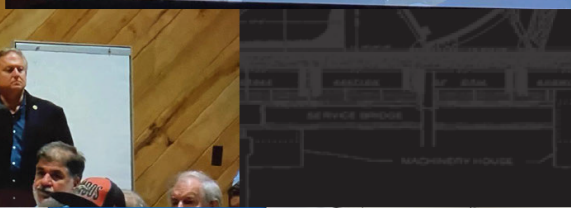


# PEARL RIVER BASIN FLOOD RISK MANAGEMENT

(b) (6)

Chief, Regional Planning Environment  
Division South

August 8, 2023



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## PRESENTATION OBJECTIVES



- Formulation summary
- Cost/benefit drivers
- Requirements for plan outcomes
- Compliance requirements

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# PLAN FORMULATION SUMMARY



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# FINAL ARRAY OF ALTERNATIVES



## *Alternative A*

Nonstructural plan included acquisition (buyout) of structures and either relocation or demolition of these structures. Removes structures out of 500-year floodplain and acquires the land where they reside. Total number of structures would be more than 3,000, including residential, commercial, government and public buildings, schools, and hospitals. Does not include structures behind existing levees, although risk in these areas may still exist.

It was determined by the NFI and concurred by USACE that the alternative was impractical due to the logistics and costs associated with implementation.

**SCREENED FROM FURTHER ANALYSIS**

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# FINAL ARRAY OF ALTERNATIVES



## *Alternative B*

The levee plan alternative was part of the final array in the NFI Section 211 Report, and was determined not to be the national economic development plan (NED) or locally preferred plan (LPP). USACE determined that a significant design and cost reduction would be needed to result in a federally justified project.

Due to this, no further evaluation of Alternative B, the levee plan, was completed.

**SCREENED FROM FURTHER ANALYSIS**

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# FINAL ARRAY OF ALTERNATIVES



## *Alternative C*

Per the NFI Section 211 Report, Alternative C is the LPP and NED and the NFI recommended plan. The plan consists of channel improvements, demolition of existing weir near J. H. Fewell WTP site, construction of new weir with a low-flow gate structure further downstream to create a year-round recreational water body, Federal levee improvements, and upgrading an existing non-Federal levee into a federalized ring levee around Savannah Street WWTP. Includes features required to avoid and/or minimize impacts to federally-listed species. New EIS would likely need to be conducted.

PDT qualitatively evaluated removal of non-flood risk reduction features of Alternative C to reduce total project costs. Not only would this reduce construction costs, but also mitigation for implementation of the project. Removal of the weir would substantially reduce terrestrial habitat impacts and monitoring would no longer be required. With the reduction of quantities and total project costs, a revised Alternative C to only include flood risk reduction features would likely not be the NED Plan.

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# FINAL ARRAY OF ALTERNATIVES



## USACE Developed Alternatives

### *Alternative A1*

Nonstructural plan that includes residential structures were to be elevated up to 13 feet above the ground and nonresidential structures to be floodproofed up to 3 feet above the ground. Nonstructural components would be voluntary. Approximately 600 structures are included. This nonstructural plan is included in the implementation plan. The acquired properties would become greenspace that is publicly owned and maintained by the NFS. This alternative may be executed immediately under the Section 3104 current authority once this EIS is finalized.

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# FINAL ARRAY OF ALTERNATIVES



## USACE Developed Alternatives

### *Alternative CTO*

- Represents the “combination thereof” (CTO) referenced in the Section 3104 authority.
- Some portion of the structural measures could be implemented under Section 3104 in lieu of or in combination with a subset of the nonstructural plan, subject to the 902 limit.
  - The preliminary NED Plan, Nonstructural Plan Alternative A1, may be executed once this EIS is finalized.
  - With additional evaluation and site-specific NEPA
    - Channel Improvements of Tributaries
    - Small Levees
    - Bridge Modifications
- Channel improvements (Alternative C-like features) as a future feature
- A single CTO alternative has not been developed, but several different measures could be considered for inclusion.

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# FINAL ARRAY OF ALTERNATIVES



## *Other Alternative Considerations*

Alternatives that would not be under the USACE purview for authority and implementation.

### **Operational Changes at Ross Barnett Reservoir**

The Ross Barnett Reservoir, a non-Federal project operated by the Pearl River Valley Water Supply District, was constructed in 1962 for water supply and recreation. Although the reservoir was not designed for flood control, a flood reduction mission was later added in 1972. The reservoir has been actively reducing peak flows during large inflow events since at least 1979. It was estimated that peak flows are being reduced by as much as 28% due to these operations. A sensitivity analysis shows that reducing the flows from the Reservoir by 20 percent would reduce damages to the project. **The goal of this alternative is to implement future informed releases within the lake limits to delay or decrease peak releases for events with a forecasted peak discharge above 35,000 cfs.**

### **Water Supply**

USEPA may use existing authorities to provide water supply in addition to local water infrastructure improvements by the City of Jackson Water/Sewer Utilities Division currently being implemented in the city of Jackson under the USEPA authorities and the USACE Environmental Infrastructure Program (Section 219) project.

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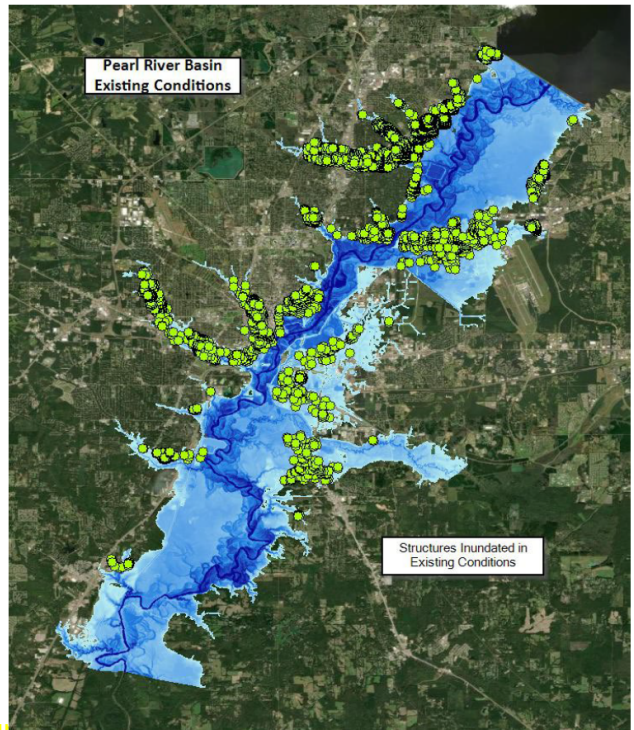


# PEARL RIVER BASIN EXISTING CONDITIONS



## Structures inundated up to the 500-year frequency event

Approximately 4,000 structures are inundated at the 500-year event under existing conditions.  
(Not pictured-approximately 1,500 structures are inundated at the 100-year event.)



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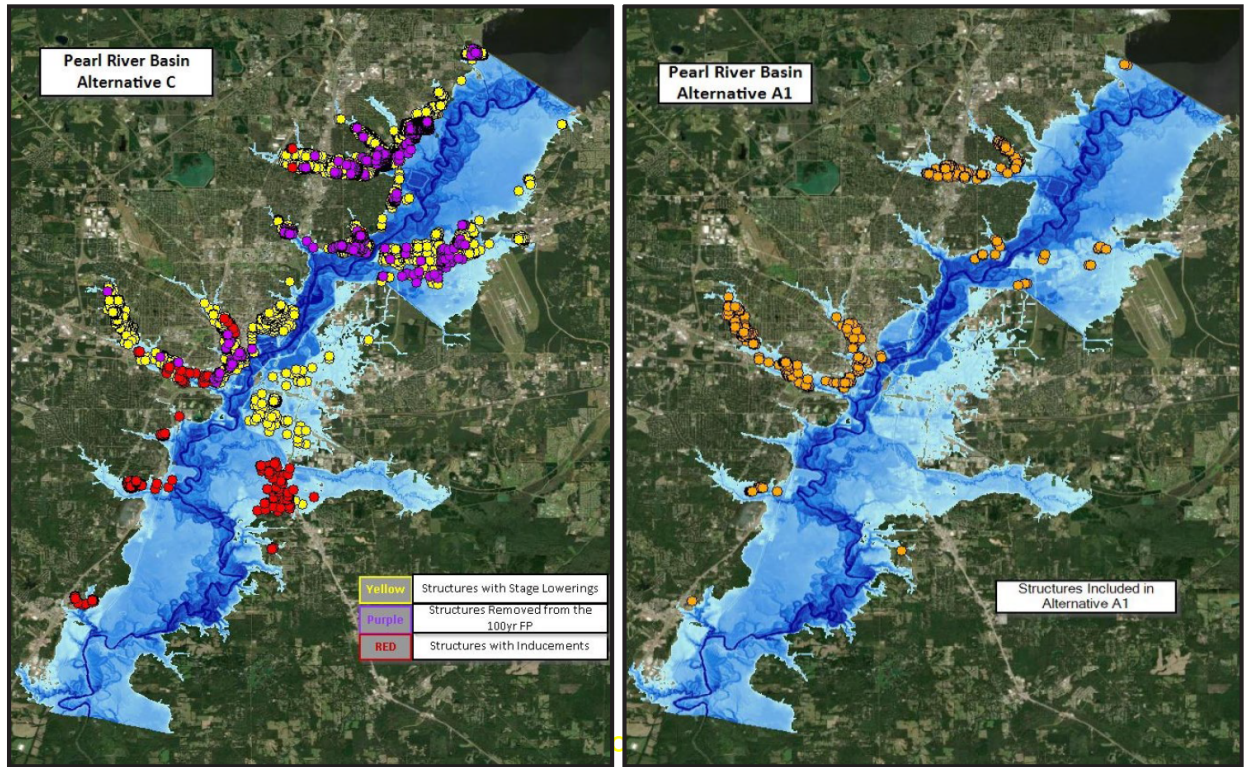
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# PEARL RIVER BASIN WITH ALT. C & A1 COMPARISON

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- Alternative C reduces flooding to approximately 3,000 structures from the 5 year to the 500-year event.
- Alternative C removes approximately 500 structures from the 100-year floodplain.
- Alternative C induces flooding to approximately 230 structures from the 5 year to the 500-year event.
- Alternative A1 removes approximately 600 structures from the 100-year floodplain.





# COST TO BENEFIT DRIVERS



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# SUMMARY OF PROJECT BENEFITS



Although more limited in scope, Alternative A1 would reduce an additional 25% of damages in the study area compared to Alternative C. Furthermore, Alternative A1 would not induce any flooding upon implementation, while Alternative C would induce flooding on approximately 230 structures within the study area and potentially more structures south of the study area. The CTO alternative would further reduce the residual damages that would remain with the Alternative A1 in place.

Damage Category	Alternative A1			Alternative C	
	Without Project	With Project	Damage Reduction	With Project	Damage Reduction
Structures, Contents, and Vehicles	\$40,535,000	\$22,826,400	\$17,708,600	\$32,226,500	\$8,308,500
Emergency Cleanup Cost	\$1,792,900	\$788,800	\$1,004,100	\$1,528,300	\$264,600
Road and Bridge	\$916,600	\$0	\$0	\$137,500	\$779,100
Water and Sewer	\$214,800	\$0	\$0	\$50,400	\$164,400
WWTP	\$3,398,200	\$0	\$0	\$169,900	\$3,228,300
Traffic	\$1,615,100	\$0	\$0	\$80,800	\$1,534,300
<b>Total</b>	<b>\$48,472,600</b>	<b>\$23,615,200</b>	<b>\$18,712,700</b>	<b>\$34,193,400</b>	<b>\$14,279,200</b>

Level \$  
For Alternative C, benefits for the following damage categories were taken directly from the NFI Section 211 Report Appendix B Table B-16: road and bridges, water and sewer, WWTP and traffic



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# COST TO BENEFIT DRIVERS

Alternative C: Total Project Costs - Low to High Estimates

	Low	High
Land and Damages	\$33,221,000	\$33,221,000
Relocations	\$3,513,000	\$3,513,000
Channel and Levee Improvements	\$201,765,451	\$201,765,451
Capture and Relocation of Sawback Turtle	\$110,400	\$110,400
New Slurry wall for seepage of existing features	\$1,600,000	\$4,300,000
Pumping Plants	\$195,000,000	\$195,000,000
Stabilization or Armoring for Bridge Abutments	\$200,000,000	\$200,000,000
Habitat Mitigation	\$189,131,852	\$951,200,000
Weir	\$140,000,000	\$140,000,000
Recreation (LWCF grants)	\$1,422,993	\$1,422,993
Hard Points	\$9,000,000	\$9,000,000
Pre-Construction Engineering	\$120,884,140	\$120,884,140
Construction Management	\$120,884,140	\$120,884,140
Cultural Mitigation	\$45,000,000	\$45,000,000
Riverbank Preservation	\$777,000	\$777,000
Species Monitoring of Gulf Sturgeon	\$1,620,000	\$1,620,000
Water Quality Monitoring	\$60,000	\$60,000
Mitigation for Induced flooding to structures	\$78,000,000	\$78,000,000
First Cost	\$1,341,989,976	\$2,106,758,124
HTRW	\$492,000,000	\$1,512,000,000

FY 23 Price Level \$

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# COST TO BENEFIT DRIVERS

Alternative A1: Total Project Costs

	Low
Land and Damages	
Relocations	
Channel and Levee Improvements	
Capture and Relocation of Sawback Turtle	
New Slurry wall for seepage of existing features	
Pumping Plants	
Habitat Mitigation	
Weir	
Recreation (LWCF grants)	
Hard Points	
Pre-Construction Engineering	
Construction Management	
Cultural Mitigation	\$1,523,680
Riverbank Preservation	
Species Monitoring of Gulf Sturgeon	
Water Quality Monitoring	
Mitigation for Induced flooding to structures	
First Cost	\$198,520,000
HTRW	\$3,000,000

FY 23 Price Level \$

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# USACE IMPLEMENTABLE ALTERNATIVE COST TO BENEFIT RATIO COMPARISON



	A1	C-Low Cost	C-High Cost
<b>Project First Cost</b>	\$198,520,000	\$1,342,000,000	\$2,106,760,000
<b>Interest During Construction</b>	\$614,000	\$86,324,000	\$135,518,000
<b>Total Investment Cost</b>	\$199,134,000	\$1,428,324,000	\$2,242,278,000
<b>AA Investment Cost</b>	\$7,021,100	\$50,359,600	\$79,058,400
<b>AA O&amp;M Cost</b>	\$0	\$940,000	\$940,000
<b>Total AA Cost</b>	\$7,021,100	\$51,299,600	\$79,998,400
<b>Benefits EAD Reduced</b>	\$18,712,700	\$14,279,200	\$14,279,200
<b>Net Benefits</b>	\$11,691,600	-\$37,020,400	-\$65,719,200
<b>B/C Ratio</b>	2.7	0.3	0.2

FY 23 Price Level \$ and Discount rate  
Contingency of 34.5% has been included for Alternative 1 and no contingencies have been applied by USACE for alternative C as an abbreviated cost risk assessment was not included as part of this effort.

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## REQUIREMENTS AND ADDITIONAL BENEFITS



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# REQUIREMENTS AND ADDITIONAL BENEFITS

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**Per the Congressional authorization, the outcomes of the plans must meet the following:**

- Section 3104 Pearl River Basin, Mississippi, of Water Resources Development Act (WRDA) 2007
  - The Secretary may construct the national economic development (NED) plan, the locally preferred plan (LPP) or some combination thereof,
  - Subject to a determination by the Secretary that the LPP provides at least the same level of flood damage reduction as the NED plan and that the LPP is environmentally acceptable and technically feasible.
- WRDA 2018 Section 1176
  - Determination by the Secretary that the project is technically feasible, economically justified, and environmentally acceptable.
  - Assess downstream effects.

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# OTHER SOCIAL EFFECTS

Alternative A1 & C Comparison



Theme	Indicator	A1	C
Health & Safety	Life Safety	+	++
	Critical Infrastructure	0	+
	Food Insecurity	--	--
Social Vulnerability & Resiliency	Reduction of Damages to Designated Tracts	++	+
Economic Vitality	Employment Activity	-	+
	Tax Base	+	+
	Gentrification	+	+
Social Connectedness & Identity	Civic Infrastructure	+	++
	Community Dynamic	--	+
	Disruption to Communities	-	-
Participation	Public Meetings	?	?
Leisure & Recreation	Access to Recreation	0	+
Environmental Justice	Lowering of Flood Stage	0	+
	No Longer First Floor Flooding	++	0
	Adverse Impacts	--	--
	Structures in EJ Areas of Concern Excluded	--	?

**KEY**

+++	Significant Beneficial Effects
++	Moderate Beneficial Effects
+	Minor Beneficial Effects
0	Negligible Effects
-	Minor Negative Effects
--	Moderate Negative Effects
---	Significant Negative Effects
?	Data not available to assess yet

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# SUMMARY OF ENVIRONMENTAL CONSEQUENCES



Resources	Alt A1: USACE Non-Structural Plan; NED Plan	Alt C: LPP, Channel Improvement/ Weir/Levee
Wetland	D/I/C = (0)	D/I/C= (---)
Forested Uplands	D/I/C = (0)	D/I/C= (---)
Aquatic and Fisheries	D/I/C = (0)	D/I/C= (---)
Wildlife Resources	D/I/C = (0)	D/I/C= (---)
T&E; Protected Species	D/I/C = (0)	D/I/C= (---)
Soils; P&U Farmlands	D/I/C = (0)	D/I/C = (0)
Cultural Resources	D/I/C = (-)	D/I/C= (---)
Recreation	D/I/C = (0)	D/I/C = (--/++)
Aesthetics	D/I/C= (-)	D/I/C = (--)
Air Quality	D/I/C= (0)	D/I/C = (-/0/0)
Noise Quality	D/I/C= (-/-/-)	D/I/C= (-/-/-)
H&H Resources	D/I/C = (0)	Sediment study not completed; could be --
Water Quality	D/I/C = (0)	Not complete; could be --
Water Supply	D/I/C = (0)	Availability: +++; quality needed to be able to use for water supply --
Socio-Economics	Not complete; could be D/I/C = (0)	Not complete; could be D/I/C = (+/+ /0)
Environmental Justice	D/I/C= (+/-/+)	D/I/C= (0/-/+)
HTRW	D/I/C= (+-/0/0)	D/I/C= (---)
Greenhouse Gas	Not complete; could be D/I/C= (+/+ /+)	Not complete; could be D/I/C= (+/-)

## KEY

+++	Direct, Indirect, Cumulative Impacts
+	Positive Impacts
-	Negative impacts
0	No Impacts
+ or -	Minor Impacts, Whether Positive or Negative
2 symbols	Major Impacts
3 symbols	Significant Impacts



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# SUMMARY OF ENVIRONMENTAL CONSEQUENCES



	Alt A1	Alt C	CTO
<b>Draft</b>	Not in compliance with: FWCA <sup>1</sup> AQ  Mitigation not required	Not in compliance with: FWCA <sup>1</sup> ESA <sup>2</sup> AQ WQ 401 <sup>4</sup>  Mitigation not complete <sup>3</sup>	Not in compliance with: FWCA <sup>1</sup> AQ  Mitigation not required for constructable features
<b>Final</b>	All compliance complete contingent on having all details of A1  Mitigation not required	Not in compliance with: FWCA <sup>1</sup> ESA <sup>2</sup> WQ 401 <sup>4</sup>  Mitigation not complete <sup>3</sup>	All compliance complete on constructable features contingent on having all details of A1  Mitigation not required for constructable features  HTRW: Conduct Phase I ESA If we are including new portions of the study area that haven't been assessed
<b>PED</b>	EJ: determine what to do for those who can't afford to participate in program and who are low-income who may be disproportionately impacted  HTRW: conduct phase I ESA	Finalize compliance with: FWCA <sup>1</sup> ESA <sup>2</sup> WQ 401 <sup>4</sup>  Need to finalize mitigation which would likely require a supplemental EIS <sup>3</sup>  EJ: determine what to do for those who can't afford to participate in program and who are low-income who may be disproportionately impacted; develop Mitigation induced flooding impacts  HTRW: conduct phase I and likely phase II ESA	EJ: determine what to do for those who can't afford to participate in program and who are low-income who may be disproportionately impacted  HTRW: conduct phase I ESA and possibly Phase II ESA

<sup>1</sup>FWCA (design dependent, i.e. fish passage design, velocity analysis, downstream impact analysis to include sedimentation analysis, more specific mitigation plan).

- For draft will have a product that constitutes partial compliance.
- sediment analysis expected during PED

<sup>2</sup>ESA (design dependent, i.e. fish passage design, velocity analysis, downstream impact analysis to include sedimentation analysis)

- sediment analysis expected during PED
- Could result in jeopardy opinion due to impacts to LA pigtoe

<sup>3</sup>Mitigation (identification of lands ongoing for terrestrial mitigation, extremely challenging (if not impossible) to mitigate riverine impacts of this proportion)

- Experts agree that restoring large systems such as this or even compensating for such great function and habitat loss to a truly desirable condition (as existed pre-disturbance) is impossible to achieve.
- Impoundment removal seems to be the national trend, due to significant adverse impacts of impoundments on river systems for natural resources and humans.

<sup>4</sup>MDEQ will not issue a WQC without sufficient design. Will likely receive a letter of confirmation for the Final and a WQC in PED



## QUESTIONS?



**(b) (6)**

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