



US Army Corps  
of Engineers



# Brief to the Louisiana Recovery Authority

April 19, 2006

D + 233

H - 43

*James O. Ward, Jr., P.E.  
Deputy Director  
Task Force Hope*

---

---

**One Team: Relevant, Ready, Responsive, Reliable**

---

---

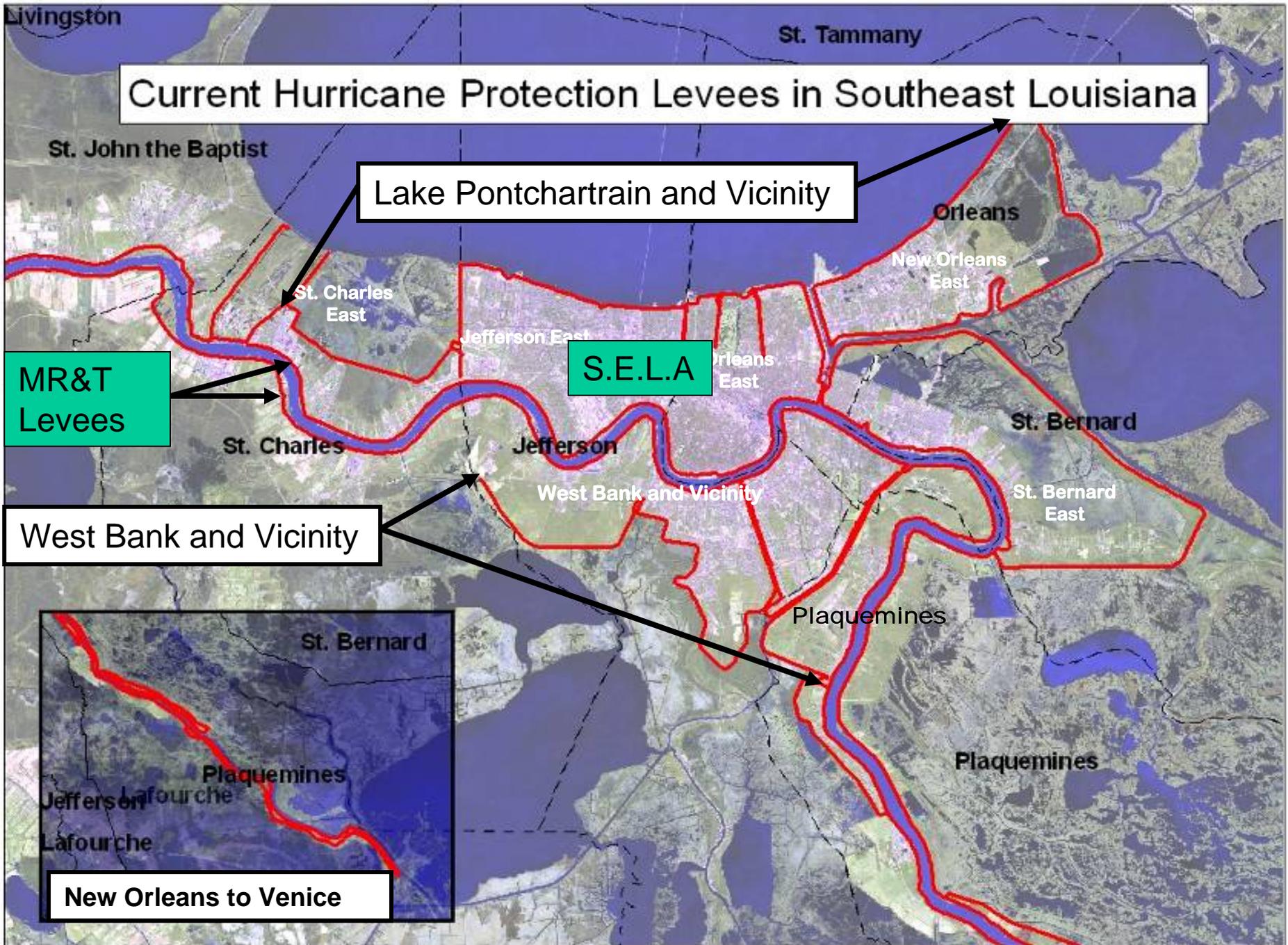


US Army Corps  
of Engineers



## Topics

- **NOLA Hurricane Protection System – Overview of Corps Activities**
- **New Requirements**
  - **IPET Floodwall Findings**
  - **Levee Certification**
  - **12 April Federal Coordinator for Gulf Coast Rebuilding Announcement**





US Army Corps  
of Engineers

# NOLA Hurricane Protection Summary



- **Repair:**
  - Return pre-Katrina protection to hurricane-damaged components by 1 June 2006
- **Restore:**
  - Restore undamaged levees/floodwalls to originally authorized heights by 1 Sep 2007
  - **Correct Floodwall Deficiencies**
- **Complete:**
  - Accelerated completion of unconstructed portions of authorized projects by Sep 2007
- **Improve:**
  - Make improvements to optimize the performance of the existing system
- **Certify:**
  - **Raise system to provide 100 year level of protection**
- **Evaluate Higher Levels of Protection:**
  - Louisiana Coastal Protection and Restoration Report - preliminary report due June 2006, final December 2007

---

---

***One Team: Relevant, Ready, Responsive, Reliable***

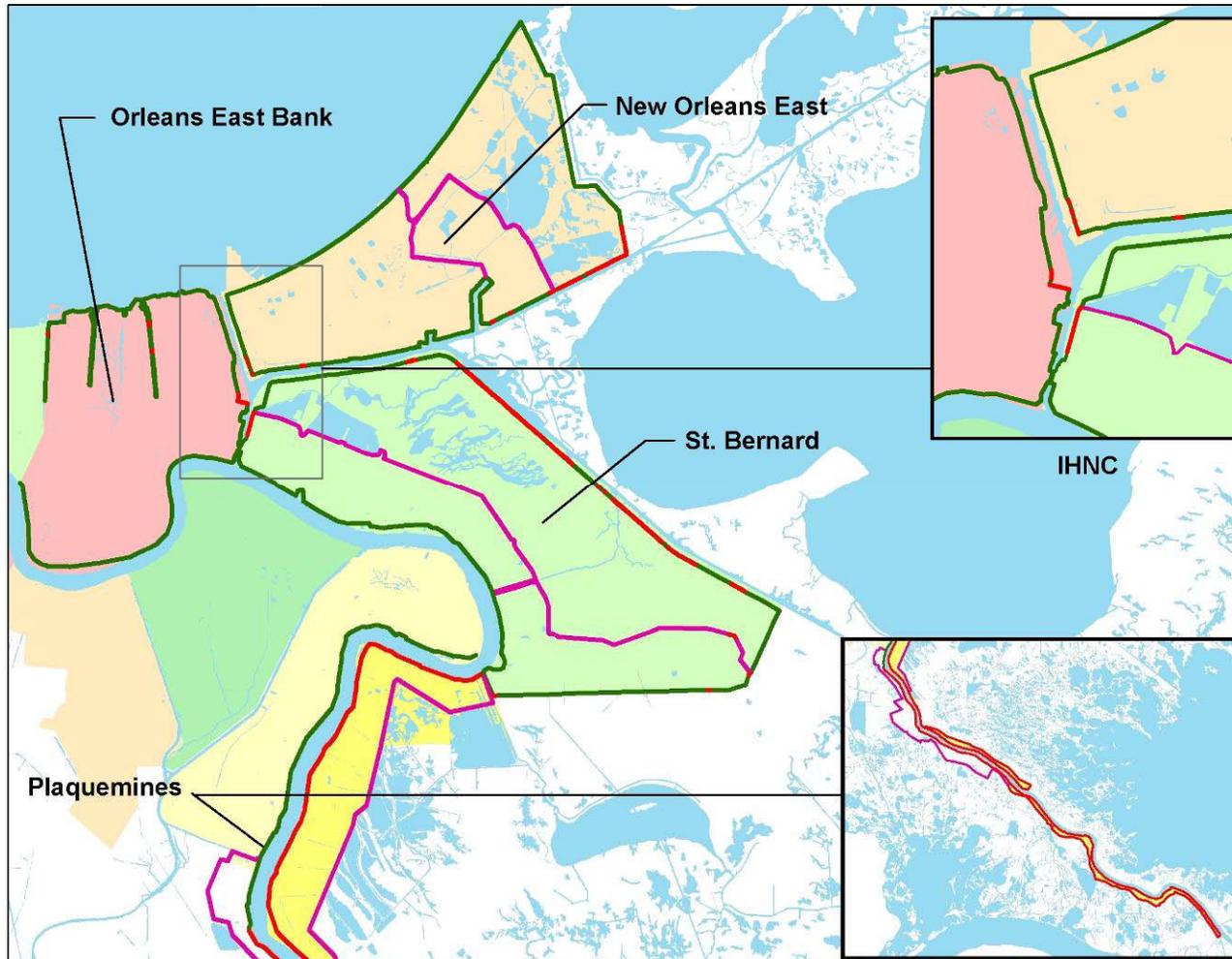
---

---



US Army Corps  
of Engineers

# Hurricane Protection System Restoration Program Summary



## Hurricane Protection System

- 350 miles
- 71 pump stations

## Damage

- 41 miles severe, 128 miles moderate damage
- 34 pump stations were non-operational

## Cost

- \$ 798 million

## Percent of Pre-Katrina Protection Restored

**63 % Complete**

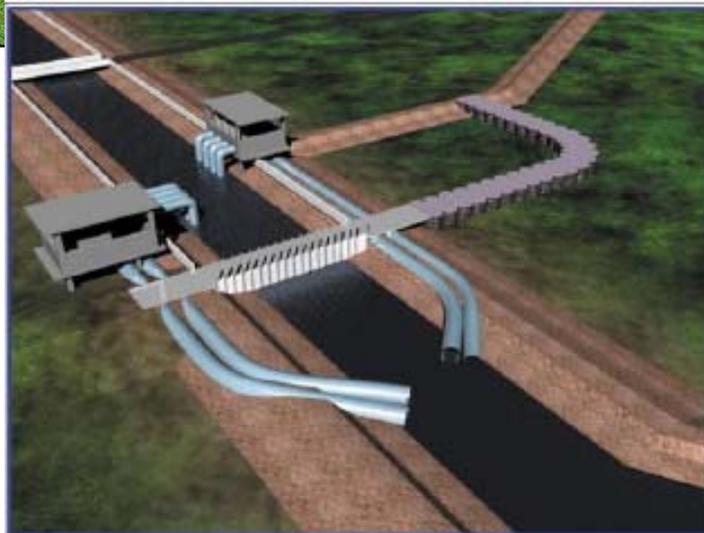
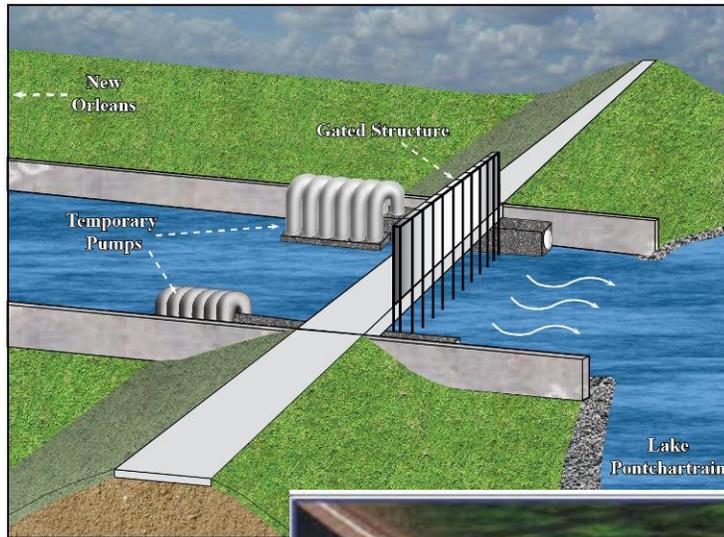
**20 of 59 contracts complete**

**One Team: Relevant, Ready, Responsive, Reliable**



US Army Corps  
of Engineers

# New Orleans Outfall Canal Interim Closure Plan



- Three locations on Lake Pontchartrain
- Provides protection by 1 June 2006
- Provide New Orleans with rainwater drainage
- Prevent storm surge
- Pumps permit drainage while closed

=====**One Team: Relevant, Ready, Responsive, Reliable**=====



US Army Corps  
of Engineers

# New Orleans and Vicinity Hurricane Protection System Emergency Supplemental Funding to Date (\$M)



Component	Funded
Repair Existing System and Rebuild to Design Height	\$1,533
<u>Complete Authorized System</u>	
New Orleans to Venice (Hurricane Protection)	\$ 33
West Bank and Vicinity (Hurricane Protection)	\$147
Lake Pontchartrain and Vicinity (Hurricane Protection)	\$120
Southeast Louisiana (Interior Flood Damage Reduction)	\$225
Grand Isle (Hurricane Protection)	\$ 15
Larose to Golden Meadow (Hurricane Protection)	\$ 4
<b>TOTAL</b>	<b>\$2,077 M</b>

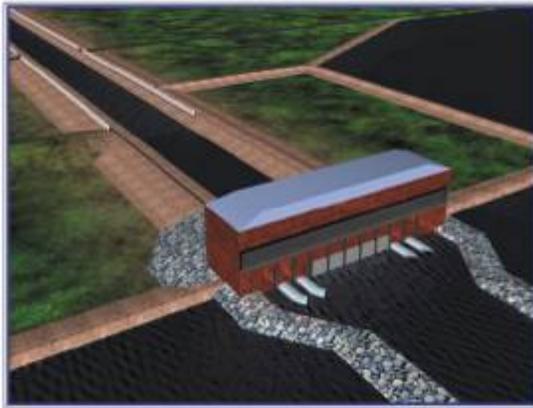


US Army Corps  
of Engineers

# Southeast Louisiana Hurricane Protection



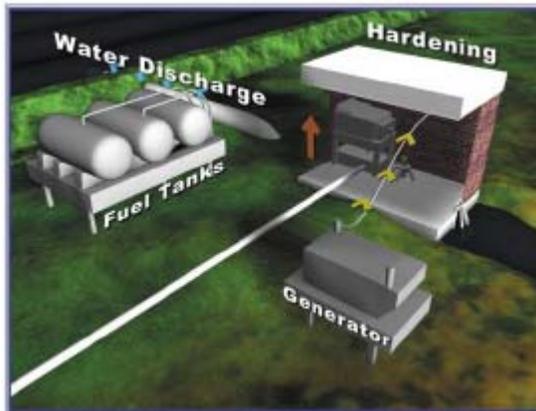
## ADDITIONAL IMPROVEMENTS



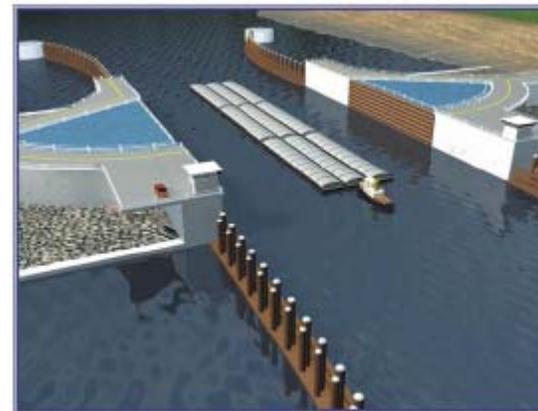
Permanent  
Pumps &  
Closures



Selective  
Armoring



Storm-Proofing  
Pump Stations



Navigable  
Closures

=====**One Team: Relevant, Ready, Responsive, Reliable**=====

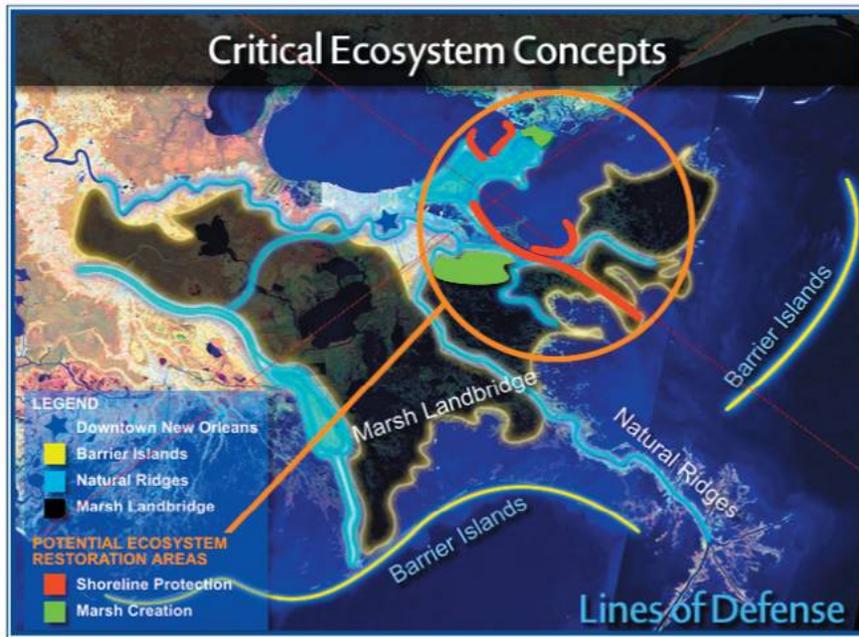


US Army Corps  
of Engineers

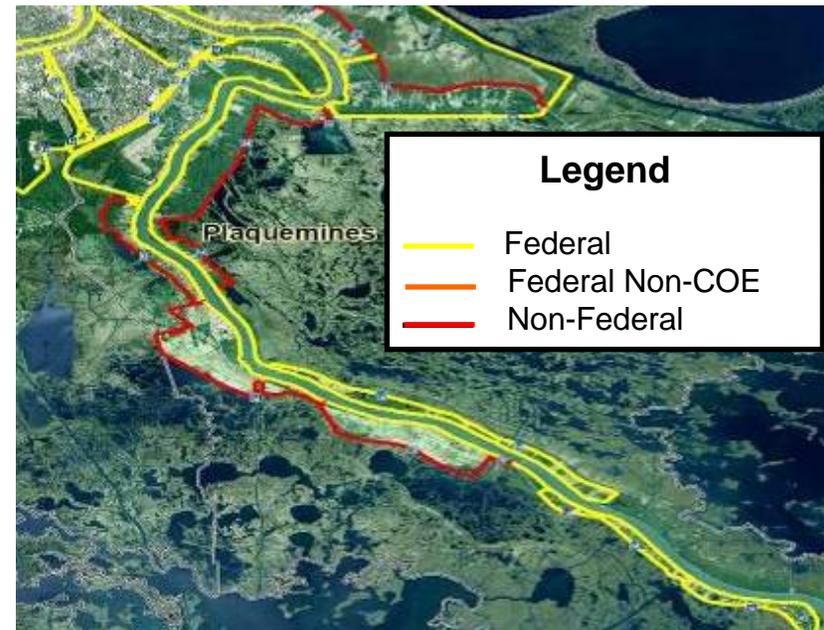
# Southeast Louisiana Hurricane Protection



## ADDITIONAL IMPROVEMENTS



**Wetlands and Ecosystem Restoration**



**Incorporation of non-federal levees in  
Plaquemines**



US Army Corps  
of Engineers



## Hurricane Recovery 4th Emergency Supplemental Appropriations for Louisiana Hurricane Protection Status as of 7 April 06

Component	President's Proposal (\$ 000)	House Bill (\$ 000)	Senate Mark-up (\$ 000)
Permanent Outfall Canal Closures and Pump Stations	530,000	530,000*	720,000
IHNC Floodwall Improvements (e.g. Navigable Floodgates)	350,000	350,000*	370,000
Strom-Proofing of Pump Stations	250,000	250,000*	250,000
Selective Armoring	170,000	170,000*	300,000
Incorporate non-federal levees, West Bank Plaquemines Parish	60,000	60,000*	220,000
Reduce storm damage by restoring wetlands	100,000	100,000	100,000
Incorporate non-federal levees, East Bank Plaquemines Parish			94,000
Repair non-federal levees in Terrebonne Parish			30,000
<b>Total</b>	<b>1, 460, 000</b>	<b>1, 460,000</b>	<b>2,084,000</b>

\* Subject to authorization

**One Team: Relevant, Ready, Responsive, Reliable**



US Army Corps  
of Engineers

# Louisiana Coastal Protection and Restoration (LaCPR)



## Congress directed analysis and design of:

- Category 5 Hurricane Protection
- Full range of measures for flood control, coastal restoration, and hurricane protection
- Preliminary Report to Congress – June 2006
- Final Technical Report – December 2007
- Submit reports on component areas for authorization as practicable

---

---

*One Team: Relevant, Ready, Responsive, Reliable*

---

---

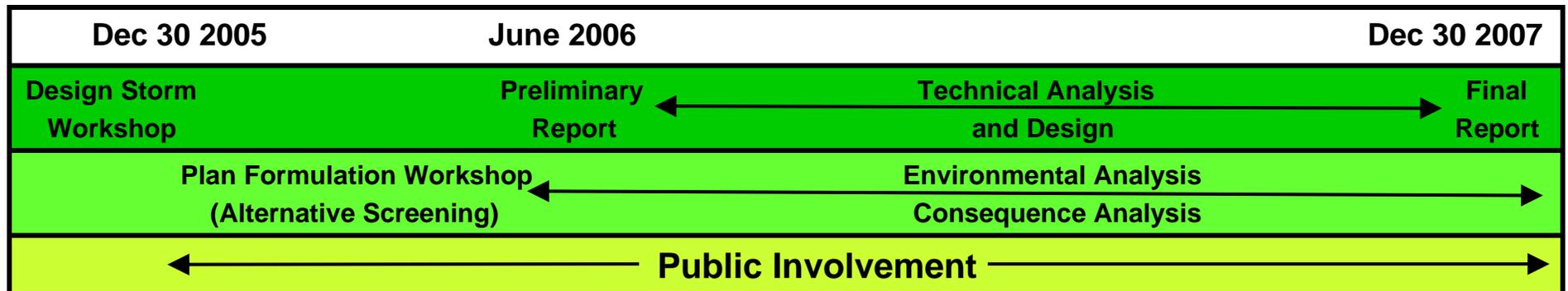


US Army Corps  
of Engineers

# Louisiana Coastal Protection and Restoration (LaCPR) - Status



- Partnership with State Coastal Protection and Restoration Authority
- Team formed
- Project Management Plan drafted
- Finalizing HQ guidance
- Frequent broad based public involvement planned



==== *One Team: Relevant, Ready, Responsive, Reliable* ====



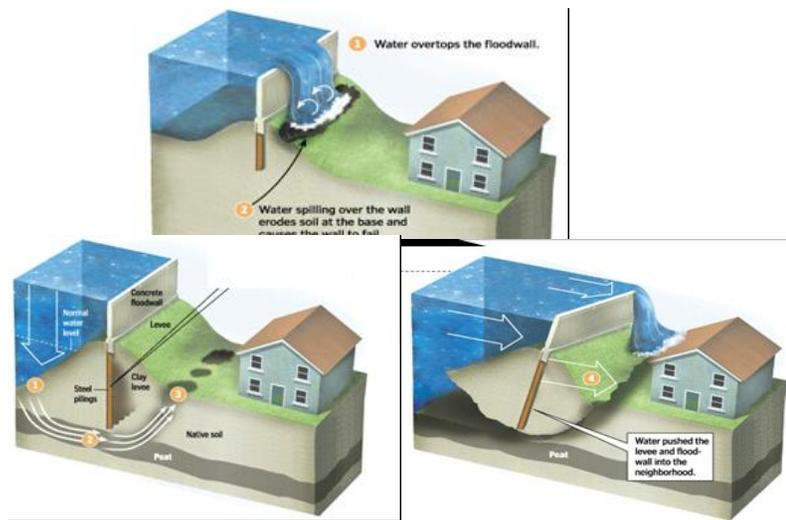
US Army Corps  
of Engineers

# Interagency Performance Evaluation Task Force Structure Response and Behavior

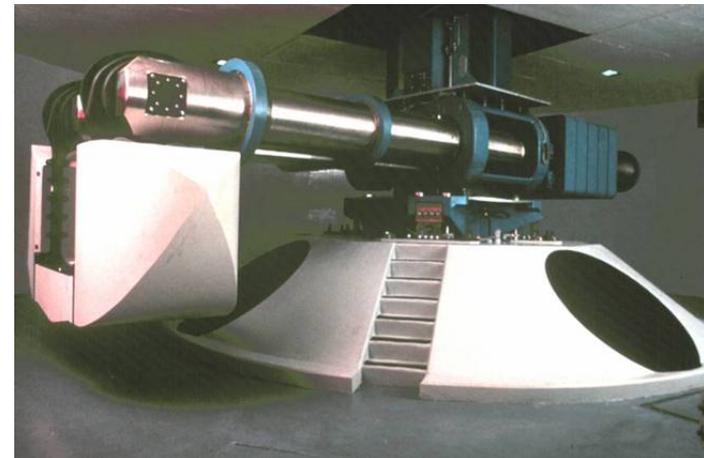


Combination of numerical  
and physical modeling

Sophisticated soil-structure  
analysis will use the  
Army centrifuge and at RPI



Key Response analyses



Army Centrifuge



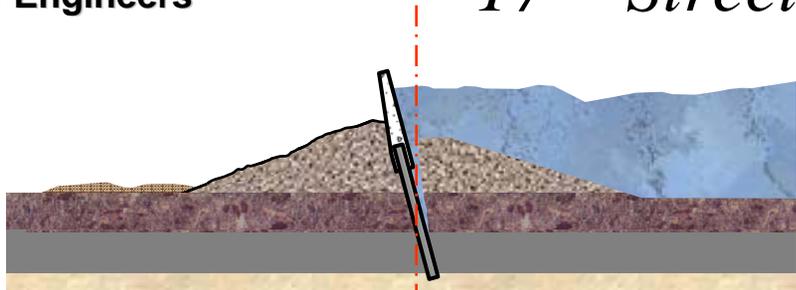
GeoDelft Institute Levee Model



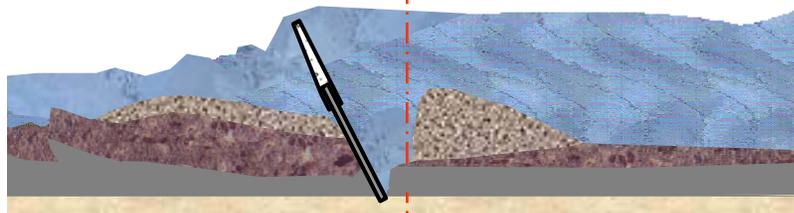
US Army Corps  
of Engineers

# Performance

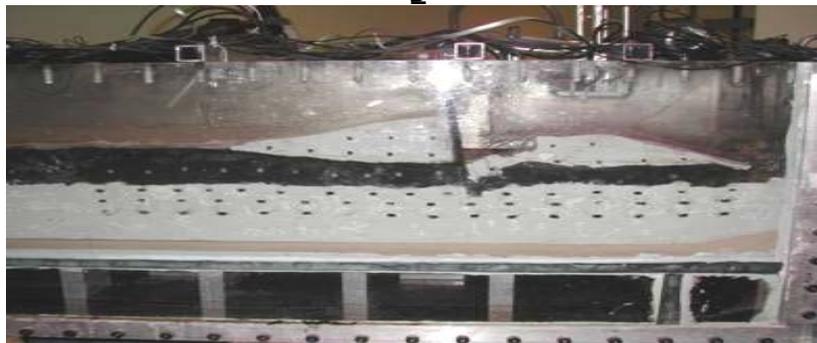
## 17<sup>th</sup> Street Canal Breach Analysis



Deflection and Pressure



Failure and Movement



Confirmation in Centrifuge

### 17<sup>th</sup> Street Canal Breach Mechanism

- Deflection of I-Wall by surge/waves
- Full hydrostatic pressure along wall splits levee into two blocks
- Weaker clay at levee toe causes failure in subsurface clay layer
- Soil block from wall back displaced



Displacement of wall and part of levee

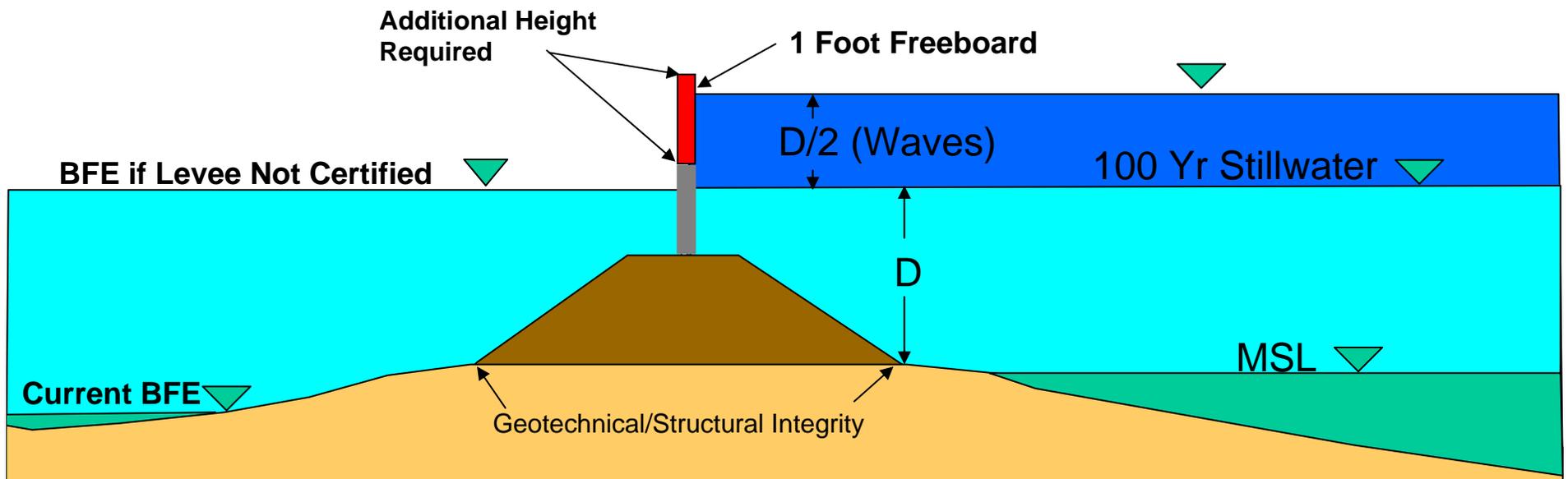


US Army Corps  
of Engineers

# Levee Certification



Using Criteria from FEMA Regulations



as of 3/30/06

**One Team: Relevant, Ready, Responsive, Reliable**



US Army Corps  
of Engineers

# Costs to Certify Levees by Hydraulic Area – Details (Population)



	BFE		Dollars			Population		
	Deficiency		Total	%	Cumulative %	Total	%	Cumulative %
A: Orleans East Bank	~	ft.	\$--*	0%	0%	317,530	30.4%	30.4%
B: Algiers	2.5 - 3.5	ft.	\$163 M	4.1%	4.1%	139,987	13.4%	43.8%
C: Jefferson East Bank / St. Charles	1.5 - 2.5	ft.	\$631 M	15.9%	20%	274,938	26.3%	70.1%
D: Jefferson West Bank	0.5 - 4.0	ft.	\$552 M	13.9%	33.9%	107,393	10.3%	80.4%
E: New Orleans East	0 - 3.5	ft.	\$760 M	19.1%	53%	94,820	9.1%	89.4%
F: St. Bernard / Lower 9 <sup>th</sup> Ward	1.5 - 7.5	ft.	\$258 M	6.5%	59.5%	85,607	8.2%	97.6%
G: Belle Chase / Algiers East	2.5 - 4.0	ft.	\$45 M	1.1%	60.7%	10,158	1.0%	98.6%
H: Plaquemines West Bank	2.0 - 8.0	ft.	\$1,073 M	27%	87.7%	10,457	1.0%	99.6%
I: Plaquemines, Non-federal**	2.5 - 7.0	ft.	\$345 M	8.7%	96.4%	2,526	0.2%	99.8%
J: Plaquemines East Bank	7.0	ft.	\$143 M	3.6%	100%	1,812	0.2%	100.0%

**TOTAL**

**\$3970 M**

As of 12 April News Release

\* Area A will be certifiable in 2010 upon completion of the work already authorized and funded, as well as the work proposed in the Supplemental now before Congress.

\*\* Does not include \$200 M to incorporate non-federal levees into system

Sources: USACE, FEMA, HUD, Census



US Army Corps  
of Engineers

# GCR Announcement

## 12 April 06



- **Administration will support an additional \$2.5 Billion**
  - Replace or reinforce 36 miles of floodwalls.
  - Raise levees to levels necessary to certify in Orleans, Jefferson, St. Bernard, St. Charles and upper Plaquemines Parishes (Bell Chase area).
  - Deferred decision on lower Plaquemines Parish till June
- **FEMA Issued Advisory Base Flood Elevations**
  - New construction and reconstruction - build to current BFE or 3 feet above existing ground whichever is higher.



US Army Corps  
of Engineers

# Estimated Cost to Provide Protection to Base Flood Elevation (Billions)

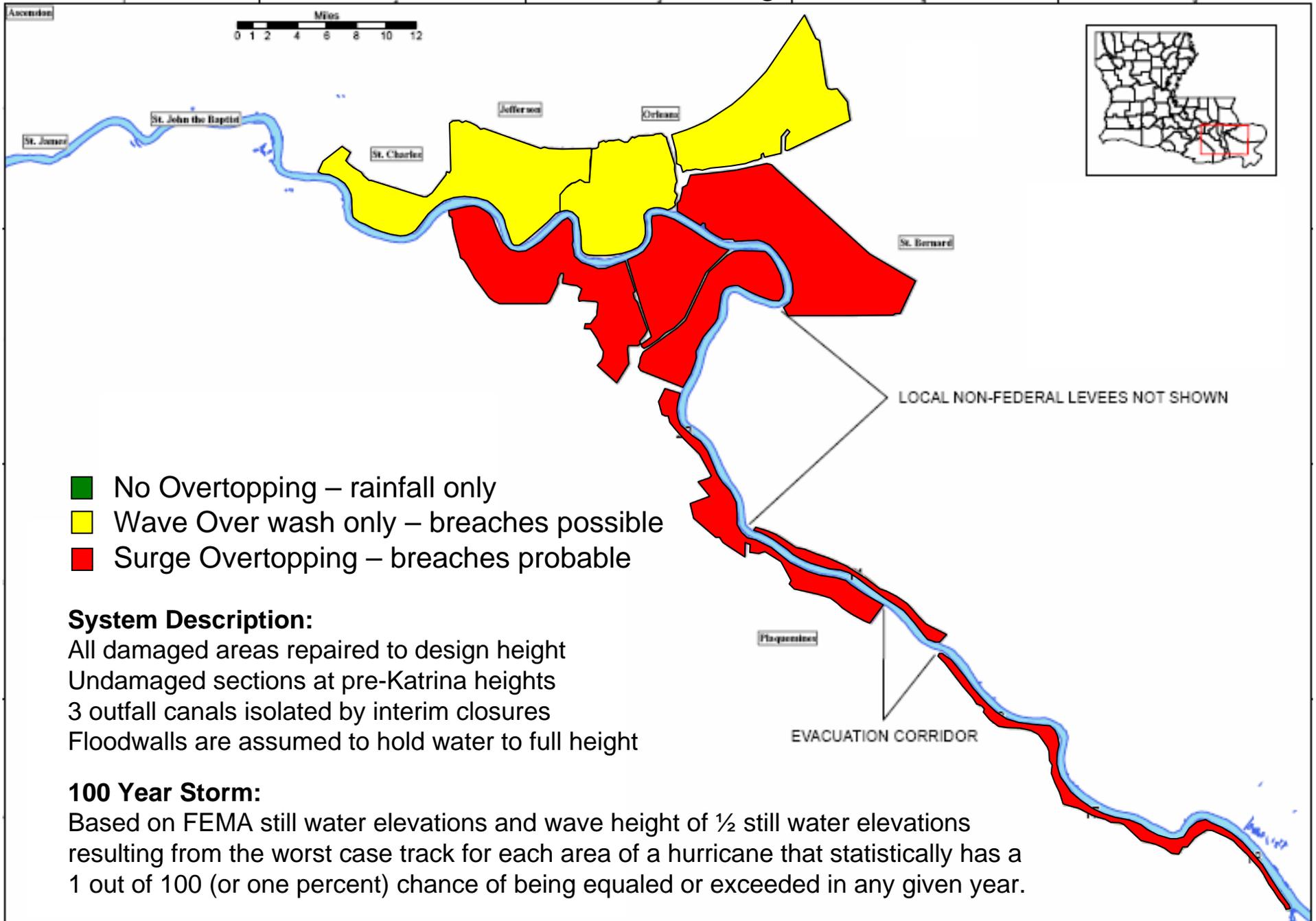


Previously Appropriated Funds	\$2.08	
Pending Supplemental Request	\$1.46	
<b>Total Funds Provided/Requested</b>		<b>\$3.54</b>
<b>Additional Cost for New Orleans Metro Area and Belle Chase</b>		
• Floodwalls	\$1.6*	} <b>\$2.5</b>
• 100-year Protection	\$0.8	
• Non-Federal Levees (West Bank of Plaquemines)	\$0.2	
<b>Additional Costs for Lower Plaquemines Parish</b>		
• T-Walls	\$0.5	} <b>\$1.6</b>
• 100-Year Protection	\$1.1	
<b>Total Additional Costs</b>		<b>\$4.10</b>

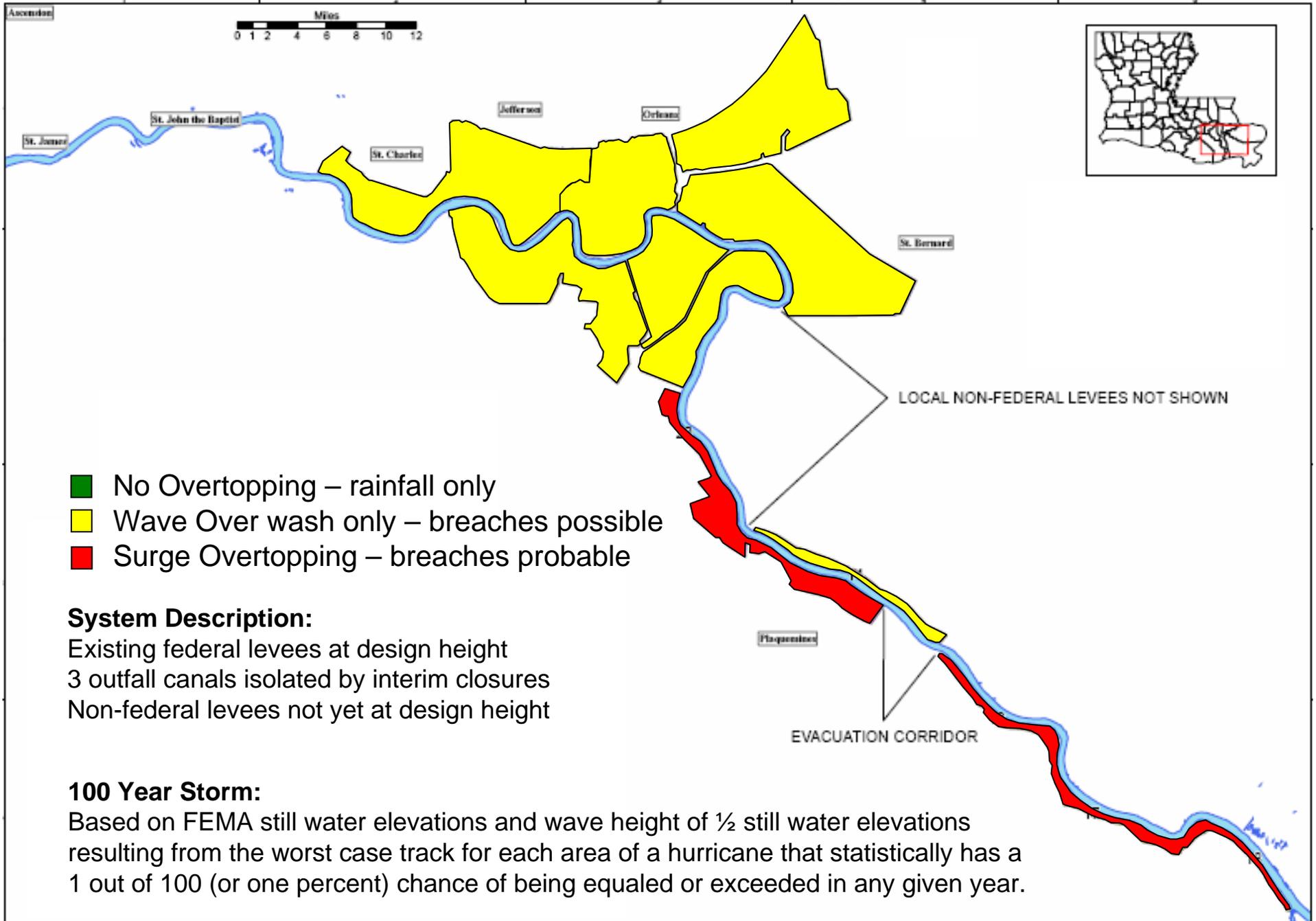
\* Assumes 36 miles of floodwall replacement (worst case) per IPET analysis

**One Team: Relevant, Ready, Responsive, Reliable**

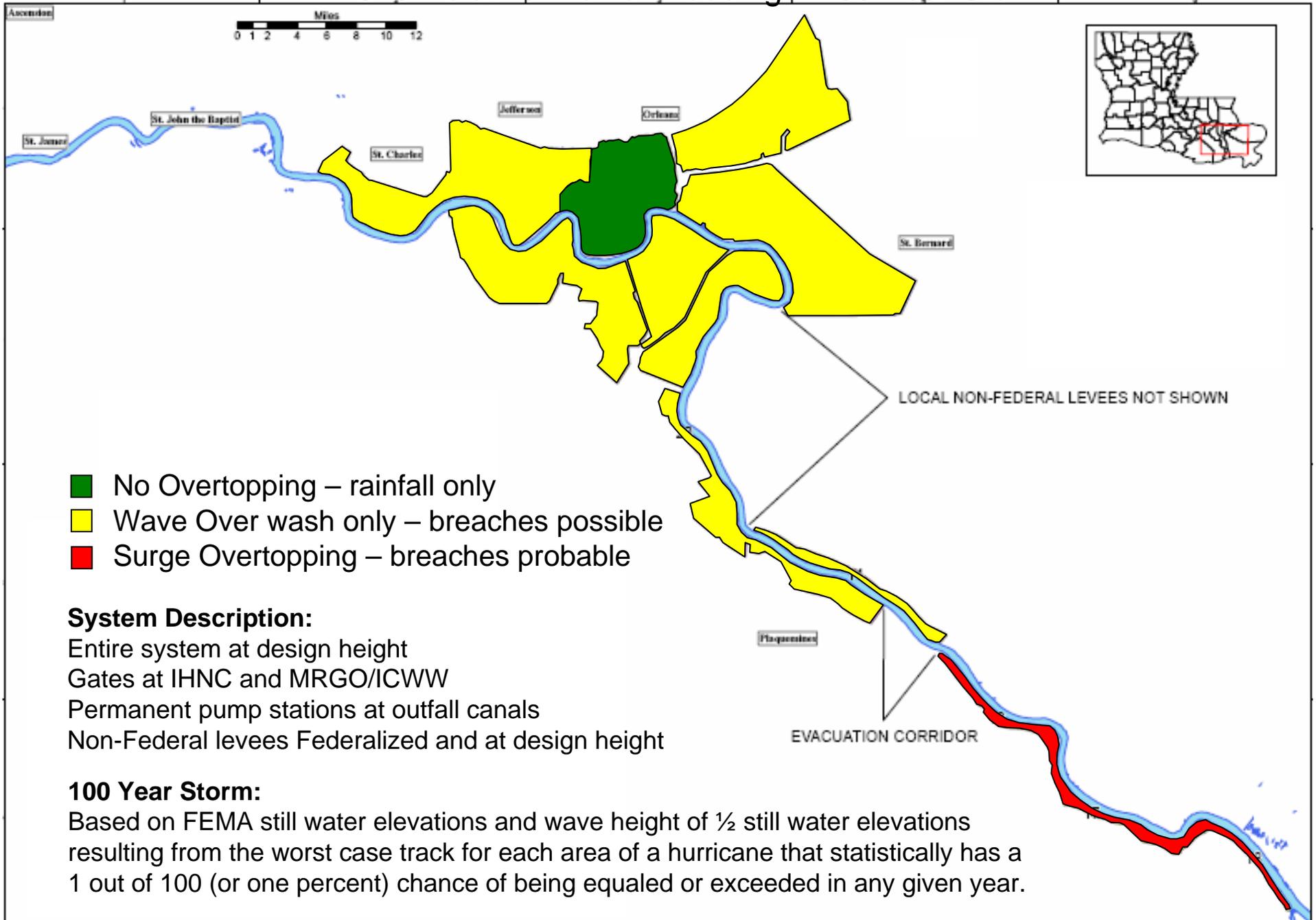
## June 2006 Relative Risk of Flooding – 100 Year Storm



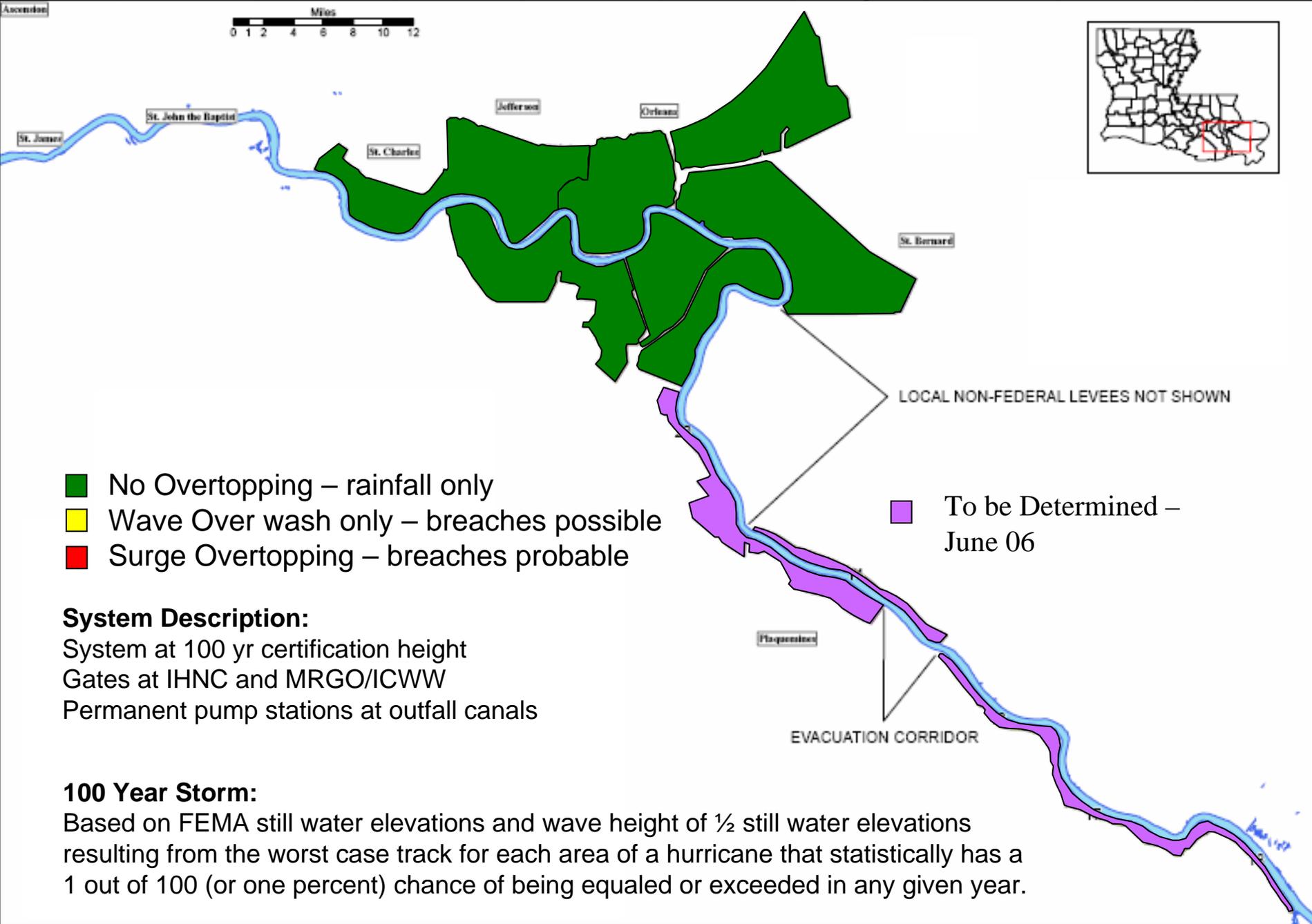
# September 2007 Relative Risk of Flooding – 100 Year Storm



## 2010 Relative Risk of Flooding – 100 Year Storm



# 100 Year Protection Relative Risk of Flooding – 100 Year Storm





US Army Corps  
of Engineers



# Questions or Comments?

---

---

*One Team: Relevant, Ready, Responsive, Reliable*

---

---