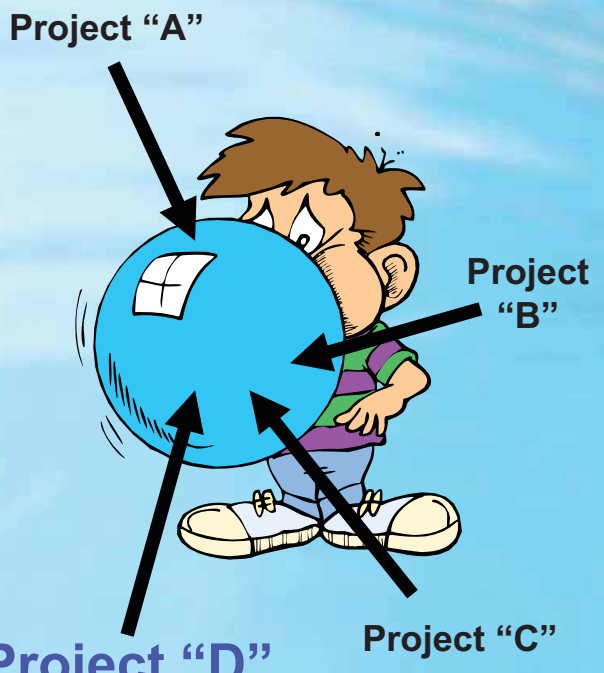
The last development in the watershed usually gets the shaft.

If projects “A” through “C” are allowed to impact the flood plain (without compensation), then the Flood Plain “Balloon” may expand (encroach) onto the last remaining properties in the watershed. This will render Project “D” undevelopable, or at a minimum cost the owner a lot of $$$ to develop his / her property.



The principle of fairness

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June 18, 2001

No Adverse Impact:
A New Direction in Floodplain Management Policy

Larry Larson[1] and Doug Plasencia[2]

Abstract:
Annual flood losses in the United States continue to worsen in spite of 75 years of federal flood control and 30 years of the National Flood Insurance Program. This trend is unnecessary, and is primarily due to federal policies that have encouraged at-risk development, provided for insufficient consideration of the impact of that development on other properties and on future flood and erosion potentials, justified flood control projects based on a benefit-to-cost ratio that favors an intensification of land uses within the floodplain, and engendered an unhealthy reliance on federal resources by state and local governments. The authors propose a new "no adverse impact floodplain" approach that shifts the focus from the techniques and standards used for floodprone development to how adverse impact resulting from those land use changes can be planned for and mitigated. The proposed policy promotes fairness, responsibility, community involvement and planning, sustainable development, and local land use management, while not infringing on private property rights.

Refer to the community case examples beginning on page #14 of this document, especially the DuPage County, Illinois (West Chicago) case on page #15.

http://www.floods.org/NoAdverseImpact/NAIjournal.pdf

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Regulatory Implications

Cumulative Impacts

- **The perception of "Double Standards" by the public**

- **Potential Third party objectors**

(can tie-up you client's project in a De Novo or Administrative Hearing)

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Flood Plain Hazards

Consequences to the development potential of a piece of property:

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Flood Plain Hazards

- **Additional earth fill** over the site to minimize flooding impacts to access roadways and the finished floor elevations of buildings.

- Any **additional earthwork** & grading operations over the site **may cause additional impacts to the Flood Plain** that will require compensation areas.

- Unlike wetland mitigation, **Flood Plain compensation areas can NOT be credited from an off-site "bank".**

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Flood Plain Hazards

Consequences to the Engineer of Record:

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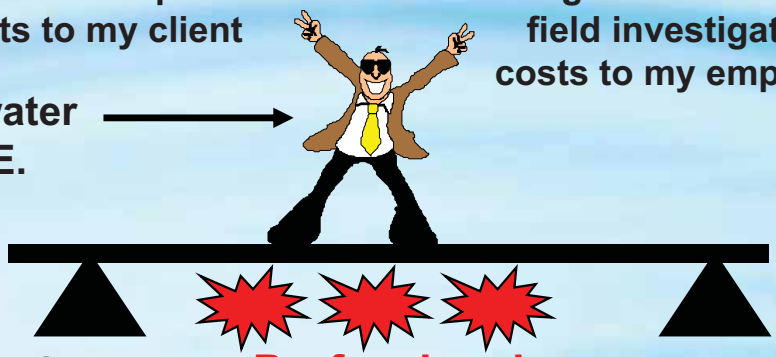
A major consideration in storm water management is the balancing of Risk (and Liability) vs. Cost.

Higher development costs to my client

Higher research & field investigation costs to my employer

The storm water design P.E.



My Client

Professional liability risk

My Employer

Who is looking after the interest of this lady's PROPERTY RIGHTS?

What level of risk are you willing to take in the design of your surface water management system?

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Drainage Law Review – from the FDOT Drainage Manual (2008 Edition)

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

DRAINAGE MANUAL

OFFICE OF DESIGN, DRAINAGE SECTION January 2008
TALLAHASSEE, FLORIDA

Topic No. 625-040-002-b
Drainage Manual

Effective: January 2005
Revised January 2008

APPENDIX C
DRAINAGE LAW

C.1 OVERVIEW

Current drainage law has evolved from case law in the courts, administrative hearing rulings, and the requirements which have been placed on the Department by other regulatory agencies. The discussion presented in this chapter of the Department's legal rights and responsibilities to the public as they relate to highway drainage is not intended as a substitute for legal counsel, but rather to familiarize engineers with basic drainage law, terminology, rules, and applications as they relate to state road design and maintenance.

This document can be downloaded from the following web address:

http://www.dot.state.fl.us/rddesign/dr/Manualsandhandbooks.htm

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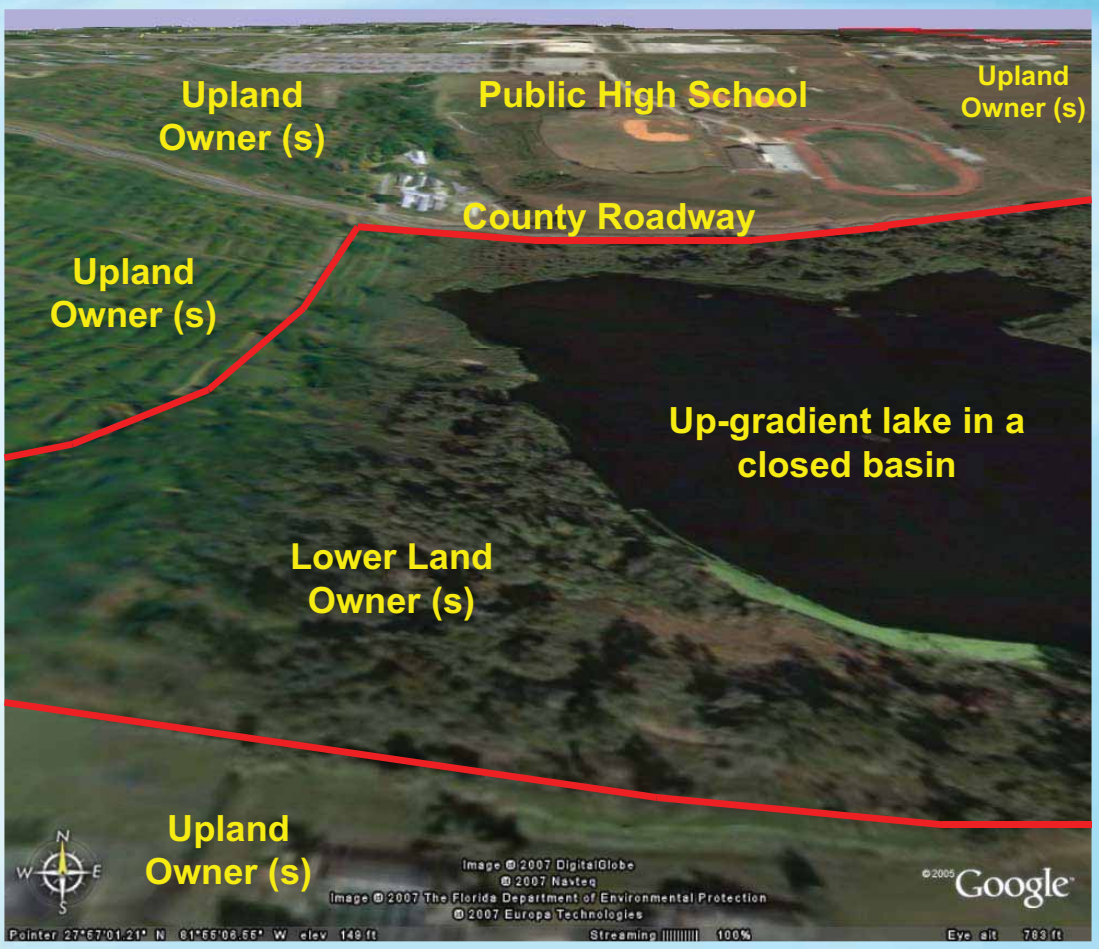
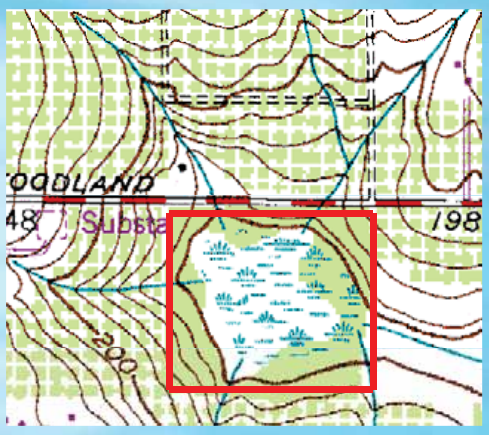
Surface Water Law – Duties of the Upland and Lower Land Owners

Sections C.3.1 and C.3.2 of the 2008 FDOT Drainage Manual





USGS Quad Sheet – 10 foot contour interval (from the SWFWMD GIS database)

Source of (distorted) oblique image: Google Earth Pro©
http://earth.google.com/earth_pro.html

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Slide #17
As of 04/04/08

Surface Water Law – The Upland Owner

Section C.3.1 of the 2008 FDOT Drainage Manual

- **Ideally,** the surface water flow should imitate the conditions in existence when the lands were in a natural state *(i.e. maintain the status quo).*

- **Realistically, changes** made in the development of real property **are reviewed by the courts on a case-by-case basis** to determine whether the changes which occur are substantial and whether the development has been reasonable.

- A major factor, if the courts find that a nuisance has been created by the upland owner on the lower land, is whether or not the lower land owner came to the nuisance.

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Surface Water Law – The Lower Land Owner

Section C.3.2 of the 2008 FDOT Drainage Manual

- Generally, the lower land owner has the duty to the upland owner not to prevent or obstruct the flow of surface waters onto his land from that of the upland owner.
- The lower land owner cannot exclude these surface waters, nor can he cause the water to flow back to his upland neighbor.
- If the lower land owner diverts additional waters into the land-locked basin, and takes the chance that such a natural event could occur, the lower land owner may be responsible for the surface-water overflow onto the neighboring property.

QUESTION for the last bullet: If the lower land owner constructed additional impervious areas on his / her property (without retaining the additional runoff volumes), then is (s)he *"diverting additional waters"* into the land locked basin?

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How does drainage law, cost and risk tie into Federal and local governments?

The national flood insurance program.

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Flood Insurance Rate Map (F.I.R.M.)

Does the word "engineering" appear in F.I.R.M. ?

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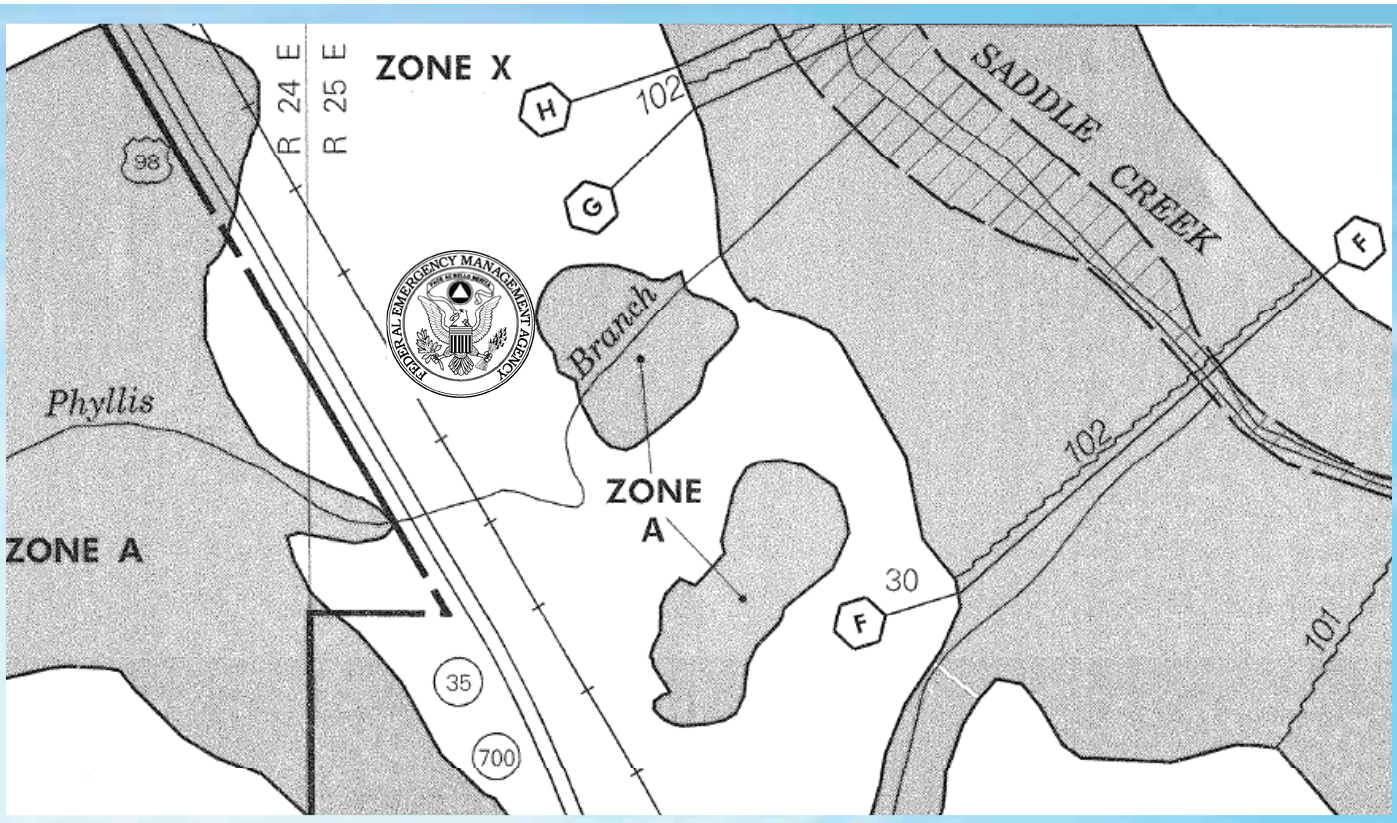

F.I.R.M. maps estimate Flood ZONES

(i.e. flood hazards & their associated Risk).

They do NOT determine the horizontal and vertical limits of a Flood Plain

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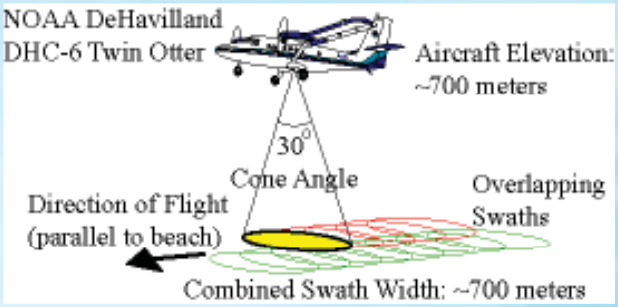
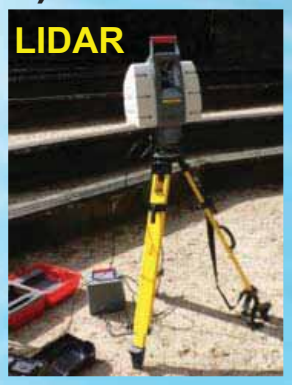
F.I.R.M. maps utilize MINIMUM engineering analysis

to predict potential flood hazards along major rivers, streams and large lakes with outfall structures (Zones A1 – A30, etc.).

Stereoscope





LIDAR (*Light Detection and Ranging*)

Field survey data (the foundation of the analysis) is limited due to cost.

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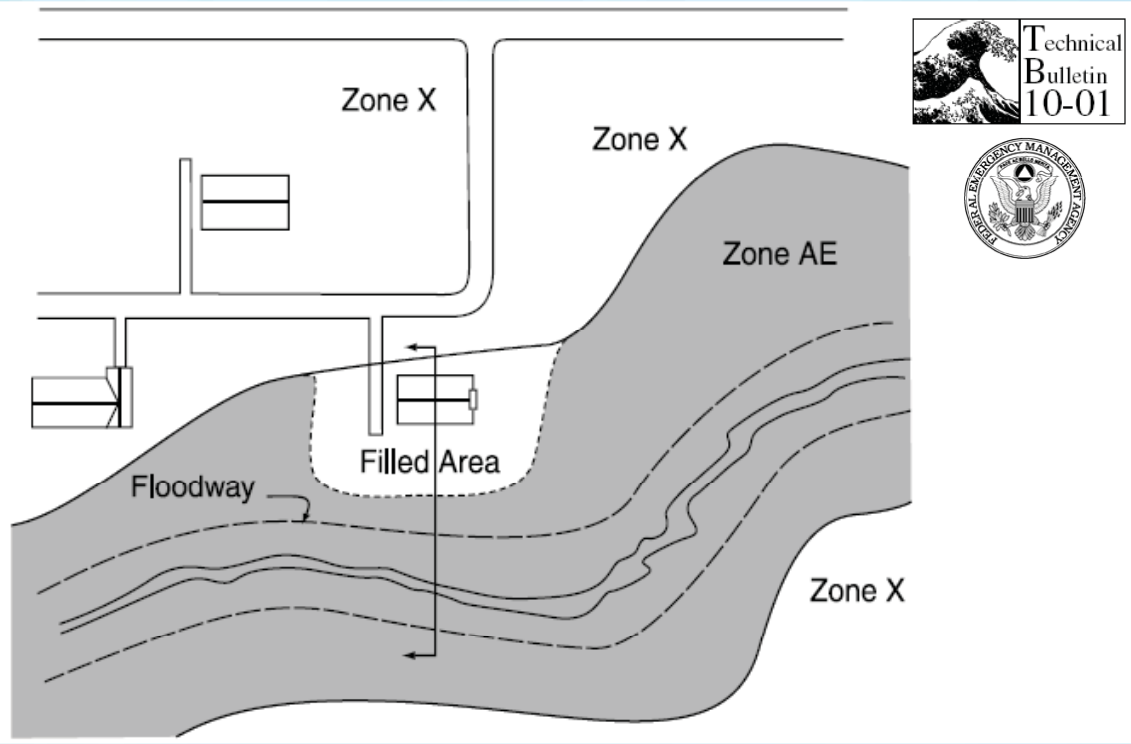
Zones "A1 through A30" on a F.I.R.M. Map indicates where *"Areas of 100-year flood; base flood elevations* and flood hazard factors *determined"*.



Technical Bulletin 10-01

Have they really been "determined", or is "estimated" a better description?

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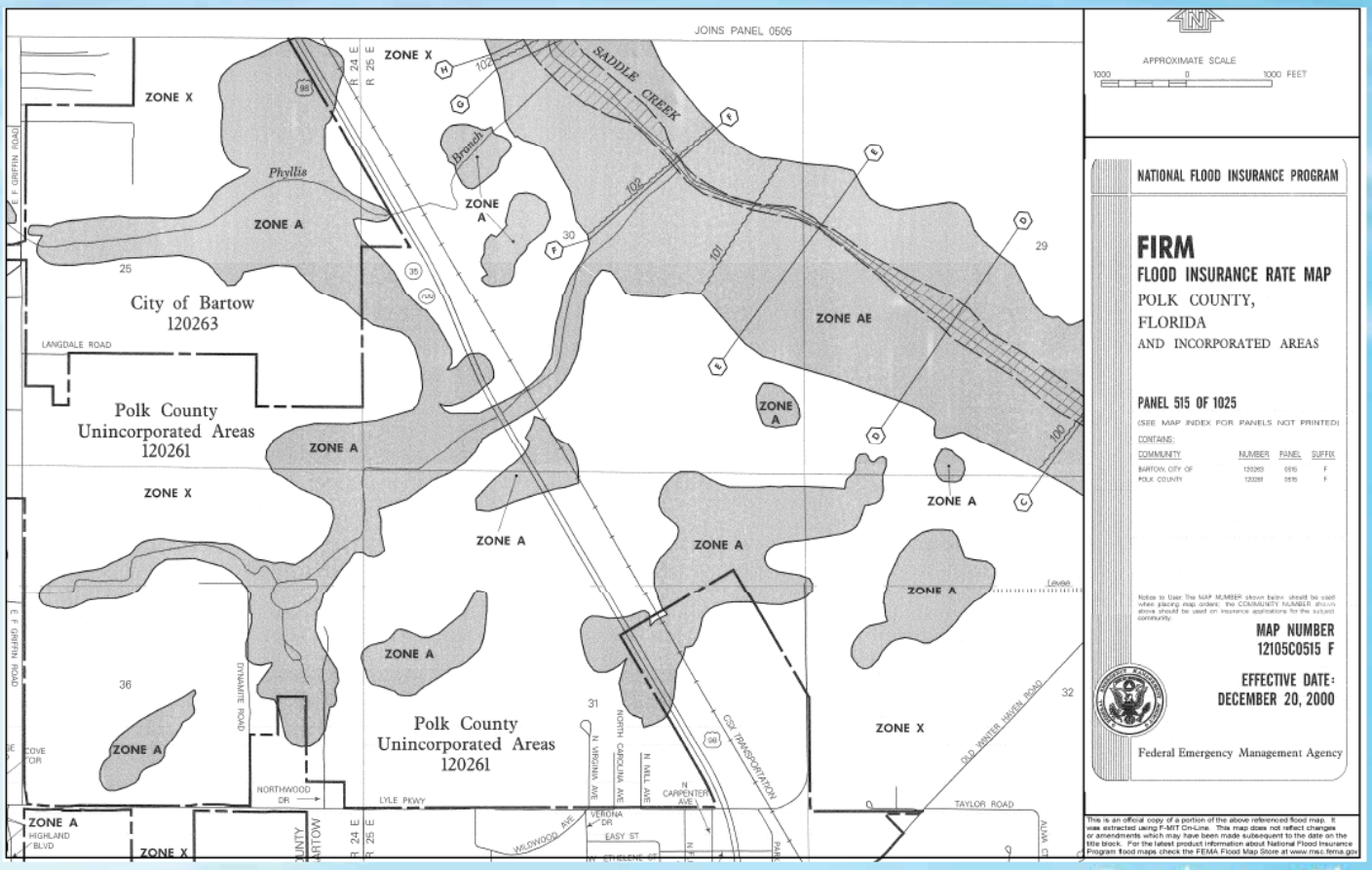
http://www.fema.gov/fima/techbul.shtm

In Florida, Zone "A" designations are frequently the majority of the flood hazards that are identified on a F.I.R.M. map.



Zone "A" on a F.I.R.M. Map indicates *"Areas of 100-year flood; base flood elevations and flood hazard factors NOT determined".* Zone "A" flood hazards are "estimated" by FEMA for smaller lakes, wetlands and streams.

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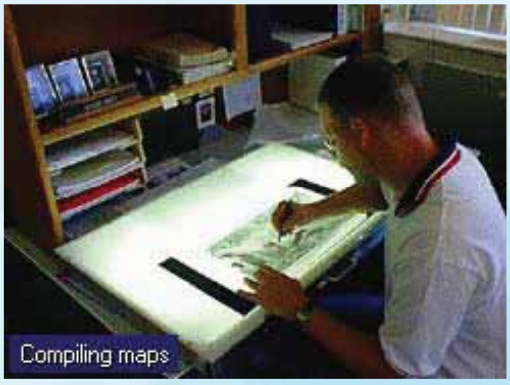
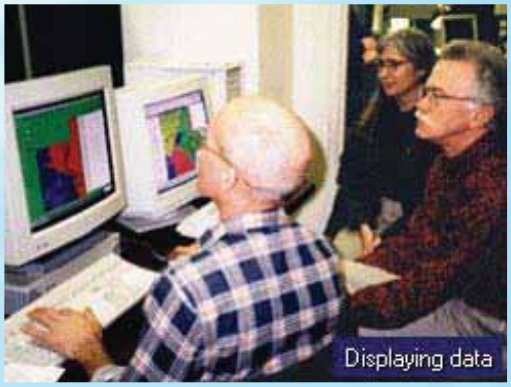
Slide #25
As of 04/04/08

Data that is used by FEMA to estimate ZONE "A" flood hazards:

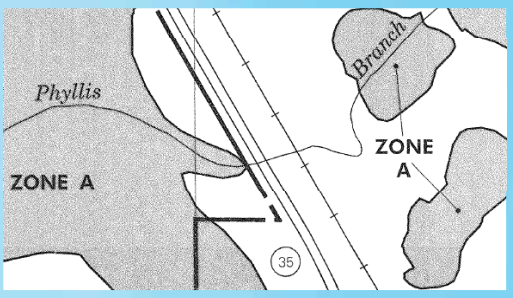
- Federal Natural Resource Conservation Service **(NRCS) Soil Surveys** (for wetland / hydric soils)
- Federal United States Geological Survey **(USGS) Quadrangle Sheets** (for 5' or 10' topography) – **this vertical data is too course for detailed analysis**
- Federal United States Fish & Wildlife Service (NWS) **National Wetland Inventory Maps**
- **Recent Aerial Photography**, typically obtained from the State Department of Transportation



Light table overlays – older technology



Graphical Information Systems (GIS) – current technology



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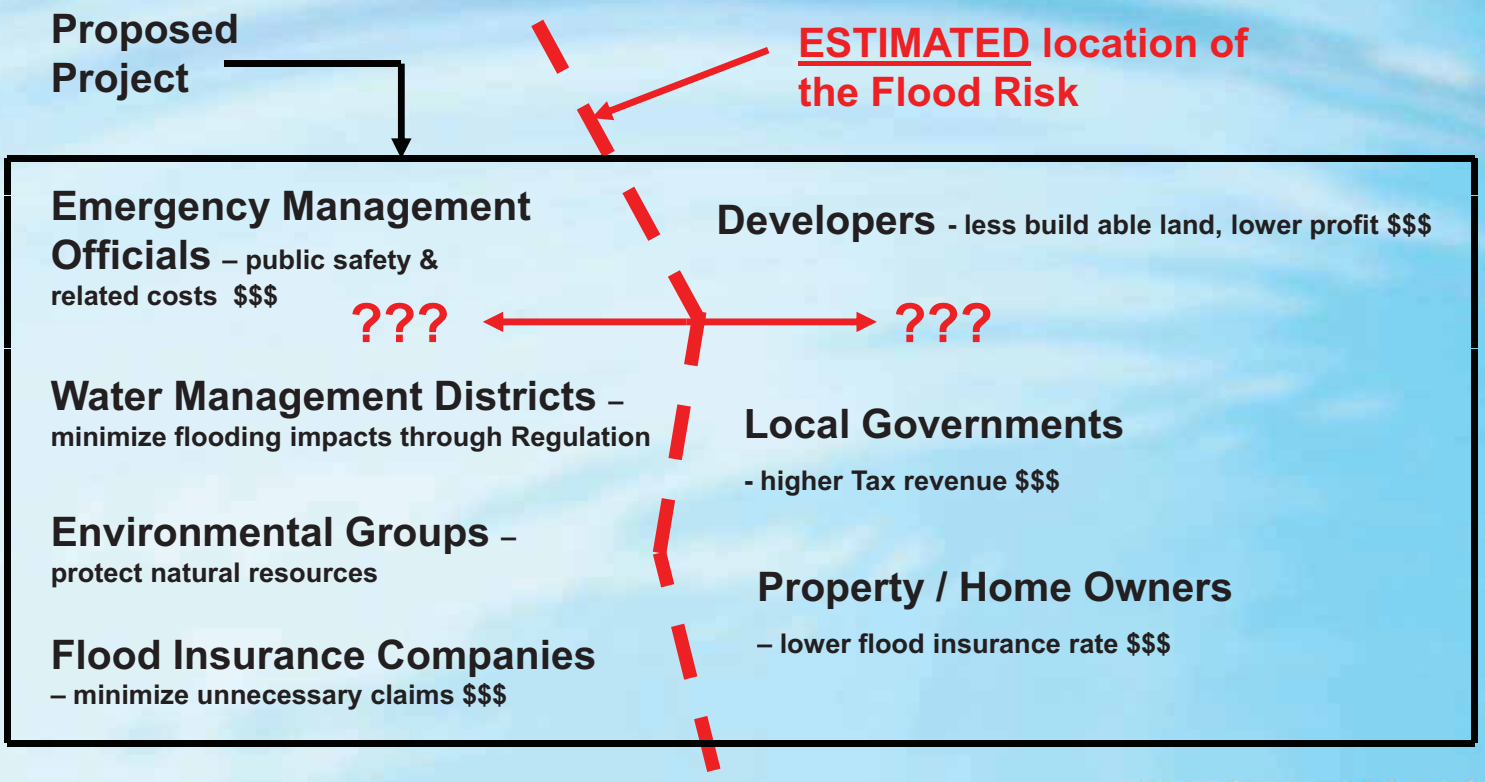
Who are the potential stakeholders in the designation of Flood Hazard (Risk) Areas?



Development (property) rights vs. public welfare & safety issues, all driven by $$$

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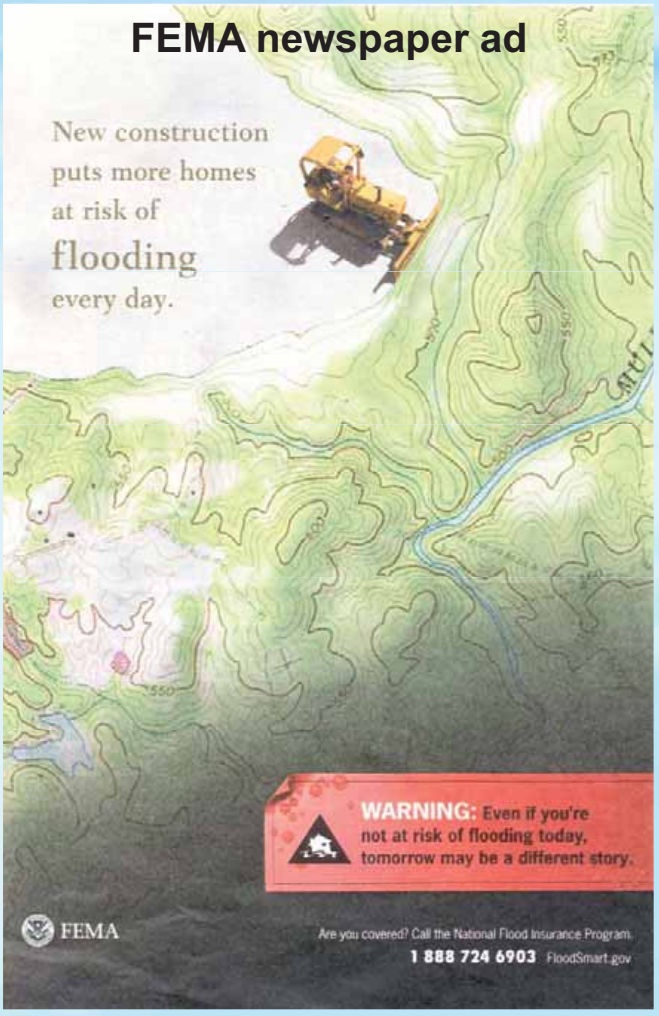
Flood Plain Hazards



Treat a F.I.R.M. map the same way you would for a 5 – day weather forecast.

They are good planning tools, but don't bet your life (or professional liability) on either of them.

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Flood Protection Responsibilities

Rule 62-40.450(1)(a), Florida Administrative Code

Local governments have the primary responsibility

for regulating land use, enforcing construction criteria for flood prone areas, establishing local storm water management levels of service, constructing and maintaining local flood control facilities, and otherwise preventing flood damages to new and existing development.

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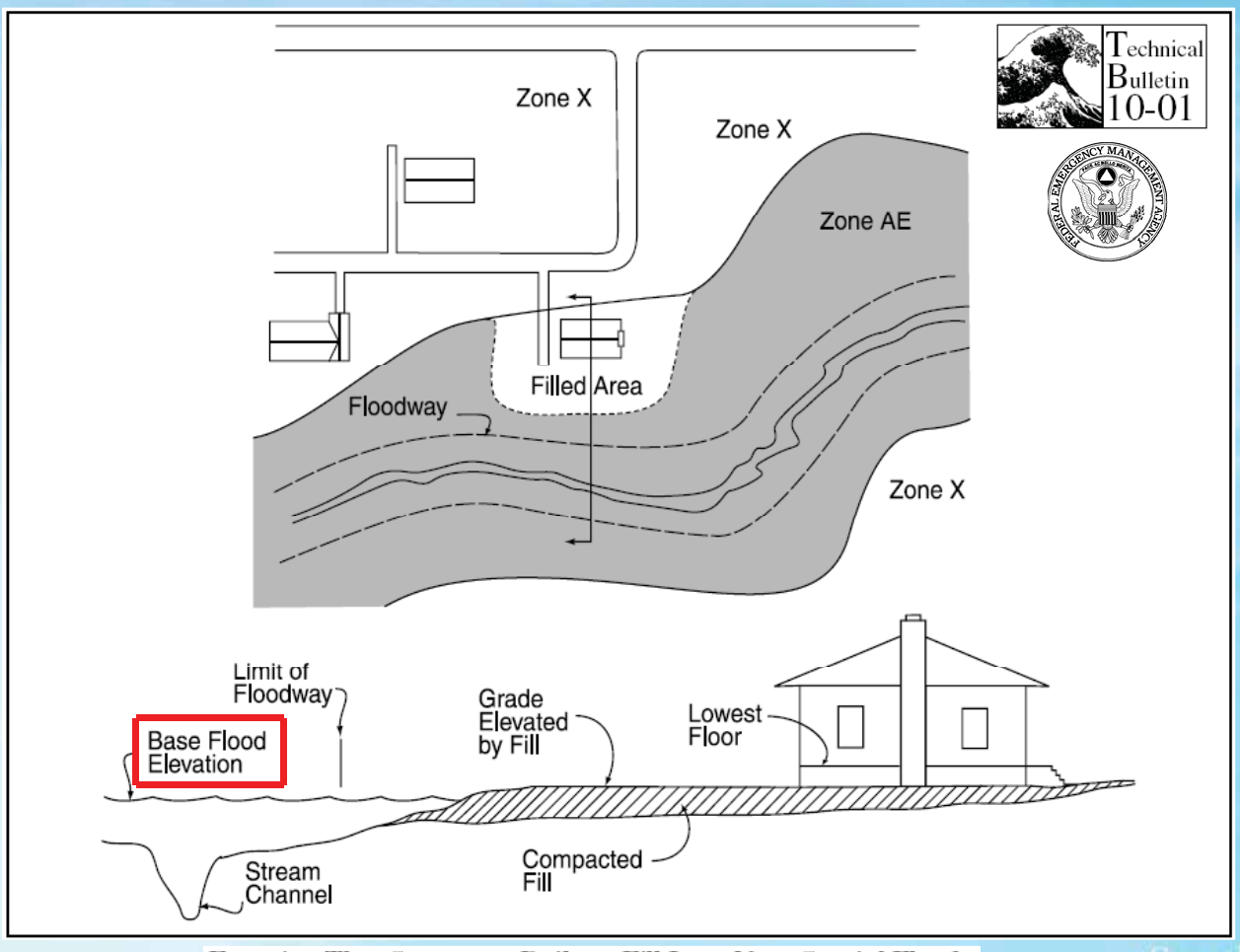
Measures to minimize risk to home flooding



Ensuring That Structures Built on Fill In or Near Special Flood Hazard Areas Are Reasonably Safe From Flooding
in accordance with the
National Flood Insurance Program

http://www.fema.gov/fima/techbul.shtm

FEMA

FEMA guidance documents

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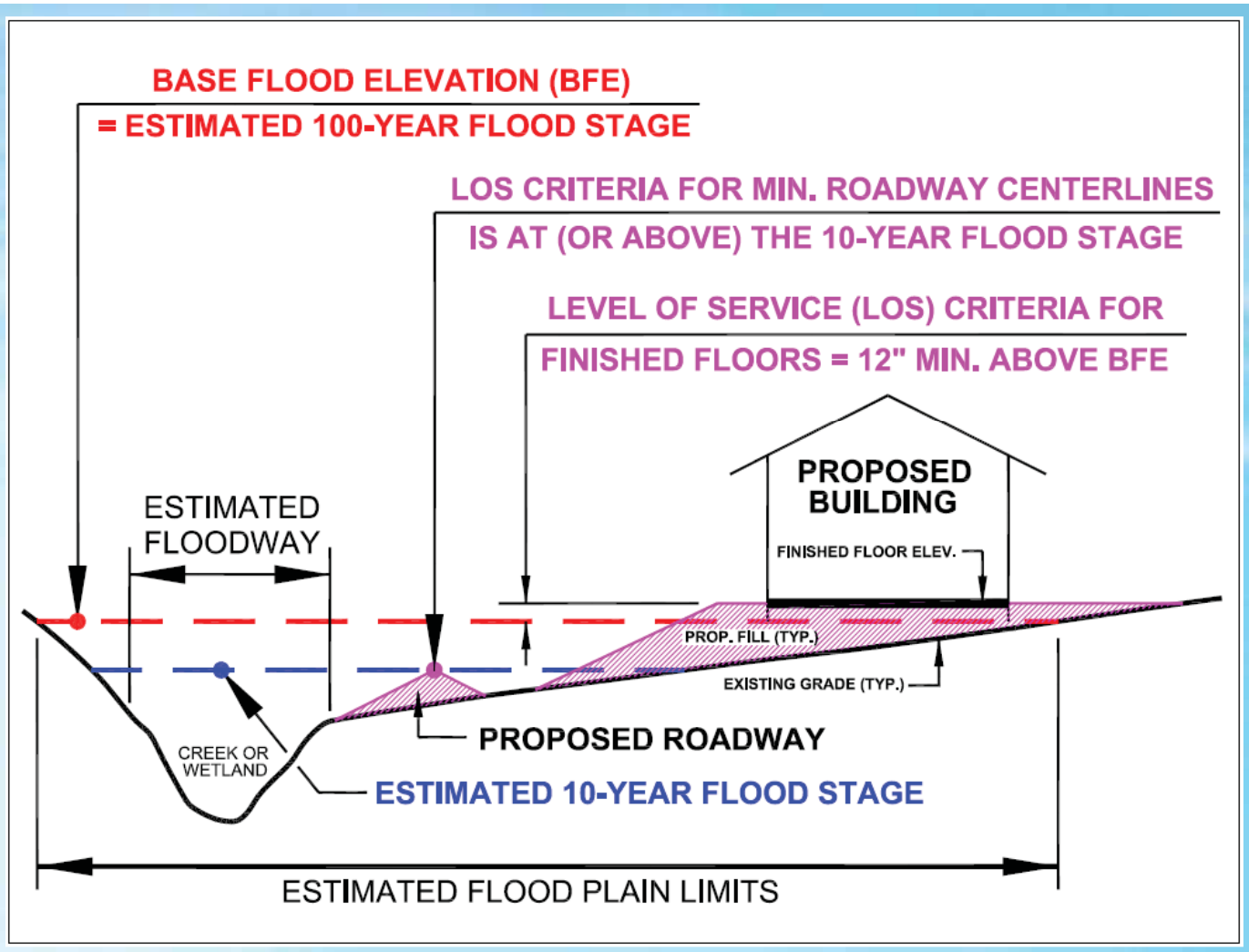

Typical City / County Level of Service (LOS) Standards

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The finished floor elevation of this home is probably set above the Base Flood Elevation – BFE (the estimated 100-year flood stage). However, the surrounding yards are probably in the flood plain.

Road centerline elevations of these private roads may (or may not) have been set above the County's standards for publicly owned roadways.

Potential problems in residential subdivisions with private roads.

Who's risk / liability is in question?

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Flood Plains (FP) and Historic Basin Storage (HBS)

Let's talk about some *"generic"* definitions.

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What are Flood Plains?

- **FLOOD PLAINS are normally dry or semi - dry land areas to which water naturally flows as water levels rise.**
  Floodplains are typically found near rivers, lakes and the coast; however, many of Florida's flood-prone lands are simply low-lying areas or depressions where water naturally collects when it rains.

- **FLOOD PLAINS provide detention (temporary storage) that is dynamic - water will move (flow) downstream.**

Hunting & Fishing Shack Built Within the Flood Plain Along the Manatee River.

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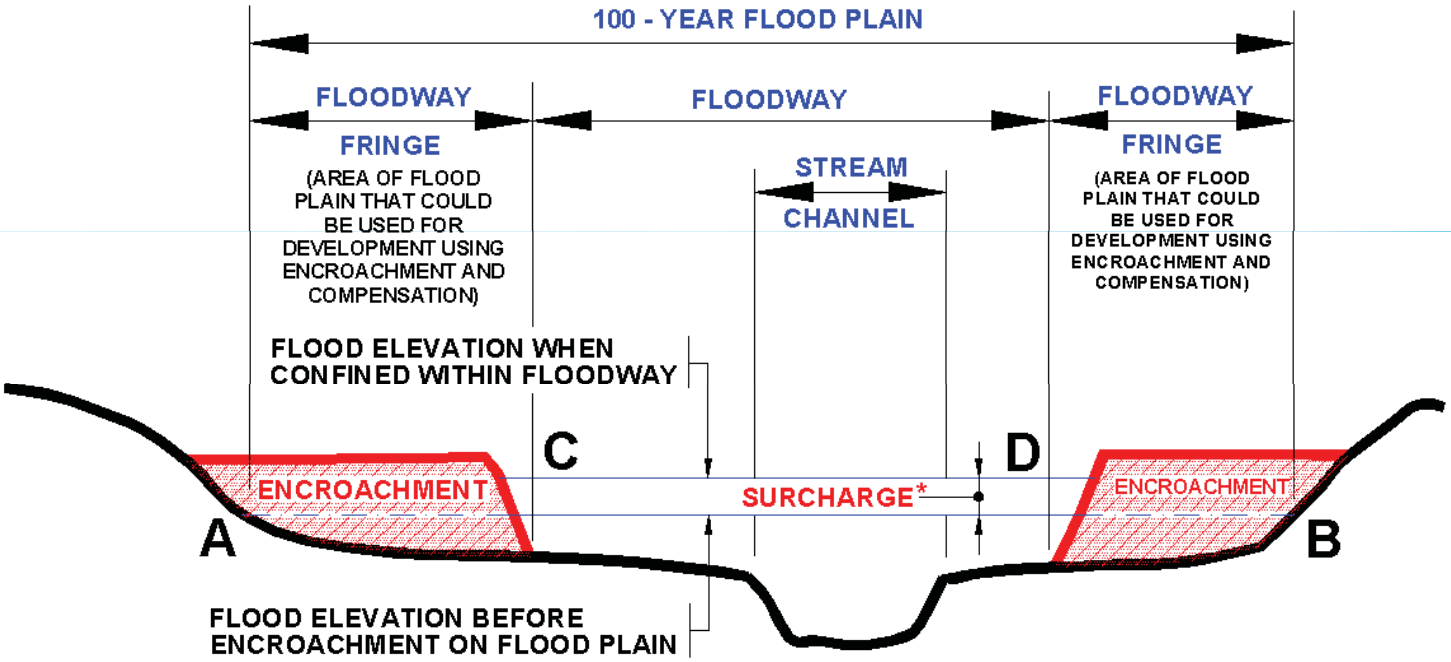
Riverine Flood Plains

As defined by the Federal Flood Insurance Rate Maps (FIRMs)



LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT

LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT

* THEORETICAL SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

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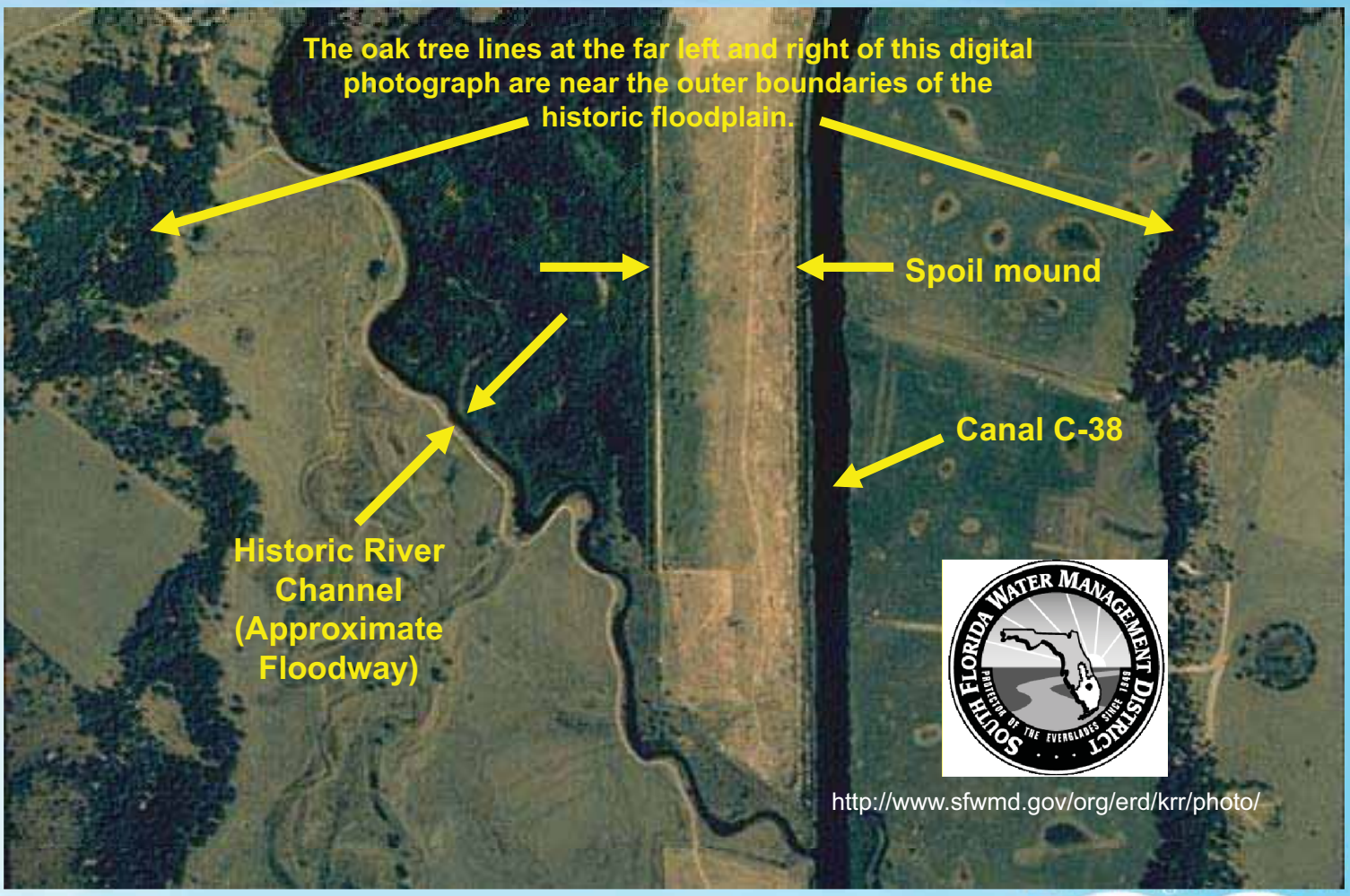
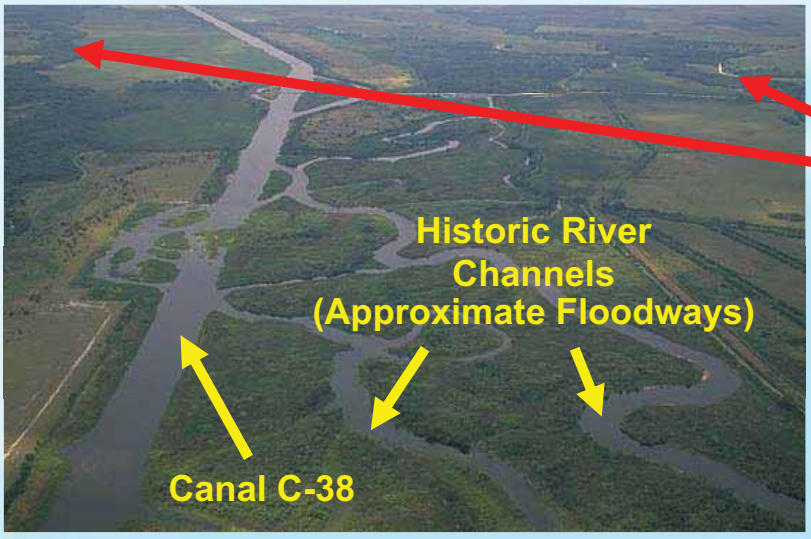
Kissimmee River Flood Plain



Aerial views of the channelized system showing the canal (center) and spoil mound (left-center), drained floodplain, and remnant river channel.

Kissimmee River Flood Plain



http://www.sfwmd.gov/org/erd/krr/photo/

The oak tree lines on these digital photographs mark the (approximate) outer historical boundaries of the floodplain.

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What is Historic Basin Storage?

- **HISTORIC BASIN STORAGE** is the wet or dry depression storage available on the site in the pre-development condition.

- **HISTORIC BASIN STORAGE** provides retention storage that is static. Storm water can only escape via evaporation into the air, or percolation into the soil.

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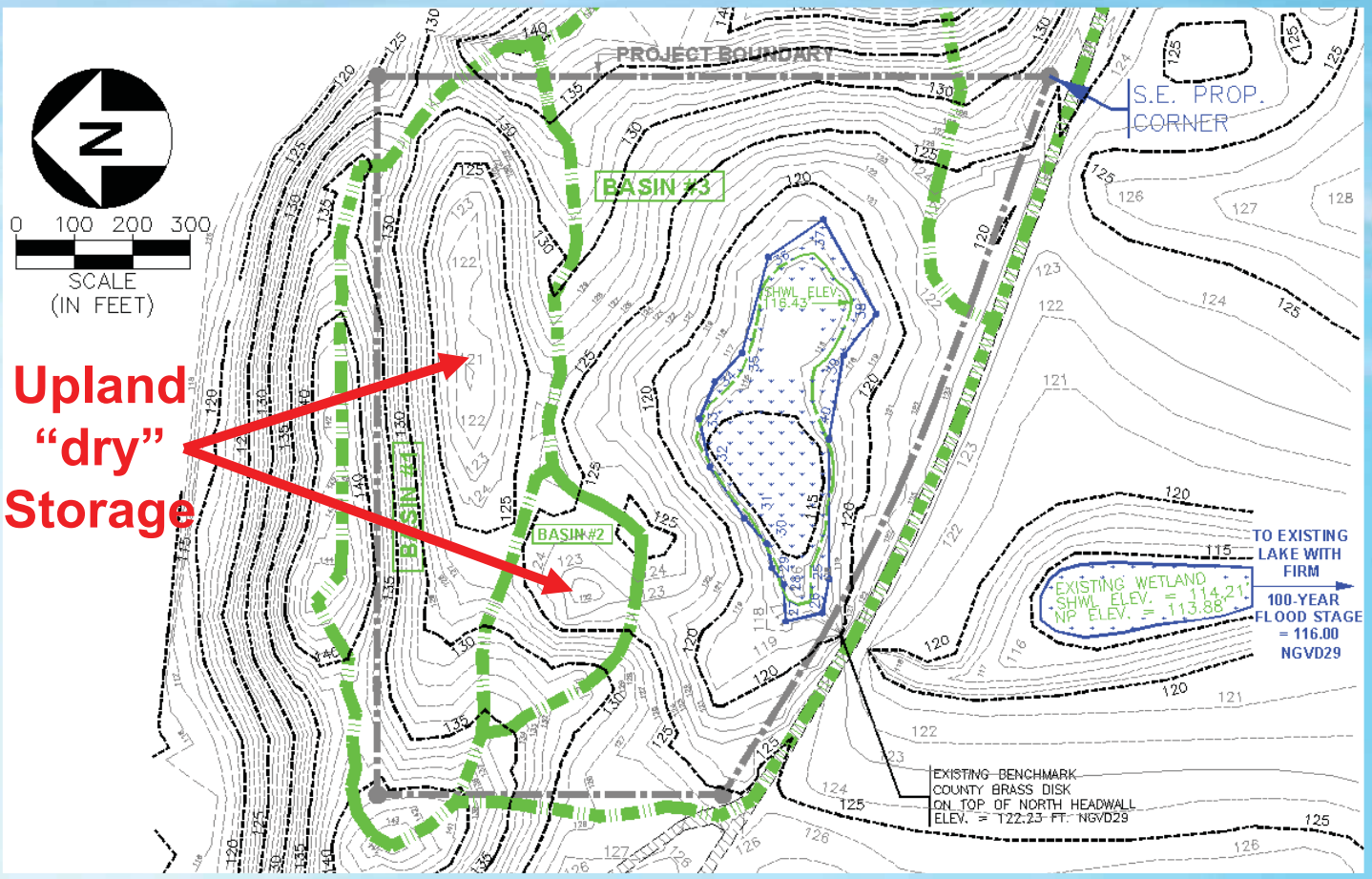
The Importance of Historic Basin Storage (HBS)



Typically, FEMA does not classify these types of "dry" HBS areas as Flood Hazards on their FIRM maps.

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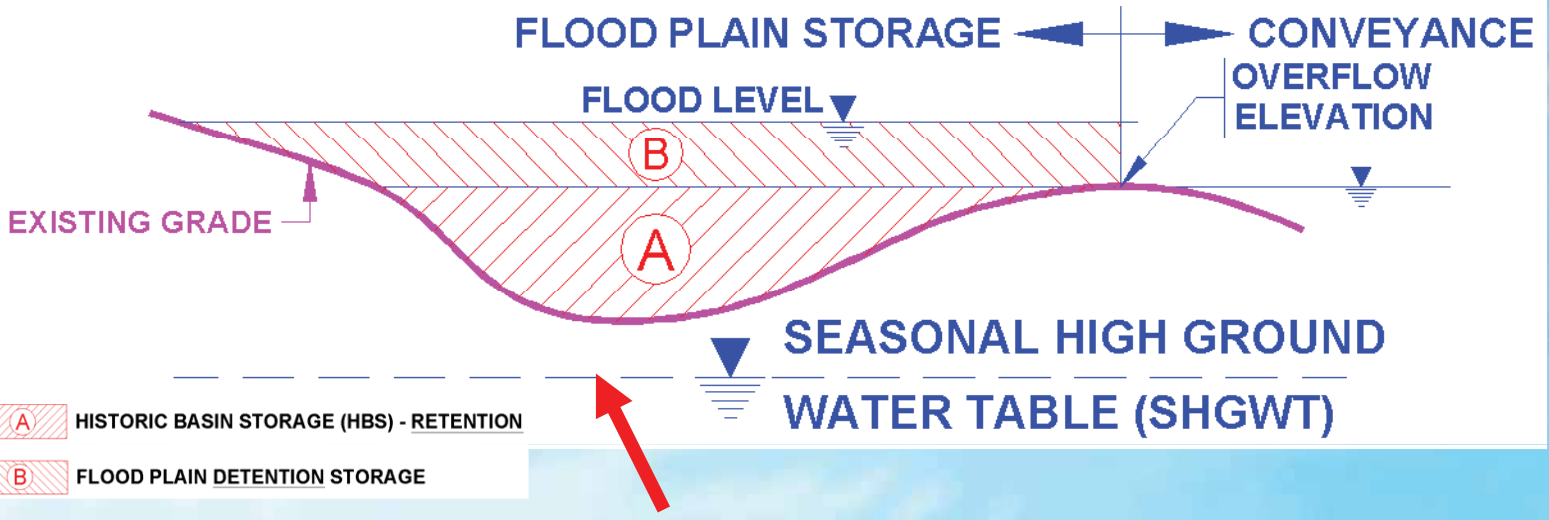
Flood Plains and Historic Basin Storage within Uplands

UPLAND STORAGE WITH SHGWT BELOW NATURAL GRADE



RETENTION:

TO PERMANENTLY RETAIN OR HOLD BACK. STORM WATER CAN ONLY ESCAPE VIA EVAPORATION INTO THE AIR, OR PERCOLATION INTO THE SOIL.

DETENTION:

TO TEMPORARILY HOLD BACK. STORM WATER CAN ESCAPE DOWNSTREAM THROUGH A NATURAL OR ARTIFICIAL OVERFLOW.

SHGWT = SEASONAL HIGH GROUND WATER TABLE :

THE ZONE OF WATER SATURATED SOIL AT THE HIGHEST AVERAGE DEPTH DURING THE WETTEST SEASON OF THE YEAR.

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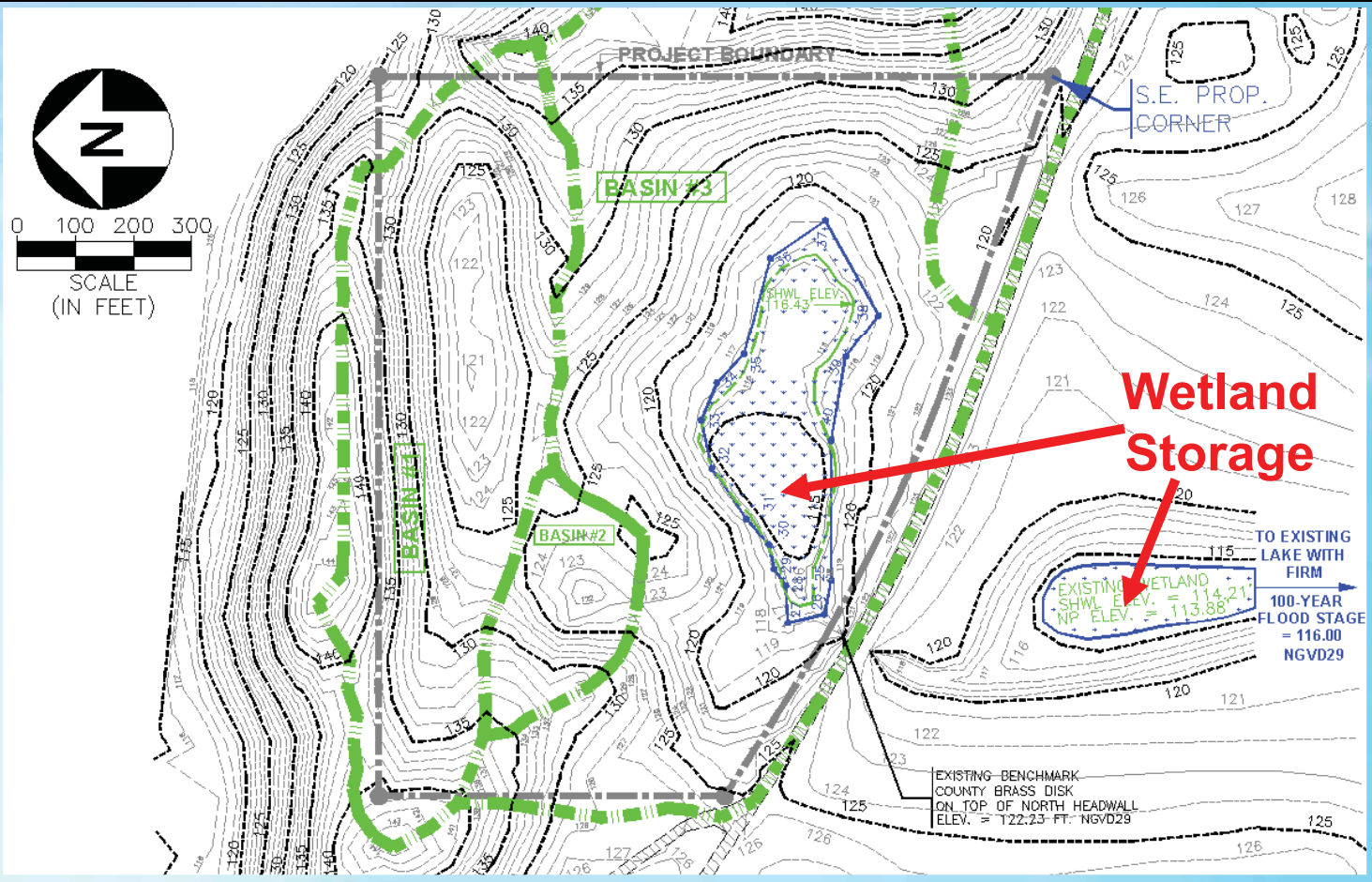
The Importance of Wetland Storage



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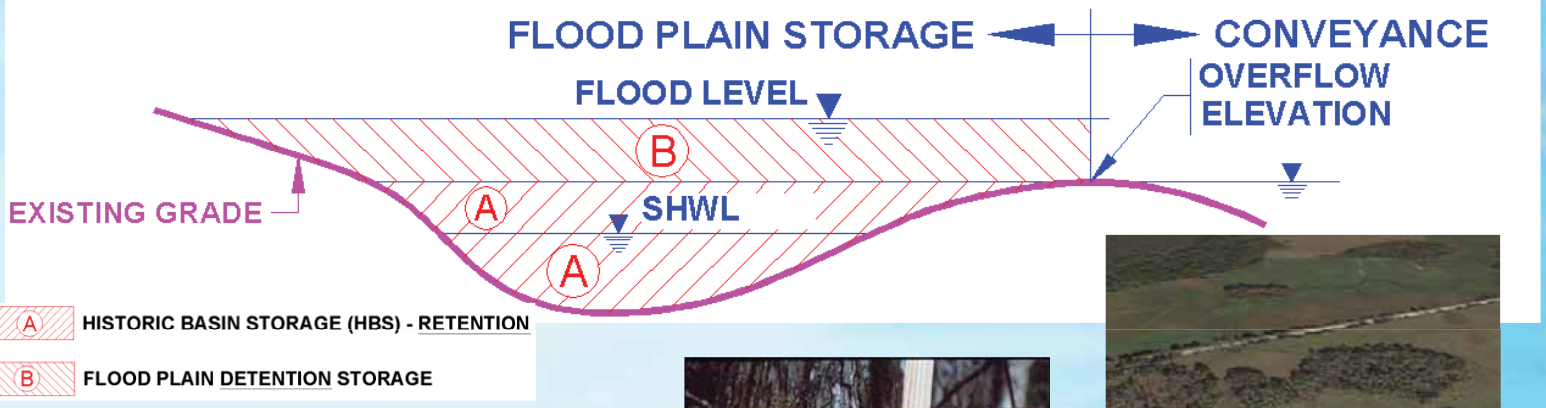
Flood Plains and Historic Basin Storage within Wetlands

WETLAND SHWL BELOW OVERFLOW - (I.E. ISOLATED WETLANDS)



RETENTION:

TO **PERMANENTLY** RETAIN OR HOLD BACK. STORM WATER CAN ONLY ESCAPE VIA EVAPORATION INTO THE AIR, OR PERCOLATION INTO THE SOIL.

DETENTION:

TO **TEMPORARILY** HOLD BACK. STORM WATER CAN ESCAPE DOWNSTREAM THROUGH A NATURAL OR ARTIFICIAL OVERFLOW.

SHWL = "SEASONAL HIGH WATER LEVEL" :

THE ELEVATION TO WHICH THE GROUND OR SURFACE WATER CAN BE EXPECTED TO RISE DUE TO A NORMAL WET SEASON.

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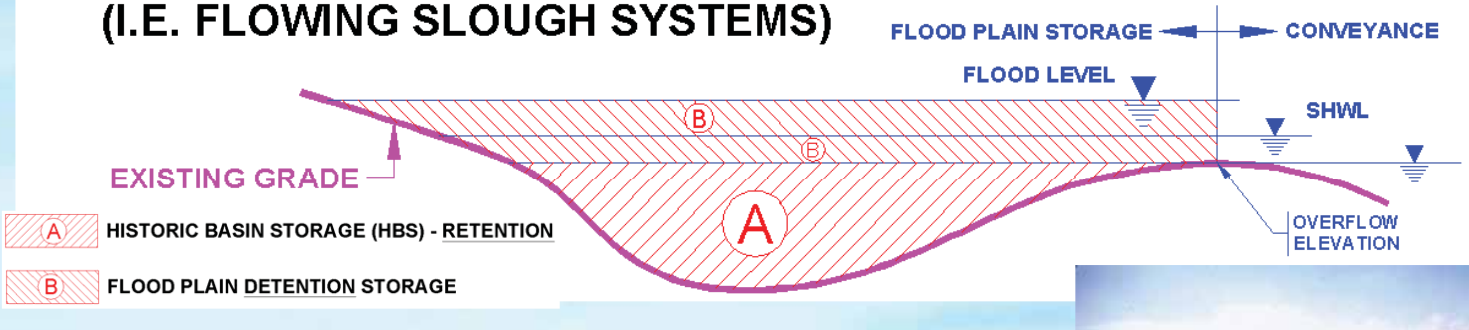
Flood Plains and Historic Basin Storage within Wetland Sloughs

WETLAND SEASONAL HIGH WATER LEVEL (SHWL) ABOVE OVERFLOW (I.E. FLOWING SLOUGH SYSTEMS)



RETENTION:

TO PERMANENTLY RETAIN OR HOLD BACK. STORM WATER CAN ONLY ESCAPE VIA EVAPORATION INTO THE AIR, OR PERCOLATION INTO THE SOIL.

DETENTION:

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SHWL = "SEASONAL HIGH WATER LEVEL" :

THE ELEVATION TO WHICH THE GROUND OR SURFACE WATER CAN BE EXPECTED TO RISE DUE TO A NORMAL WET SEASON.

Digital photographs from the SFWMD web site:

http://www.sfwmd.gov/org/erd/krr/photo/

Patches of broadleaf marsh plants within a wet prairie along the periphery of the floodplain.

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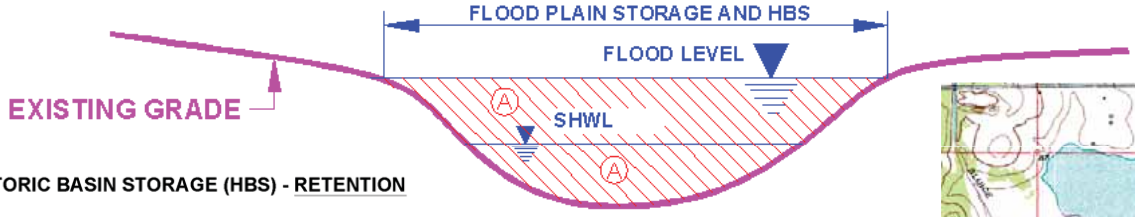
Slide #43

As of 04/04/08

Flood Plains and Historic Basin Storage within a Closed Basin Wetland / Lake

SEASONAL HIGH WATER LEVEL (SHWL) BELOW OVERFLOW (CLOSED BASIN)



A HISTORIC BASIN STORAGE (HBS) - RETENTION

B FLOOD PLAIN DETENTION STORAGE

RETENTION:

TO PERMANENTLY RETAIN OR HOLD BACK. STORM WATER CAN ONLY ESCAPE VIA EVAPORATION INTO THE AIR, OR PERCOLATION INTO THE SOIL.

DETENTION:

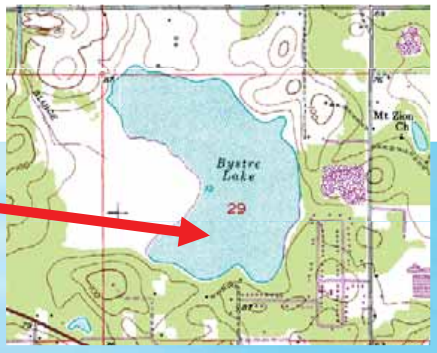
TO TEMPORARILY HOLD BACK. STORM WATER CAN ESCAPE DOWNSTREAM THROUGH A NATURAL OR ARTIFICIAL OVERFLOW.

SHWL = "SEASONAL HIGH WATER LEVEL" :

THE ELEVATION TO WHICH THE GROUND OR SURFACE WATER CAN BE EXPECTED TO RISE DUE TO A NORMAL WET SEASON.

Bystre Lake

Hernando Co.



Lake Deeson

Polk Co.

Closed basins typically occur on lands with steep topography, especially north of I-4 (Citrus & Hernando Counties, Highland Ridge area etc.).

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Flood Plains (FP) and Historic Basin Storage (HBS)

Research and design aids.

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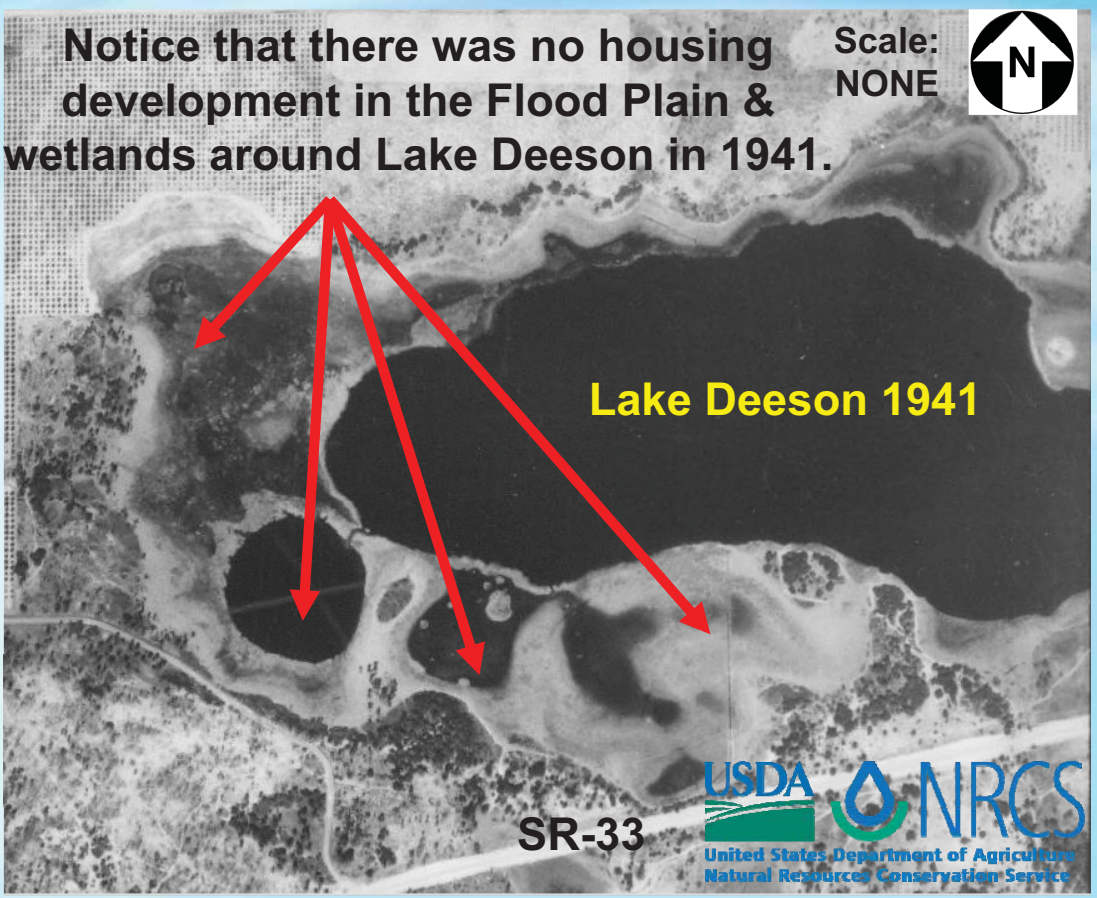
Sources of information to assist in estimating flood hazard areas



1941 black & white photography – from the Natural Resource Conservation Service

Source: State University System of Florida, Institute of Museum & Library Services

http://web.uflib.ufl.edu/digital/collections/FLAP/

Florida Department of State Library Services & Technology Act

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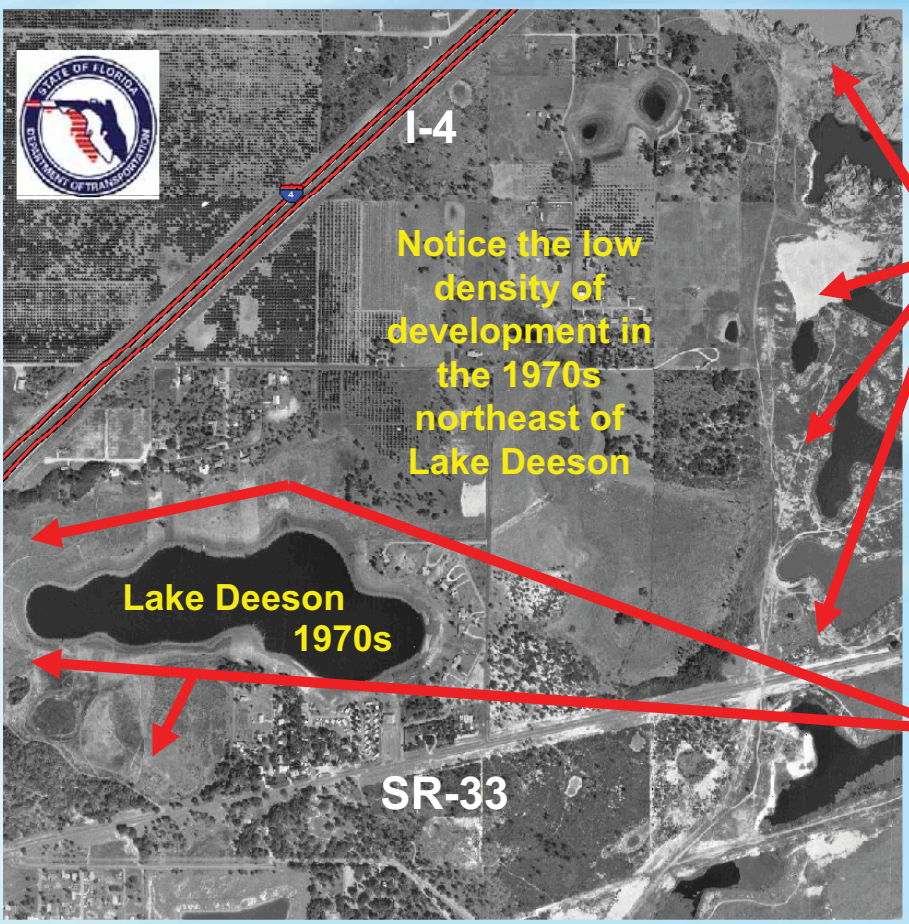
Slide #46

As of 04/04/08

Sources of information to assist in estimating flood hazard areas

1970s Black & white photography – from the Florida Department of Transportation



Look how low the water level was in Lake Deeson. Possible causes:

1. Drought
2. Phosphate mining activities in the late 1960s & early 1970s.

N

Scale: NONE

Source: SWFWMD GIS data base

Notice that there was no housing development in the Flood Plain & wetlands around Lake Deeson in the 1970s.

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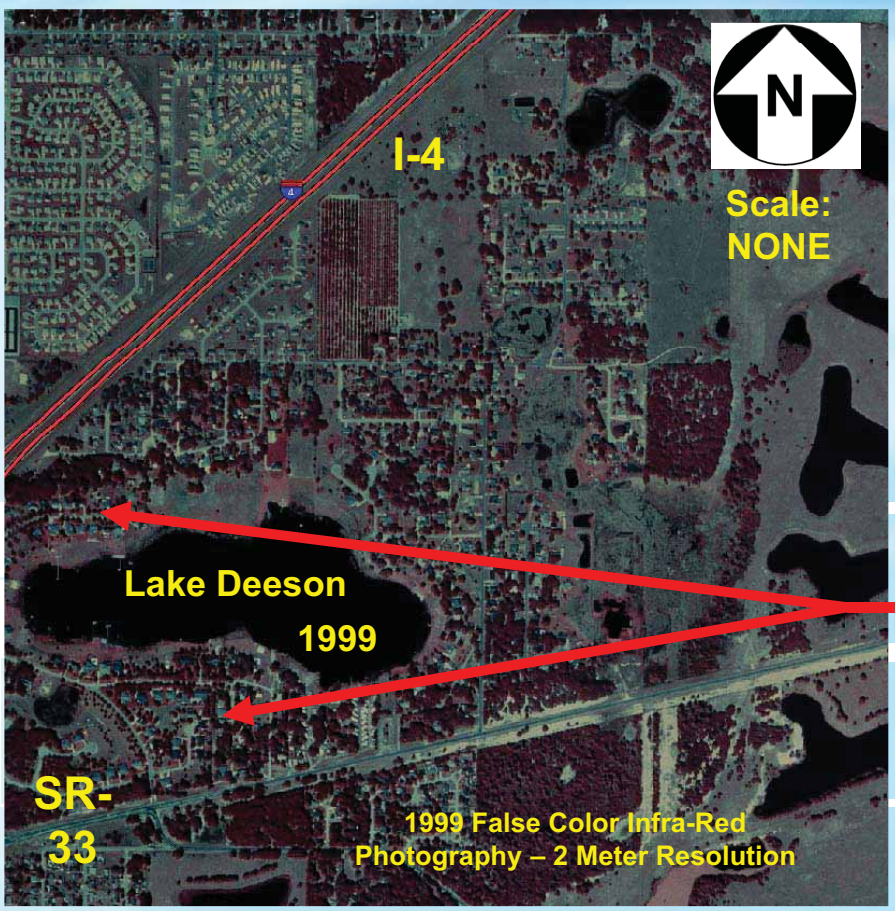
Slide #47

As of 04/04/08

Sources of information to assist in estimating flood hazard areas



Risk (liability) vs. cost

Source of Aerial Photograph:

SWFWMD GIS data base

http://www.swfwmd.state.fl.us/data/gis/

Notice the housing development (pre-1984) in the Flood Plains around Lake Deeson (a "closed basin" lake).

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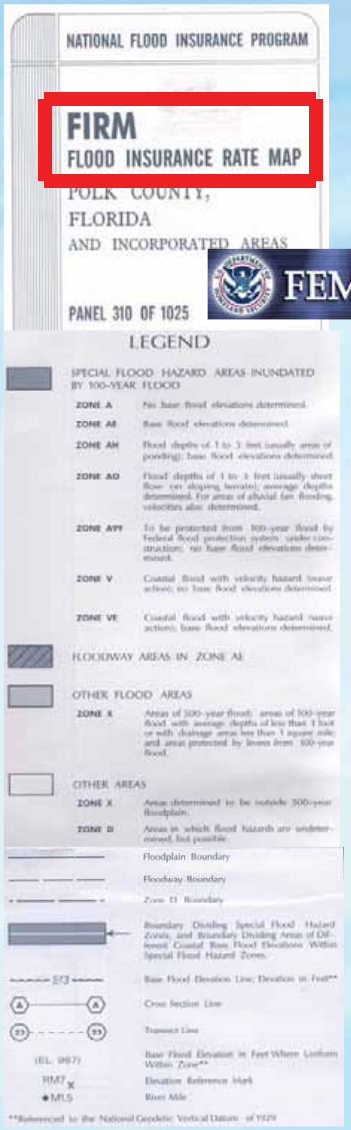
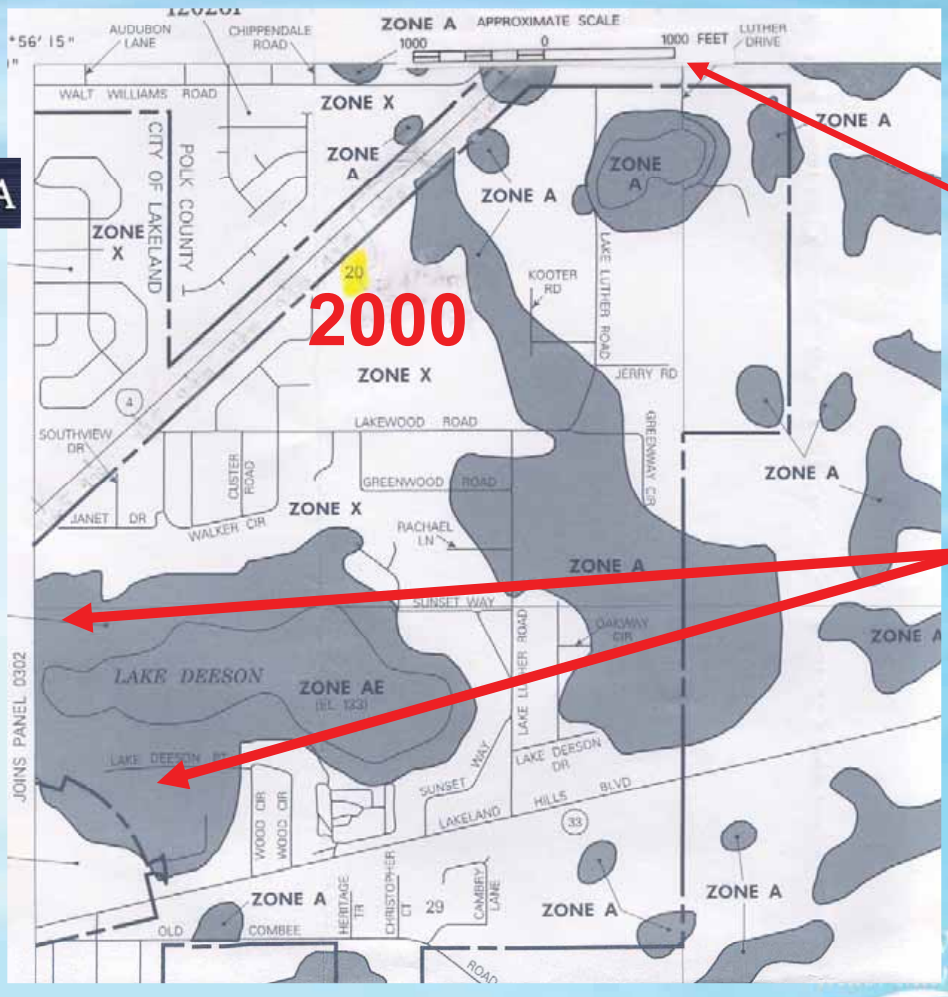
Updated F.I.R.M.





Scale: As noted

Notice from the previous slide that homes were built in these portions of the Lake Deeson Flood Plain.

Lake Deeson, Polk County - 2000

Web addresses for GIS data in Florida

http://findgis.com/index.php?option=com_content&task=blogcategory&id=0&Itemid=15

and

http://findgis.com/index.php?option=com_content&task=view&id=2&Itemid=2

Includes links to Federal USGS and NRCS data

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Other Sources of Additional Research & Design Aids

NRCS training presentations for HEC-RAS:

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

http://www.wsi.nrcs.usda.gov/products/W2Q/H&H/Tools_Models/Ras.html

FEMA Maps, Studies & other data:

FEMA

http://store.msc.fema.gov/

SWFWMD GIS system data:

http://www.swfwmd.state.fl.us/data/

Florida Historical Aerial Photography:

http://web.uflib.ufl.edu/digital/collections/FLAP/

Florida Department of State
Library Services & Technology Act

Color and Oblique Aerial Photography:

http://earth.google.com/

Google Earth BETA — A 3D interface to the planet

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Slide #51
As of 04/04/08

Flood Plains (FP) and Historic Basin Storage (HBS)

Let's talk about some of the regulatory issues.

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Some of the Applicable Rules

Sections 4.4 and 4.7of the Environmental Resource Permitting Information Manual, "Basis of Review" (BOR), list the following requirements:

- ***"4.4 Flood plain encroachment - No net encroachment into the flood plain, up to the 100- year event, which will adversely affect either conveyance, storage, water quality or adjacent lands, will be allowed. Any required compensating storage shall be equivalently provided between the seasonal high water level and the 100 year flood level to allow storage function during all lesser events."***

- ***"4.7. Historic Basin Storage - Provision must be made to replace or otherwise mitigate the loss of historic basin storage provided by the project site."***

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Recommended SWFWMD procedures to address impacts to Flood Plains, Floodways and Historic Basin Storage areas

For ERP application review, the following Five (5) procedures (in order of preference) are recommended to address potential impacts:

- Elimination / reduction of potential impacts
- On-site "volume for volume" compensation (a.k.a. "cup for cup" or "fill and scrape")
- Off-site compensation via land purchase or easement for flooding rights
- Alternative design analysis [i.e. rigorous hydraulic assessment utilizing dynamic (unsteady state) computer modeling].
- Application for variance in accordance with Section 120.542, Florida Statutes and Rule 28-104, (F.A.C.).

If you are taking notes, this may be the most important slide of today's presentation.

Southwest Florida Water Management District

Recommendations from the South Florida WMD

Design Example for Flood Plain Storage Compensation, page XE-i of the ERP Information Manual, Volume IV, 2000
(a,k.a. the "import / export" example problem)

- "The following design example is NOT intended to serve as a definitive analysis ....."
- "The impact on conveyance of flows in a flood plain is NOT covered in this example ... "
- "Consideration must be given to the timing ... In many cases, determining that the on-site runoff volume can be detained for a period of time sufficient to protect the flood plain, while at the same time providing on-site flood protection, **will be difficult**".
- "The most straightforward approach ... Is to compensate for fill in the floodplain by creating storage accessible to the flood plain in another part of the project area. This can be accomplished by excavation, equivalent to the fill volume, between the water table and existing ground". >> *This is the "volume for volume" / "cup for cup" compensation method.*

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For ERP application review, the following procedures (in order of preference) are recommended to address potential impacts:

- **Elimination / reduction of potential impacts**
  - Speaks for itself (i.e. "No impact = No compensation")
  - Bottom line - avoid encroachments into the flood plains, floodways and HBS areas

- **On-site "volume for volume" compensation**
  - Also known as *"cup for cup"* or *"fill and scrape"* compensation
  - This is the procedure recommended in Section 4.4 of the District's *Basis of Review* (BOR)

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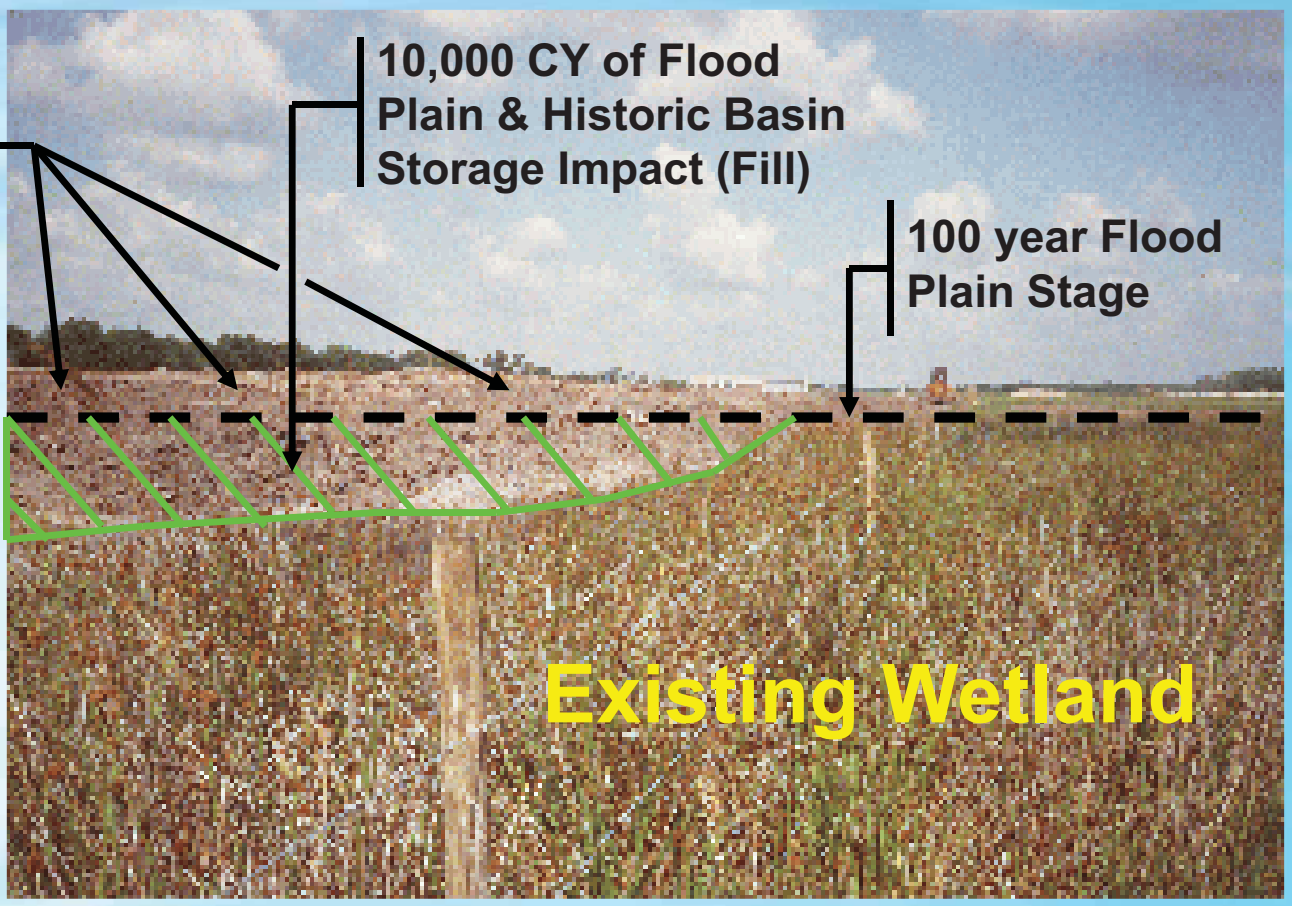
Encroachment within a flood plain



"Volume for volume" compensation is the recommended method of compensation.

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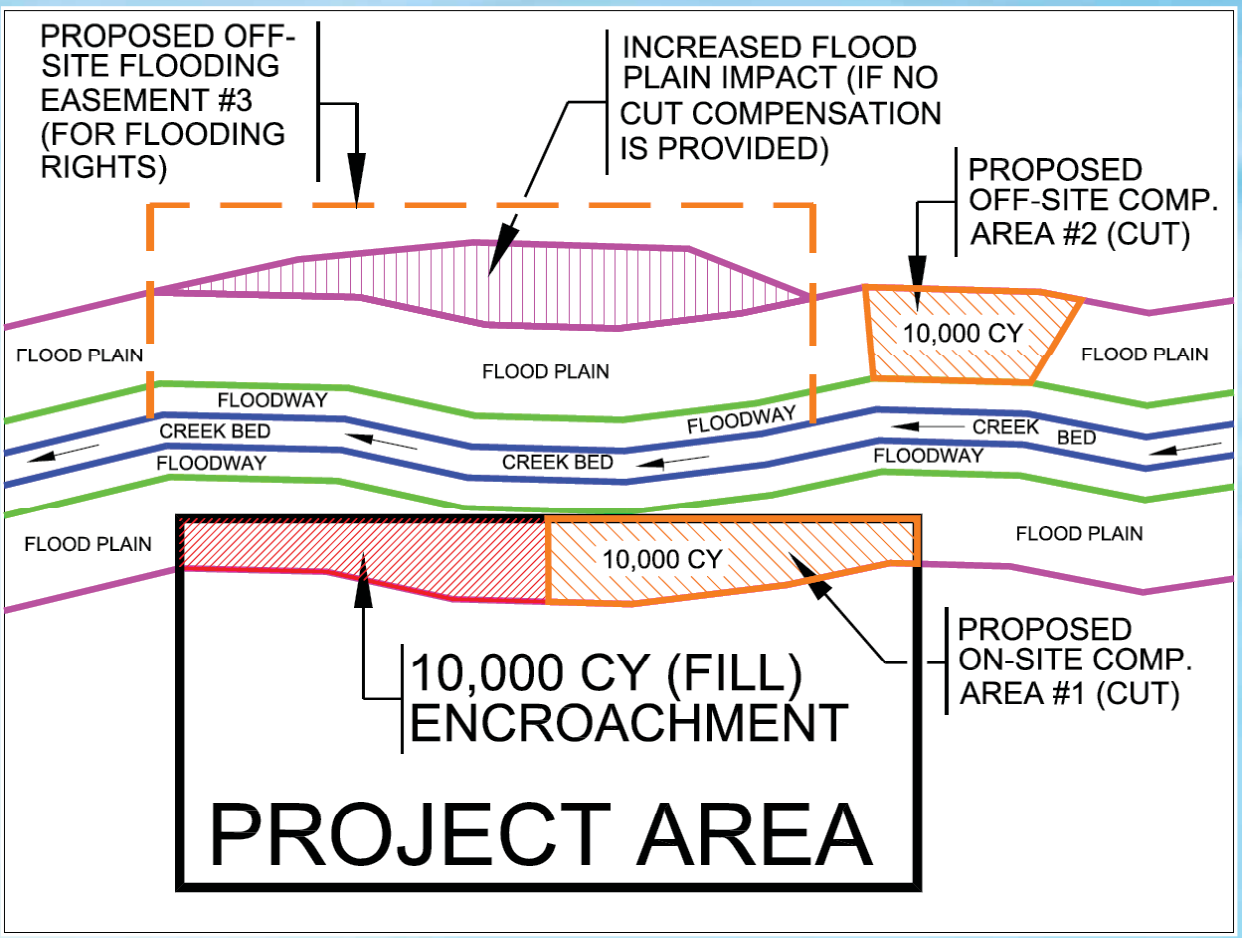
Encroachment / compensation within a flood plain



"Volume for volume" compensation is the recommended method of compensation.

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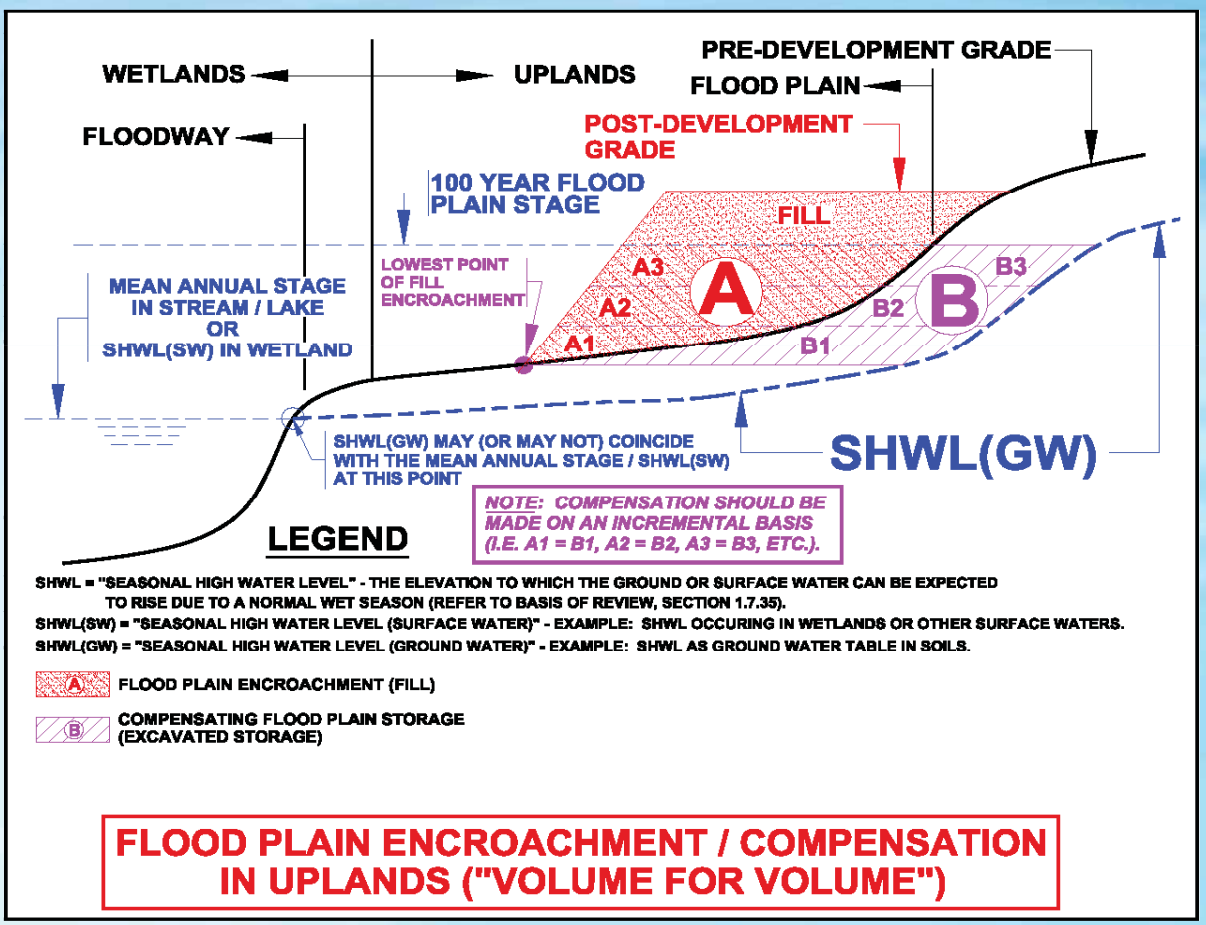
Encroachment / Compensation within a Flood Plain



FLOOD PLAIN ENCROACHMENT / COMPENSATION IN UPLANDS ("VOLUME FOR VOLUME")

"Volume for volume" compensation is the recommended method of compensation.

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Compensation Within a Storm Water Pond

If possible, avoid this method of compensation.

- **To maximize land utilization, some applicants propose compensation within storm water ponds**
  - **Extremely difficult to do correctly**
  - **Extensive computer modeling is required**
  - **Disagreements can occur based on *"assumed"* input data to the computer model**
  - **If done improperly, additional impacts can occur to the Flood Plain**

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Compensation Within a Storm Water Pond

Let's get a little more technical.

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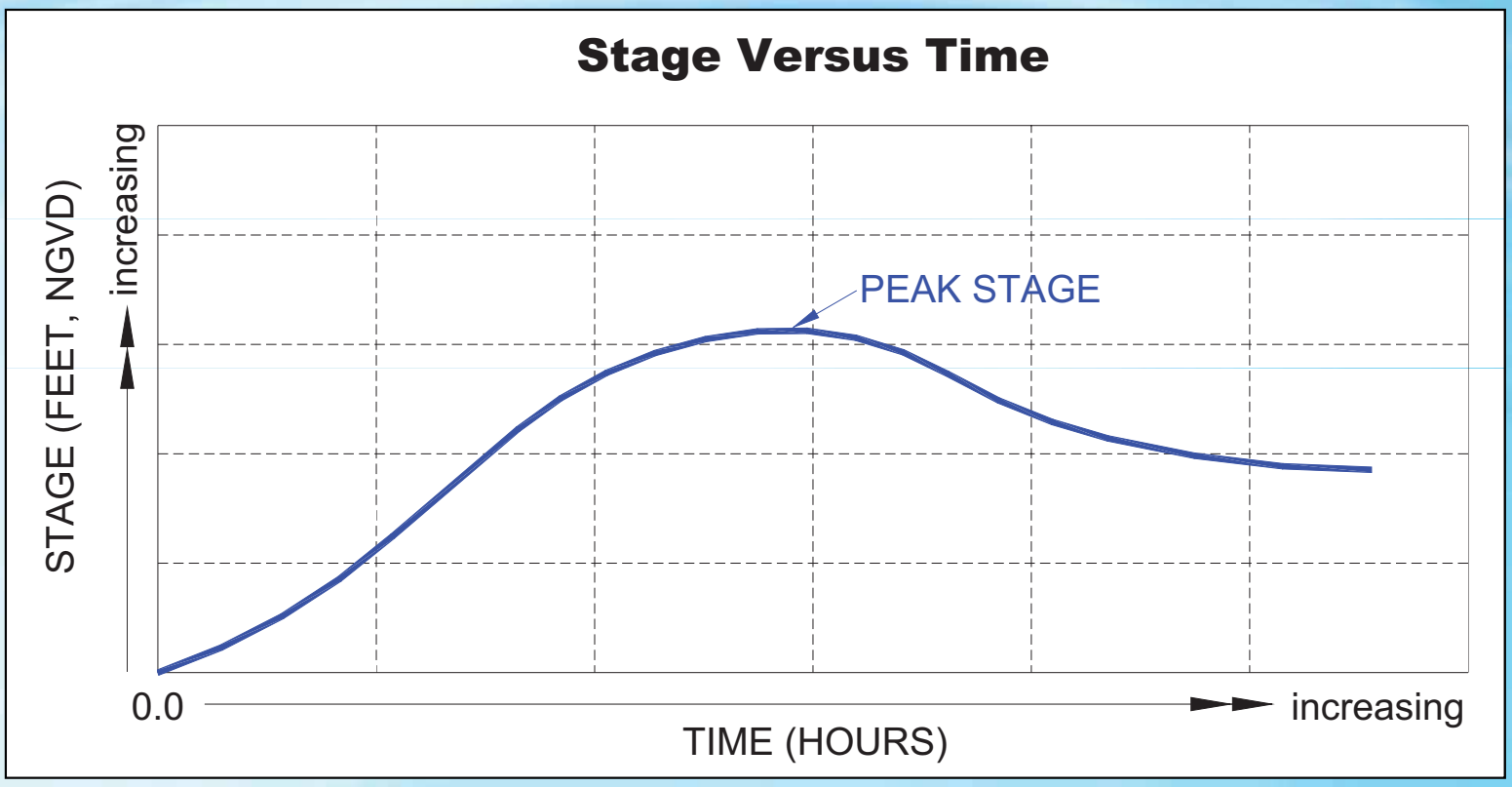
Tailwater Conditions Consist of Two (2) Components

- Stage / Elevation (Initial & Peak)
- Timing



Slide courtesy of David W. Hamstra, P.E.
Principal / Stormwater Department Manager
Professional Engineering Consultants, Inc.,
Orlando, Florida
http://www.peconline.com/

PEC Professional Engineering Consultants
engineers planners surveyors

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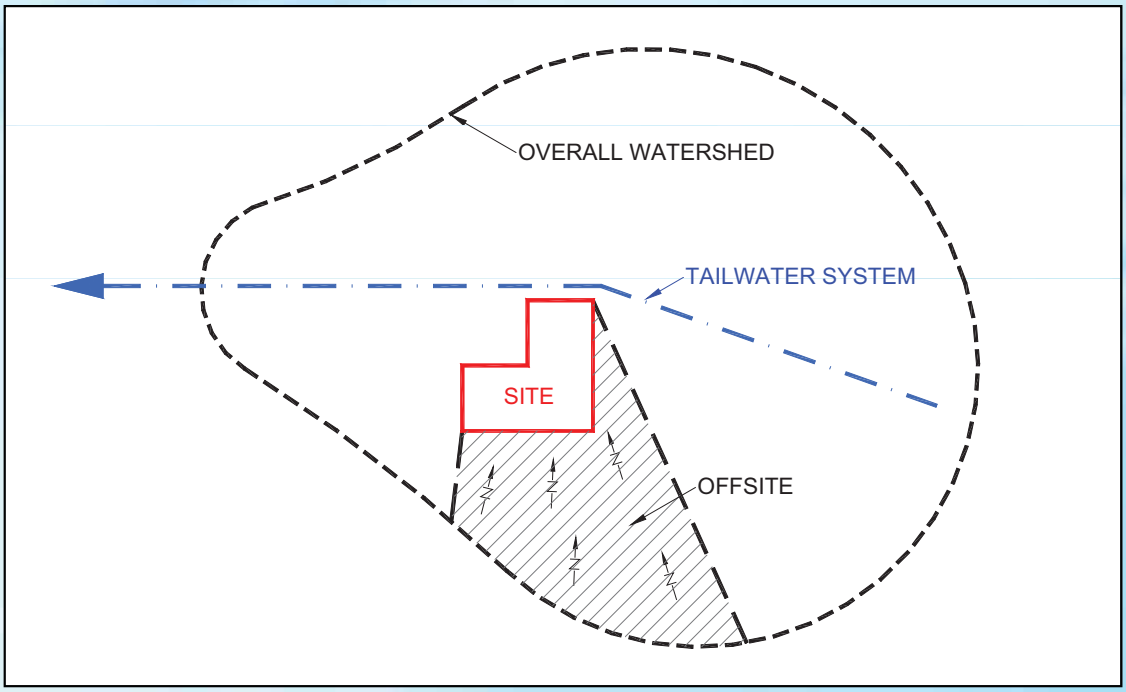
The Timing of the Peak in an Open Drainage Basin is based on the Following Conditions:

- Site Area and Location Relative to the Overall Watershed
- Watershed Lag Time



"Typically", a proposed project site must be located in the lower (down - gradient) portion of a LARGE watershed for any "potential" compensation to occur in a storm water pond. This is due to the timing of the "flood wave" in the receiving water body.

Graphic courtesy of David W. Hamstra, P.E.
Principal / Stormwater Department Manager
Professional Engineering Consultants, Inc.,
Orlando, Florida
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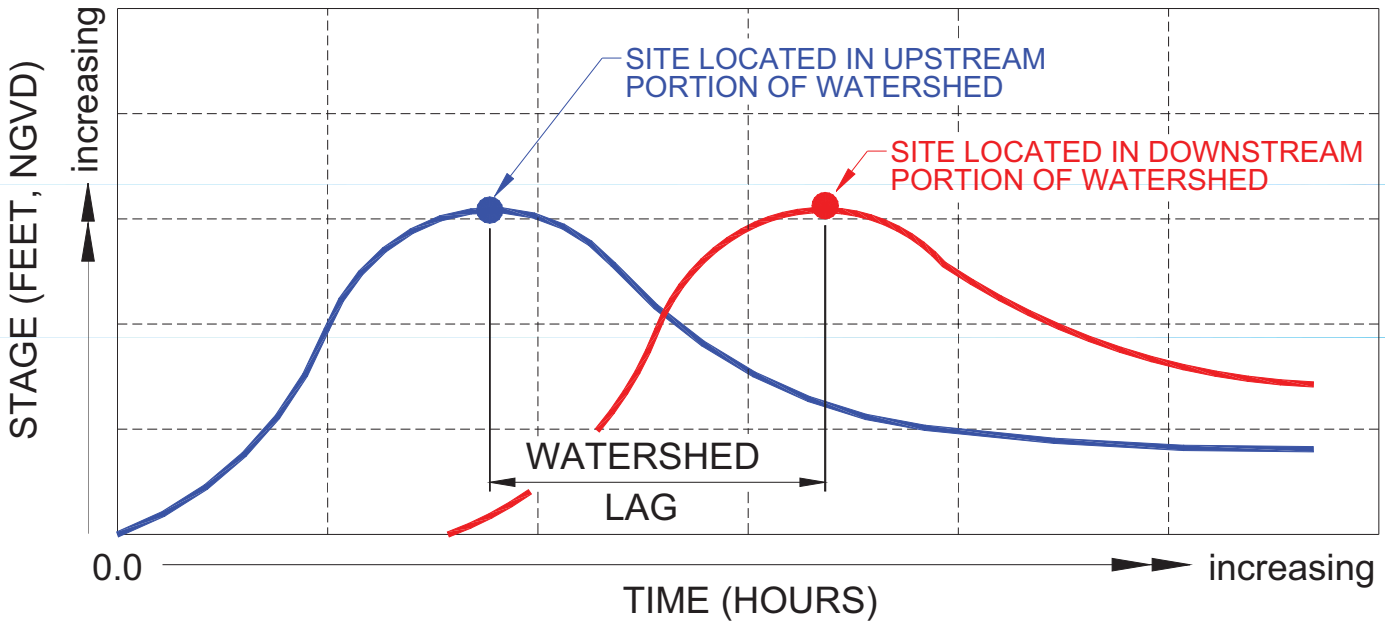
The Timing of the Peak – Watershed Lag Time



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http://www.peconline.com/

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Compensation Within a Storm Water Pond

If possible, avoid this method of compensation.

- **Common Issues and Problems**
  - "Typically", the peak stage / discharge from an on-site storm water pond occurs between hours 12 and 18 for a 24-hour design storm event
  - The storm water pond "typically" empties between hours 18 to 30
  - Compensating storage must be provided from the lowest elevation of fill encroachment up to the the EXISTING 100-year flood elevation

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Compensation Within a Storm Water Pond

If possible, avoid this method of compensation.

- **Timing of Tailwater conditions**
  - If the flood stages in the receiving water body (tailwater) also occur during (or near) this same time frame (hours 12 and 30), then the tailwater can not freely "back flow" into the storm water pond
  - In other words, the on-site runoff and the tailwater storage/volume can not occupy the same place at the same time

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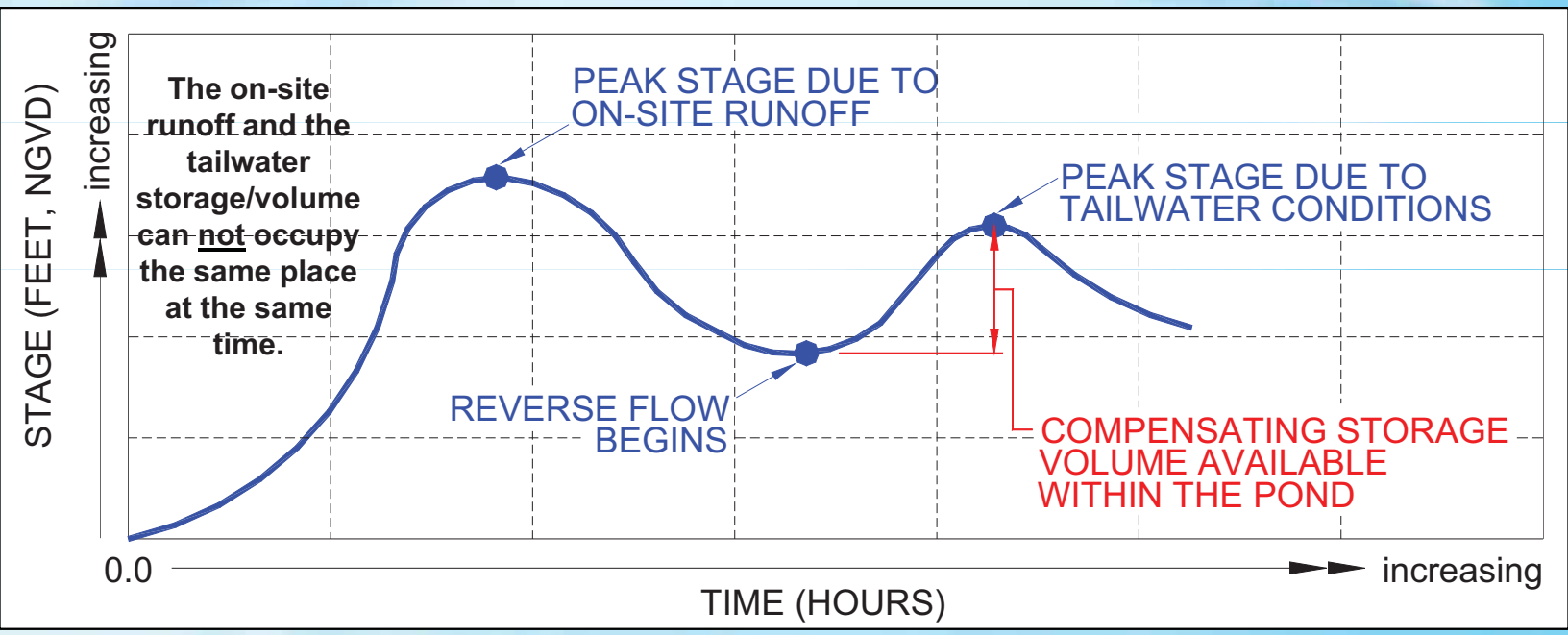
Dynamic Modeling Analysis

The "Flood Wave" in the receiving water body MUST occur and recede well before (or after) the on-site detention storage is needed in the proposed storm water pond.



Graphic courtesy of David W. Hamstra, P.E.
Principal / Stormwater Department Manager
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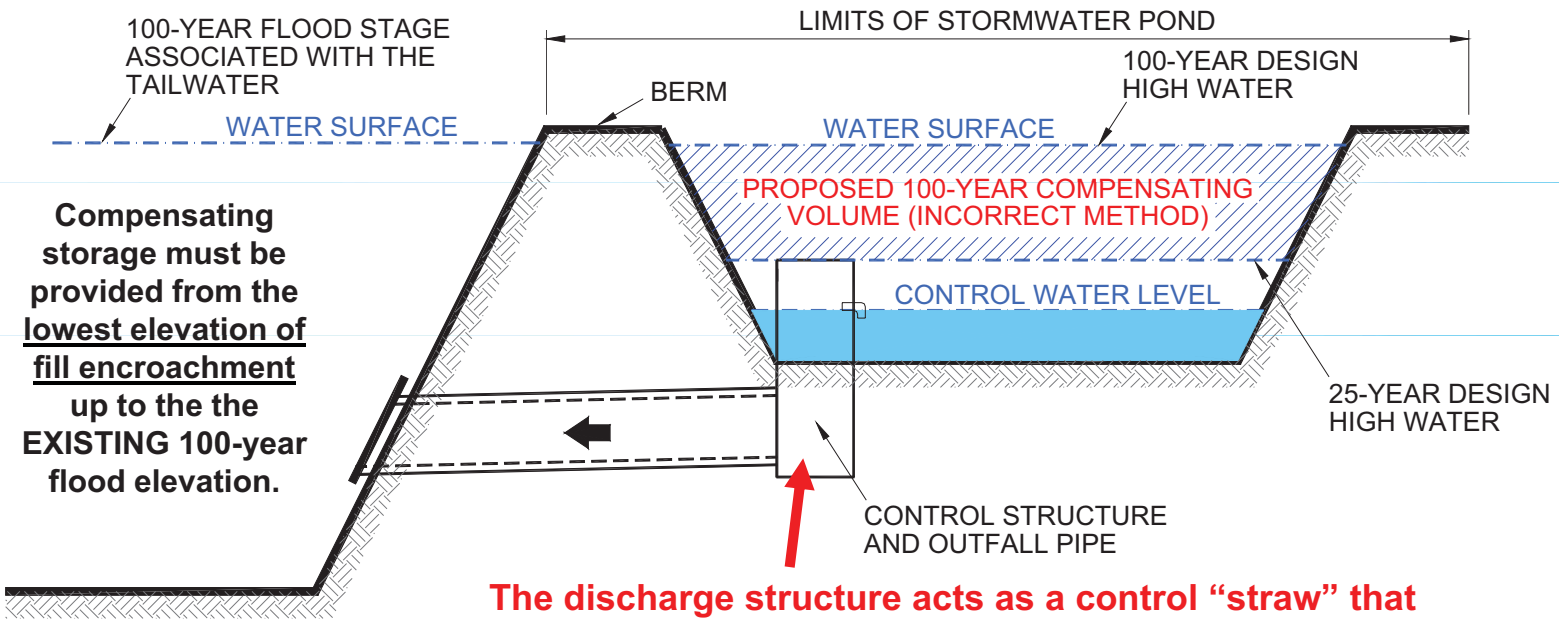
Incorrect "assumption" of compensation within a storm water pond



Compensating storage must be provided from the <u>lowest elevation of fill encroachment</u> up to the the EXISTING 100-year flood elevation.

The discharge structure acts as a control "straw" that restricts storm water into and out of the pond.

Graphic courtesy of David W. Hamstra, P.E.
Principal / Stormwater Department Manager
Professional Engineering Consultants, Inc., Orlando, Florida
http://www.peconline.com/

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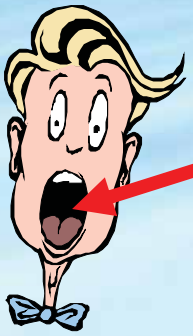
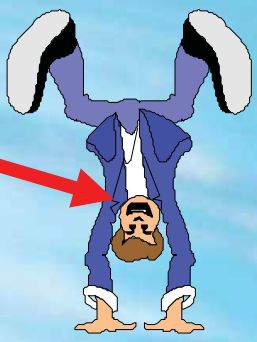
Analogy of a "constricted" discharge structure(s)

Direct / cumulative impacts to the flood plain



"Free flow" of air through his mouth into the lungs

Push-ups with a soda straw in his mouth



Imagine that the discharge structure acts like your mouth with a clip on your nose. If you open you mouth you can still breath "normally". Air can move freely between your lungs (retention / detention pond) and the atmosphere (the flood plain).

If you clamp down on a soda straw (discharge structure) with your lips, you can still breath (similar to clear weather). However, if you drop to the floor and attempt 100 push-ups (a major flooding event), it will not be long before you collapse (encroachment impacts to adjacent properties) because you can not fill your lungs fast enough with air (the flood wave from the flood plain can not get back into the retention / detention pond fast enough).

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"Bottom Line" on attempting compensation in storm water pond

If possible, avoid this method of compensation.

- **Extremely difficult to do correctly**
- **Requires detailed hydrologic assessment and dynamic modeling (substantial effort to assess tail water effects)**
- **Be prepared for delays in Agency review due to potential disagreements over model "assumptions" and input data**
- **Why go to all of the time and expense to model a storm water pond's impacts when it is much easier, faster and cost efficient to provide "cup for cup" compensation?**

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Alternate compensation procedures.

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▪ "Off-site" compensation via land purchase / easement acquisition

- Linear activities (i.e. roadway projects) may have difficulty in providing "on-site" compensation.
- If compensation areas are not available within the proposed right-of-way, the applicant / agency has the option of obtaining additional "off-site" lands for:
  - "volume for volume" compensation
  - land flooding rights through ownership or other perpetual control (i.e. recorded drainage / flooding easements, written contracts / agreements, etc.)
- The applicant / agency should also provide a rigorous hydrologic assessment and dynamic modeling analysis to demonstrate the extent, effectiveness and results of the remote compensation for offsetting local encroachment impacts.

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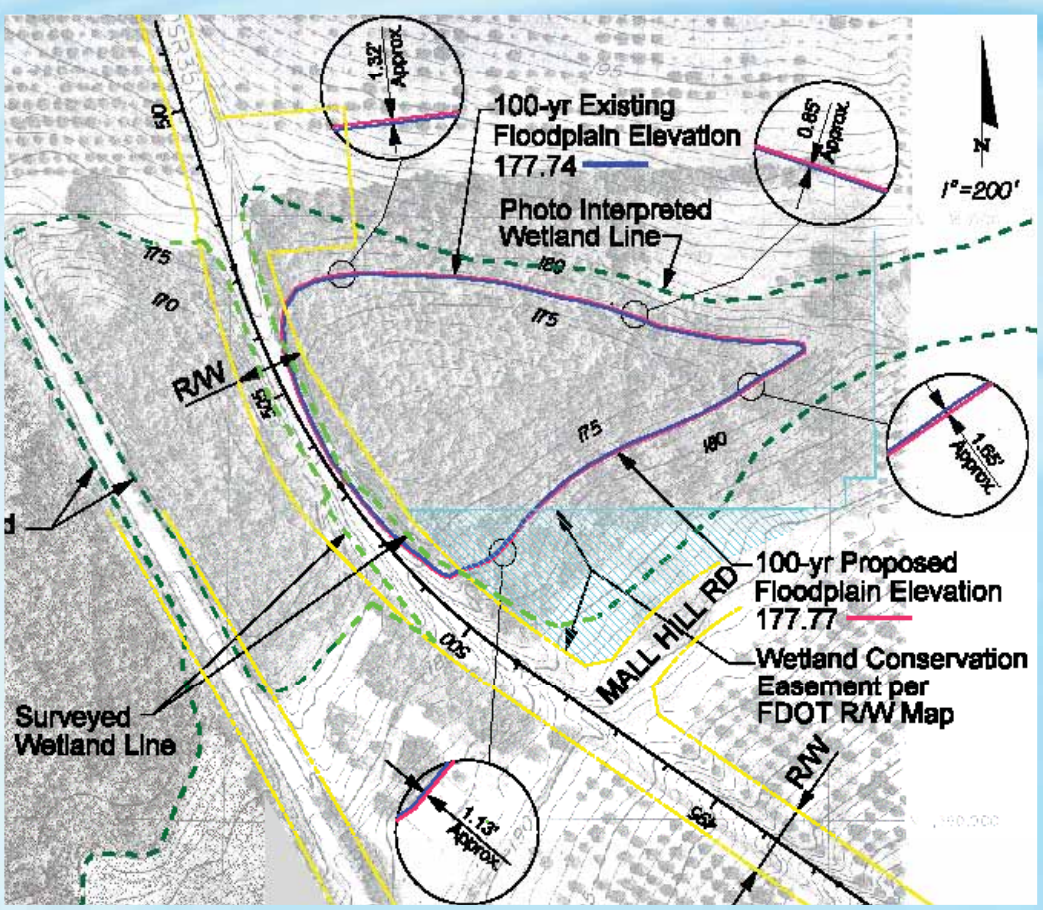
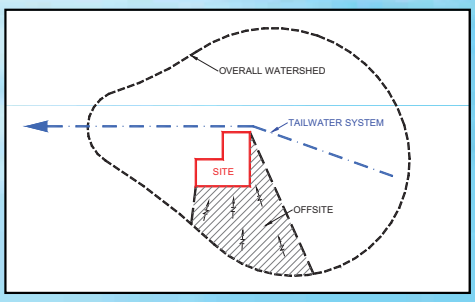
Off-site compensation via land purchase or easement (for flooding rights)



Roadway project compensation utilizing easements and rigorous computer modeling



This impact is in the upper reaches of the overall watershed. Therefore, the timing of the "flood wave" in the creek will be very close to the peak of the runoff hydrograph from the roadway project.

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A cautionary note regarding regional drainage studies.

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Regional Drainage Basin Studies (Computer Models)

If there are errors or omissions in the computer model's input data (or if the model is outdated), then the regulatory agencies are not obligated to accept the results.

This is especially true if the model is several years old and has not been updated to reflect new development within the watershed.

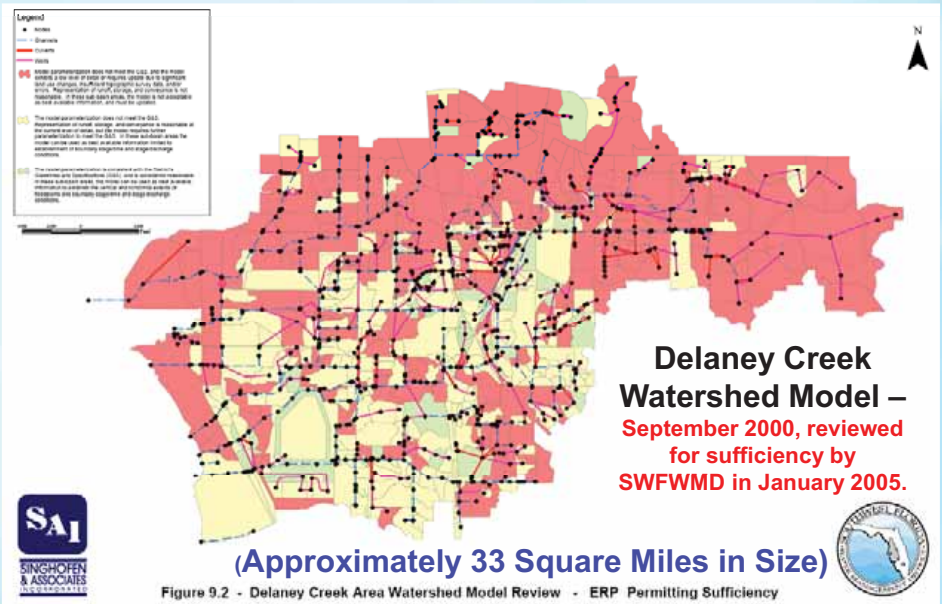

Figure 9.2 - Delaney Creek Area Watershed Model Review - ERP Permitting Sufficiency

Delaney Creek Watershed Model –
September 2000, reviewed for sufficiency by SWFWMD in January 2005.

(Approximately 33 Square Miles in Size)

Analogy:

Using last week's weather forecast to predict if it will rain next week.

Remember that a computer model's accuracy is only as good at the field verified topographic survey and soils data that it is based on.

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Regional Drainage Basin Studies (Computer Models)

Alternate design analysis utilizing computer modeling only

- **Extensive & costly field surveying is required** (very labor intensive)
- Difficult to do correctly **(can take years to build & calibrate the model)**
- Accurate **rainfall and stream flow gauged data needed** to calibrate the model
- **The model must be frequently updated** with "as – built" survey data from new developments within the watershed.
- **Disagreements** can occur based on ***"assumed"*** **input data** to the computer model. **The model is only as good as the inputted field survey, rainfall and stream flow data.**
- If done improperly, additional <u>cumulative impacts</u> can occur to the Flood Plain. **Although encroachments by a single project may be individually minimal, the <u>cumulative effects</u> of several projects are often not recognized until after they occur.**

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Flood Plains (FP) and Historic Basin Storage (HBS)

The process of "last resort"

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Application for variance

- An application for variance should only be used as a "last resort", in accordance with Section 120.542, Florida Statutes and Rule 28-104, Florida Administrative Code.
- Potential problems with a variance include (but are not limited to):
  - The applicant bears the burden of proof to demonstrate that:
    - The proposed project can achieve the purpose of the State Statute(s) which underlies the Rule(s) by other means
    - Strict adherence to the Statute(s) / Rule(s) Creates a substantial hardship
    - Strict adherence to the Statute(s) / Rule(s) violates the principles of fairness
      - The "principles of fairness" are violated when the literal application of a Rule affects a particular person in a manner significantly different from the way it affects other similarly situated persons who are subject to the Rule.

Potential problems with a variance

- **Third party objectors** during the variance process that may claim:
  - Individual trespass issues from increased flood stages / duration on their property
  - Cumulative impacts to the watershed(s) in question
  - Potential litigation from third parties after completion of the project from "actual" or "perceived" flooding damage. Both the applicant and the regulatory agency may have legal exposure.
- **The perception of "Double Standards"**, "eminent domain prejudice", and other issues or concerns.

Southwest Florida Water Management District

Engineers Creed

As a Professional Engineer, I dedicate my professional knowledge and skill to the advancement and betterment of human welfare.

I pledge:

To give the utmost of performance;

To participate in none but honest enterprise;

To live and work according to the laws of man and the highest standards of professional conduct;

To place service before profit, the honor and standing of the profession before personal advantage, and the public welfare above all other considerations.

In humility and with need for Divine Guidance, I make this pledge.

Adopted by the National Society of Professional Engineers, June, 1954

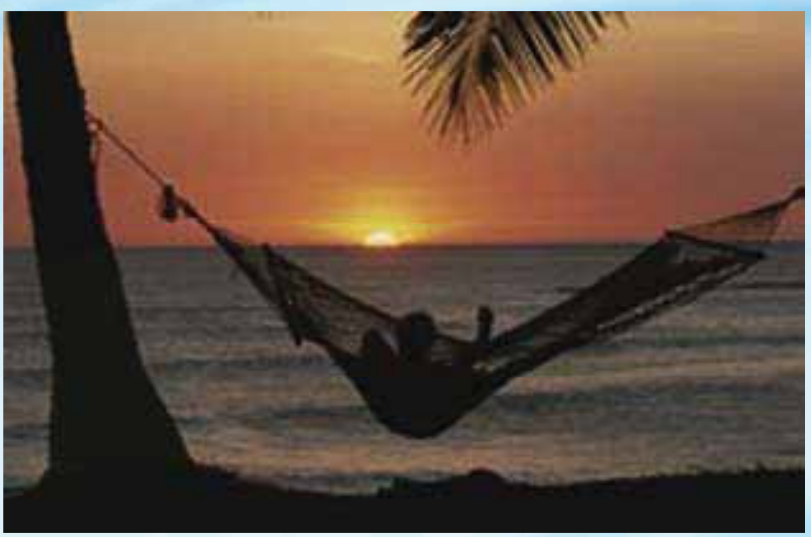
florida engineering society

National Society of Professional Engineers®

Southwest Florida Water Management District

This concludes our presentation

– thanks for your attention



Good engineering protects the environment!

Final Questions?

PROPOSED STATEWIDE STORM WATER RULE 62-347

Caloosahatchee River - October 15, 2005

Web address for current information on this ongoing Rule making effort by FDEP

http://www.dep.state.fl.us/water/wetlands/erp/rules/sw_swt_rule_dvlpmt.htm

Southwest Florida Water Management District

Proposed Statewide Storm Water Rule 62-347

Evaluation of Current Stormwater Design Criteria within the State of Florida

Final Report

Prepared for:

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

FDEP Contract No. SO108

June 2007

Prepared By:

Harvey H. Harper, Ph.D., P.E.
David M. Baker, P.E.

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Web address for this Publication
http://www.dep.state.fl.us/water/nonpoint/pubs.htm

Become involved in the public Rule workshops

(to be announced by FDEP in the Fall of 2008).

To be placed on the FDEP mailing list, please visit:
http://tlhdwf2.dep.state.fl.us/registration/ERP_Interested_Parties.asp

FDEP (Tallahassee) contacts:

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Southwest Florida Water Management District

DRAFT WHITE PAPER – PROPOSED STATEWIDE STORMWATER RULE
March 03, 2008 Revision

DRAFT
WHITE PAPER – PROPOSED STATEWIDE STORMWATER RULE
March 3, 2008 Revision

The Department of Environmental Protection (Department) together with the state's five water management districts, have begun rule development on a statewide stormwater rule that will focus on providing increased protection of our State's surface and ground waters. Currently, excess nutrients represent the leading cause of impairment in our surface water bodies. Additionally, increasing nitrogen concentrations in ground water and springs are a growing concern. Therefore, it is critically important that stormwater treatment standards are enhanced to provide for increased levels of nutrient removal and better protection of ground water. Further, a statewide regulation will provide consistent best management practice (BMP) design criteria throughout the state.

Background

The original "statewide" stormwater rule, Chapter 17-25 was adopted by the Environmental Regulation Commission in October 1981 with an effective date of February1982. This rule was the successor to the state's first stormwater treatment regulations established in Rule 17-4.248 as an interim regulation. When adopted in 1982, performance standard for stormwater treatment was set to 80% average annual load reduction of Total Suspended Solids. BMP design criteria were established, based on Florida field data, which provided a rebuttable presumption that the stormwater discharge did not cause harm to water resources. Although originally implemented statewide by the Department, authority for the Chapter 17-25 stormwater permitting program was delegated to each of the water management districts (excepting the NWFWMD) in the mid-1980s.

In the mid-1990s, the Environmental Reorganization Act provided the water management districts independent authority under Chapter 373, F.S., to regulate stormwater quality under the Environmental Resource Permit program. Accordingly, each of the WMDs promulgated their own stormwater rules. The resultant BMP design criteria adopted by each of the WMDs varied widely, ranging from essentially the same criteria found in Chapter 17-25 (now Chapter 62-25, F.A.C.) to criteria that provided both higher and lesser degrees of treatment.

Additionally, in 1990, the State Water Implementation Rule, Chapter 62-40, F.A.C. was developed and adopted in response to stormwater legislation in 1989. The stormwater program's institutional foundation, goals, and performance standards were clearly set forth in this rule. The stormwater treatment performance standard was revised to read "80% average annual load reduction of pollutants that cause or contribute to violations of water quality standards." While amended from time to time to respond to BMP monitoring results, most of the State's stormwater criteria are based on data predating 1995 and they were never changed to meet the new performance standard. More recently, with the implementation of Florida's Total Maximum Daily Load/watershed restoration program and the Springs Initiative, it has become increasingly clear that increased removal of nutrients from stormwater is critical to protecting Florida's surface and ground waters. Further, research has indicated that current design and performance criteria do not properly address nutrient loadings resulting from typical stormwater runoff conditions.

Broad Objectives

The proposed statewide stormwater rule provides for the following broad objectives:

1. To update the ERP water quality treatment rules to increase the effectiveness of new stormwater treatment systems in removing nutrients and reducing nutrient loads, and in decreasing the movement of nutrients into ground waters.
2. To reduce the number of water bodies that become impaired by nutrients from future development (about 45% of Florida's current verified impaired waters are nutrient related).
3. To meet the goal of the Water Resource Implementation Rule, Chapter 62-40, F.A.C, which is to assure that post-development stormwater characteristics do not exceed pre-development stormwater characteristics (peak discharge rate, pollutant load, volume).
4. To streamline stormwater permitting and make stormwater regulatory requirements more consistent throughout the state (provide a more level playing field).

Draft Rule Concepts

The proposed performance standard for new stormwater treatment systems is for post-development nutrient loads to not exceed the pre-development nutrient loads. For the purposes of this rule, pre-development is equivalent to undeveloped and is defined as native landscape, not the current existing land use such as row crops or other "developed" condition. Also, nutrients are defined as the more limiting of total nitrogen (TN) and total phosphorus (TP). It is presumed that treating TP and TN will provide adequate treatment for other pollutants.

Under the proposed framework, each project will require a nutrient loading assessment for both the pre-development and post-development condition. This results in each project developing its own unique treatment efficiency goal. This represents a significant departure current rules in which only post-development loading is considered and reduced. Stormwater pond design volumes for retention and detention facilities are derived primarily from values calculated in the report entitled "Evaluation of Current Stormwater Design Criteria within the State of Florida" (Harper and Baker, 2007). Stormwater treatment volumes will vary around the state depending on historical rainfall records, and will also vary in the same location based on pre- and post-development site conditions and land use.

It is proposed to use the "applicant's handbook" platform for establishing BMP criteria. The recently completed Applicant's Handbook for ERP in the Northwest Florida Water Management District has been used initially as the model document.

BMP "treatment trains" may be required in many cases in order to meet the required removal efficiencies. The proposed rule provides a mechanism to calculate the treatment credit associated with successive BMPs that are used in series. Although BMP treatment trains have always been "encouraged" by the agencies, there has not been a methodology established to calculate the appropriate load reduction for such trains.

It is anticipated that reuse or recycling of stormwater may become more commonplace in order to reduce discharge of stormwater volumes and pollutant loads, especially when using wet detention systems. Stormwater reuse may be used in combination with other "traditional" stormwater BMPs. Tables are provided that allow for calculating the amount of treatment credit to be allowed for associated water storage and irrigation rates.

In addition to stormwater reuse, a comprehensive menu of Low Impact Design (LID) concepts is under development. Credits will be established to increase the focus on nonstructural, pollution prevention BMPs as first "car" in the treatment train. These LID concepts include:

- Green roof/cistern/irrigation systems
- Pervious concrete
- Florida Friendly Landscaping/Green Industry BMP Program
- Promotion of natural vegetation on-site to reduce compaction of urban soils/loss of infiltration capacity

Lastly, a section specific to stormwater retrofitting will serve to accelerate stormwater enhancement and restoration projects for existing development.

Significant Issues to be Resolved

Staff members from DEP and the WMDs have met several times in late 2007 and early 2008 to discuss rule concepts and to compile a draft handbook. A number of significant issues have been identified that require resolution prior to moving forward with formal rulemaking. Work groups consisting of DEP and WMD staff have been assigned to each of the issue topics. These work groups will work with the members of the Technical Advisory Committee to address these and other rulemaking issues. Issue papers have been developed by the work groups and they can be found under each of the links below.

http://www.dep.state.fl.us/water/wetlands/erp/rules/sw_issue_work_groups.htm

Southwest Florida Water Management District

Rule Development Schedule

TAC meetings March – October 2008
Rule workshops November 2008 – March 2009
Rule adoption May 2009
Rule effective date July 1, 2009

http://www.dep.state.fl.us/water/wetlands/erp/rules/sw_swt_rule_dvlpmt.htm

Southwest Florida Water Management District

Technical Advisory Committee Members

STATEWIDE STORMWATER TREATMENT RULE TAC

ENTITY	REPRESENTATIVE	ALTERNATE
Audubon	Paul Gray	Eric Draper
1000 Friends	Charles Pattison	Dan Pennington
SWF Conservancy	Andrew McElwaine	Jennifer Hecker
Florida Homebuilders Association	David Carter	Dikran Kalaydjian
Florida Engineering Society	Bob Higgins Rick Barber	Rick Creech Bob Howard
Florida Chamber	Doug Durbin	Chuck Littlejohn
Florida League of Cities	John Buss	Sam Amerson
Florida Association of Counties	Kim Ornberg	Lori Cunniff
Florida Local Environmental Resource Agencies	Jack Merriam	Lenny Vialpando
Florida Stormwater Association	Chuck Walter	Don Donaldson
Florida Department of Transportation	Josh Boan	Rick Renna
Urban Redevelopment	Grady Pridgen	Steve Kurcan
Department of Agriculture and Consumer Services	Bill Bartnick	Rich Budell
South Florida area	Alan Hall	None
Southwest Florida area	Steve Suau	None
NE Florida area	Neil Aikenhead	None
Central Florida area	Devo Seereeram	Charmaine Saith
Reuse utilities	Todd Swingle	None

florida engineering society

FES Representatives

http://www.dep.state.fl.us/water/wetlands/erp/rules/draft/stormwater/sw_tac.pdf

Southwest Florida Water Management District

Technical Advisory Committee

Announcements and Meeting Agendas

- TAC meeting, March 5, 2008
  - Agenda PDF (23 kb)
- TAC meeting, April 16, 2008
  - Notice of Meeting PDF (11 kb)
  - Agenda PDF (23 kb)
- TAC meeting, May 28, 2008
- TAC meeting, July 9, 2008
- TAC meeting, August 20, 2008
- TAC meeting, October 6, 2008

http://www.dep.state.fl.us/water/wetlands/erp/rules/sw_swt_rule_agenda.htm

Southwest Florida Water Management District

04/16/08 TAC Meeting Notice & Agenda

STATEWIDE STORMWATER TREATMENT RULE
TECHNICAL ADVISORY COMMITTEE

APRIL 16, 2008

SAIC OFFICE
Science Building II/Florida Room
12901 Science Drive
Orlando, FL 32826

AGENDA

1.	Welcome, Introductions, Lunch orders	10:00 – 10:30
2.	Review of previous meeting summary, web site	10:30 – 11:00
3.	TAC roadmap – how do we proceed	11:00 – 11:30
3.	Dr. Devo Seereeram – Issues presentation and discussion	11:30 – 12:30
4.	Working lunch	12:30 – 1:00
6.	Detailed review of Harper methodology or Applicant's Handbook	1:00 – 2:30
7.	Review of Action Items, Future meetings, next steps	2:30 – 3:00

CONTACTS

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The DEP website for the Statewide Stormwater Treatment Rule TAC is:
dep.state.fl.us/water/wetlands/erp/rules/sw_swt_rule_dvlpmt.htm

NOTICE OF MEETING

"STATEWIDE STORMWATER TREATMENT RULE"

The Department of Environmental Protection, Division of Water Resource Management, announces a public meeting to which all persons are invited:

DATE AND TIME: April 16, 2008, Wed., 10:00 a.m. – 3:00 p.m. EDT
PLACE: Science Applications International Corp. (SAIC)
Science Bldg. II, Florida Room
12901 Science Drive
Orlando, FL 32826

GENERAL SUBJECT MATTER TO BE CONSIDERED: This will be the second meeting of the Technical Advisory Committee to consider development of a new rule, Chapter 62-347, F.A.C., to update stormwater quality treatment design and performance standards for stormwater treatment systems, with particular emphasis on reducing nutrient discharges.

A copy of the agenda may be obtained by contacting: Mary VanTassel, Department of Environmental Protection, Office of Submerged Lands and Environmental Resources, 2600 Blair Stone Road, MS 2500, Tallahassee, FL 32399-2400; telephone (850)245-8486; e-mail: Mary.VanTassel@dep.state.fl.us; or facsimile (850)245-8499. (The file tracking number is OGC 07-0552.)

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 5 days before the workshop/meeting by contacting: contacting Mary VanTassel at (850)245-8486. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

http://www.dep.state.fl.us/water/wetlands/erp/rules/sw_swt_rule_agenda.htm

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