

Memorandum



DATE June 8, 2012

TO Trinity River Corridor Project Committee Members: Vonciel Jones Hill (Chair)
Linda Koop (Vice Chair), Monica Alonzo, Scott Griggs, and Delia Jasso

SUBJECT **Dallas Floodway System Risk Assessment and Study Update**

At the next Trinity River Corridor Project Council Committee Meeting on Monday, June 11, 2012, the attached briefing will be presented by Colonel Richard J. Muraski, Michael Bormann, P.E., and Nathan Snorteland, P.E. with the United States Army Corps of Engineers. This briefing will provide an update on the Dallas Floodway System risk assessment and provide a study update

Please contact me if you have questions.

William Finc L for Jill Jordan

Jill A. Jordan, P.E.
Assistant City Manager



THE TRINITY
DALLAS

Attachment

Cc: Honorable Mayor and Members of the City Council
Mary K. Suhm, City Manager
A. C. Gonzalez, First Assistant City Manager
Ryan S. Evans, Assistant City Manager
Jill A. Jordan, P.E., Assistant City Manager
Forest E. Turner, Assistant City Manager
Joey Zapata, Assistant City Manager

Kelly High, Director, Trinity Watershed Management
Sarah Standifer, (I) Assistant Director, Trinity Watershed Management
Paul D. Dyer, Director, Park and Recreation
Theresa O'Donnell, Director, Sustainable Development & Construction
Rosa A. Rios, City Secretary
Stephanie Cooper, Assistant to the City Manager – Council
Frank Libro, PIO

DALLAS FLOODWAY SYSTEM RISK ASSESSMENT AND STUDY UPDATE

Colonel Richard J. Muraski, Jr.

Commander, Fort Worth District

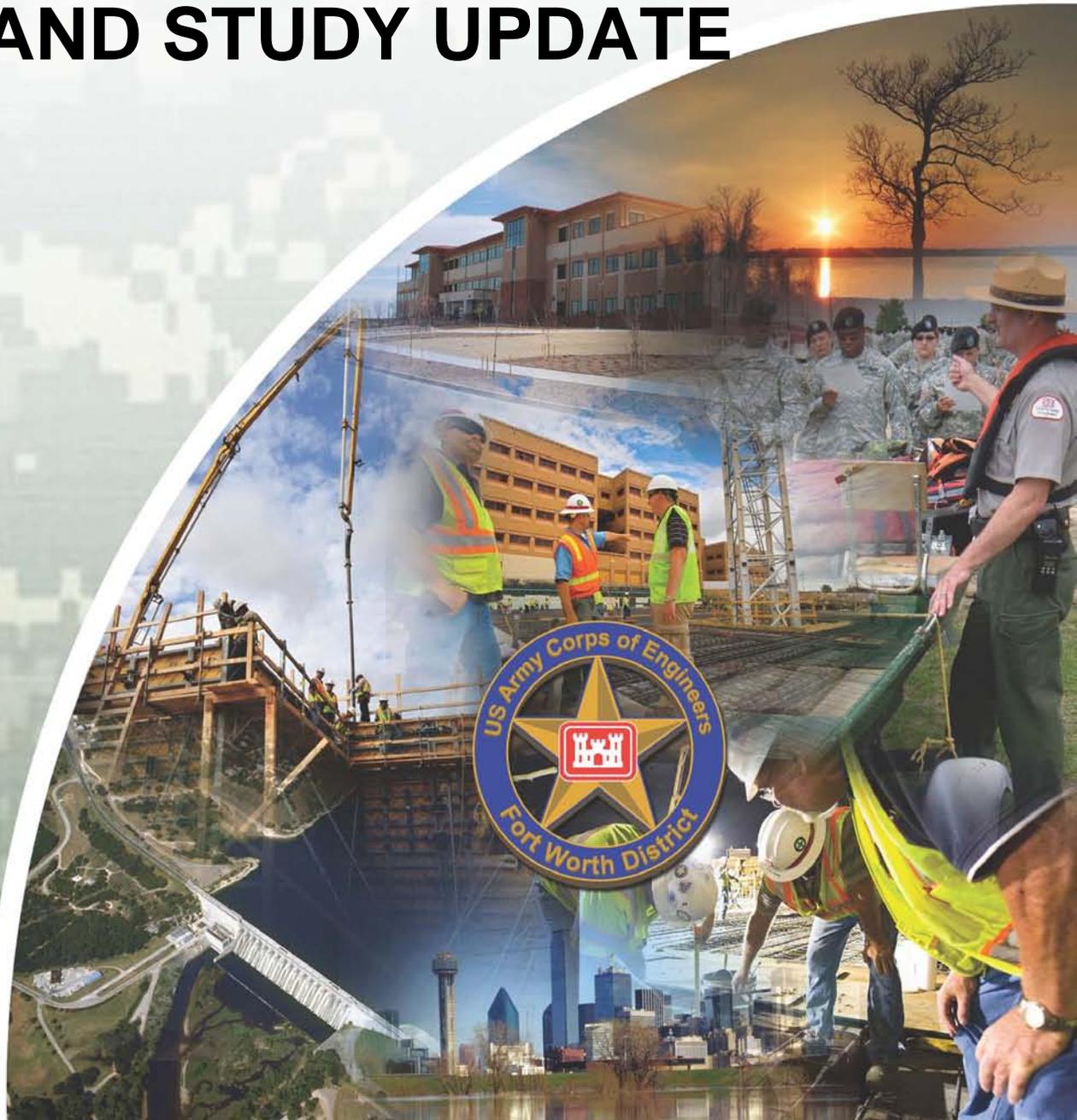
Nate Snorteland, P.E.

Director, USACE, Risk Management
Center, Golden, CO

Mike Bormann, P.E.

Director, Trinity River Corridor Project,
Fort Worth District

June 11, 2012



Introduction

- Life safety is our No. 1 priority
- The Corps of Engineers is a learning organization
- The nationwide Corps Levee Safety Program comprises 14,600 miles of levees in 2,000 systems
- Civil Works Transformation under way
- Risk Assessment part of all future Levee projects

“Life-cycle Flood Risk Management is a shared responsibility. We remain committed and vigilant to reducing flood risk to the citizens of our Nation. We will continue to look critically and vigorously at the resilience and vulnerability of our water resource infrastructure, nationwide, and help drive down risk together with all our partners.”

*- MG Merdith “Bo” Temple
Deputy Commanding General*



In Summary

- The Corps and the City are committed to life safety – protecting people and property
- **Levees more resilient than originally evaluated and less risk associated with their performance**
- **The levees have been determined to be tall enough to withstand a flood with a frequency between 1/1,000 and 1/5,000 years**
- Goal is to complete the System Study late 2013
- The City and Corps will continue to look for ways to ensure public safety and expedite this work in a cost effective manner



Purpose of Briefing

- Discuss recent successes
- Civil Works Transformation
- Discuss Risk Assessment
 - Background, Principal Findings and Recommendations
- Recent Actions
- System Study Path Forward
- Summary



Recent Successes

- City has been very diligent addressing deficiencies identified in the 2007 Periodic Inspection
- 198 maintenance deficiencies corrected
- City granted 2-yr extension in P.L. 84-99 program
- Corps approved (Section 408)
 - 100-yr Levee Improvements & Baker Pump Station
- City moving forward with 100-yr levee improvements
- Pavaho Pump Station almost finished
- Work is progressing on the System Study



Civil Works Transformation

- Why Civil Works Transformation?
 - Better address water resources challenges and the needs of the nation in fiscally constrained environment
 - Identify national priorities
 - Streamline the Civil Works planning process
 - Ensure an expedited, economical and focused study process (3x3x3 rule)
 - High Priority Dallas project selected early for Risk Assessment
 - Risk Assessments will be required for all levee projects



Risk Assessment – Background

- Prior to the Risk Assessment, we identified 3 scenarios on possible impacts to the 100-yr levee improvements plan:
 - Scenario #1 – Minor changes to plan; meet anticipated FEMA schedule for release of revised flood maps.
 - Scenario #2 – Major changes to plan; also meets FEMA schedule.
 - Scenario #3 – Changes so great, 100-year fixes will have to be rolled into larger levee improvement plan; not meet FEMA schedule
- Risk Assessment resulted in NO changes to the 100-yr levee improvements plan
- Through investigation, analysis and Risk Assessment, we know more about the Dallas Floodway system

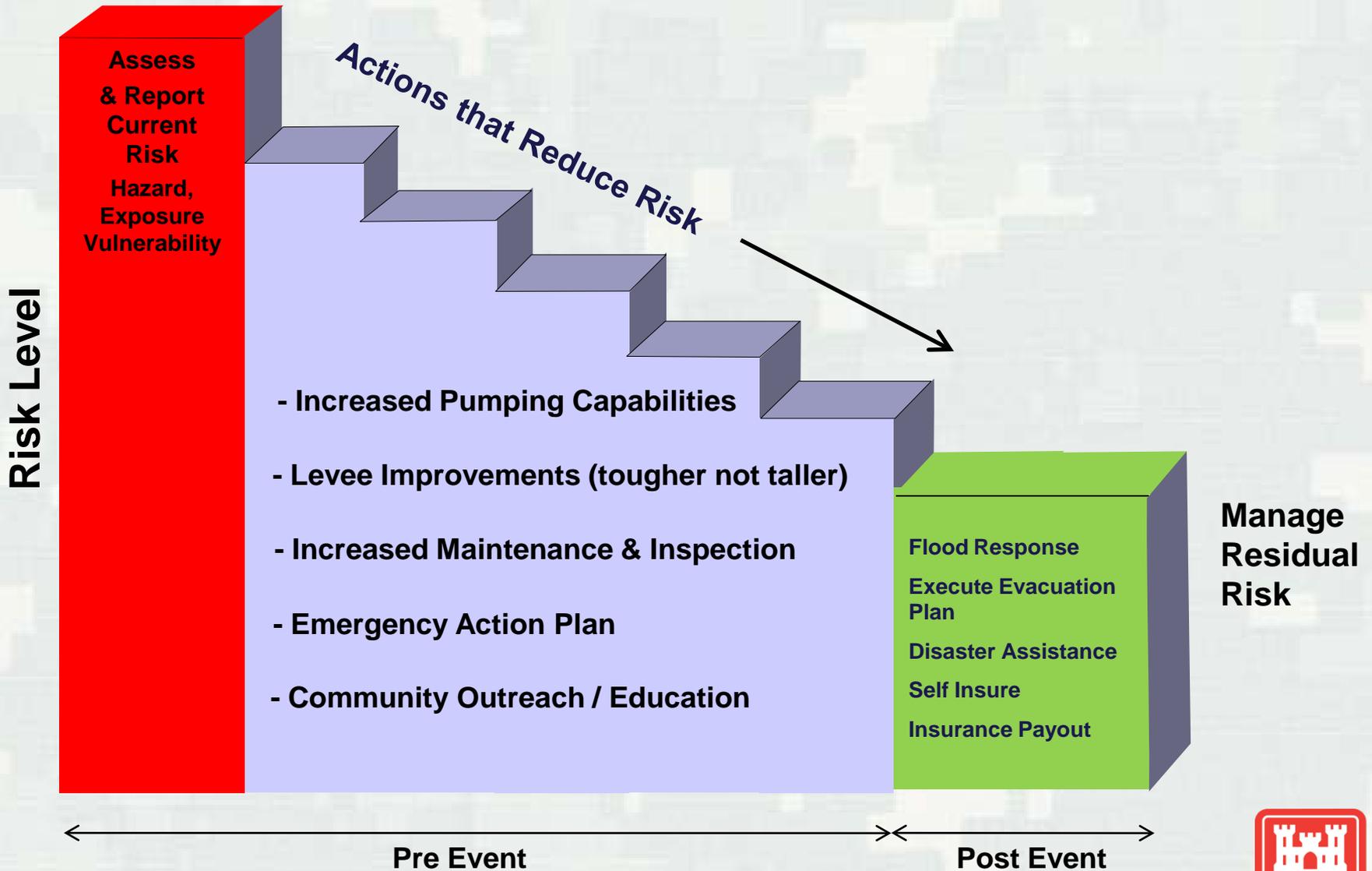


Risk Assessment – Background

- Corps uses a risk-informed approach to levee safety similar to its dam safety activities
- Evaluations of risk includes two components: structural performance and consequences
- Corps Headquarters determined the risk-informed processes could help focus the evaluation of the existing system and the scope of the ongoing study which would include life safety in addition to economic decision factors
- In September Corps Headquarters sent a team to Dallas to evaluate the economic and life safety risks posed by the system



Risk Assessment Process



Risk Assessment – Background

Recon

- Should we do something?

Feasibility

- What should we do?

Implementation

- Take Action

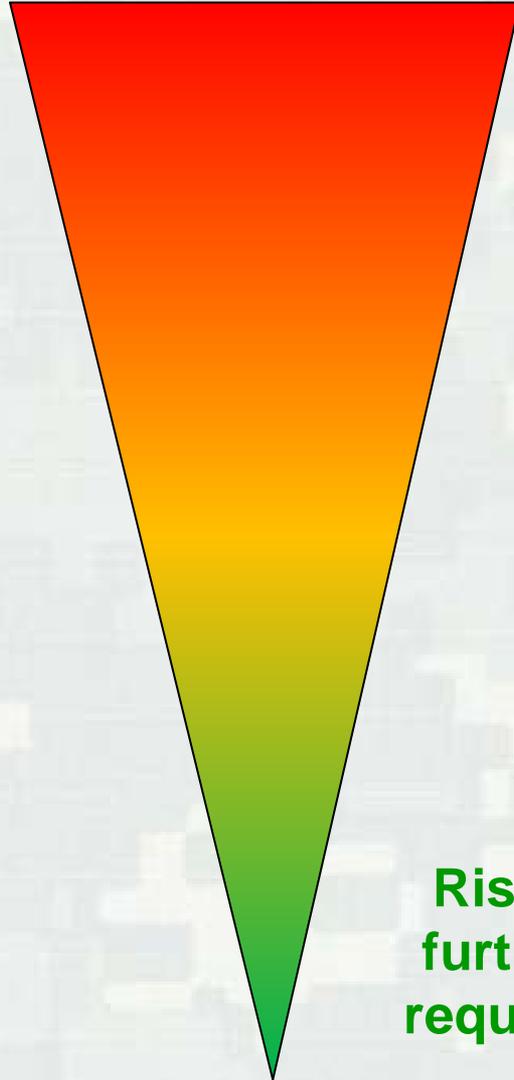


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Increasing Individual risks and societal concerns

Unacceptable Region

Tolerable Region

Broadly acceptable Region



Risks cannot be justified except in extraordinary circumstances

People and society are prepared to accept risk in order to secure benefits

Risk regarded as insignificant, further effort to reduce risk not required unless easily achieved



Activities in Trinity River Corridor

- Certification by the City of Dallas (National Flood Insurance Program)
- Ongoing repairs/improvements by the City of Dallas
 - Interior Drainage (Pump Station)
 - Sewer Interceptor (Tunnel)
- Under Construction
 - Dallas Floodway Extension
- Trinity River Corridor Project (Lakes, Highways, Levees)
- System Study (Corps – City of Dallas)
- Levee Risk Screening (Corps National)



Risk Assessment – Background

- Large flood damage reduction system – 11 miles of levees on each side of the Trinity River
- Built in many stages, with various levels of design and expertise, the levee system has only been tested to ½ its height by floodwaters
- Performance had been questioned in Periodic Inspection #9 – particularly related to stability
- Review of extensive geotechnical work done to date (5,000-plus borings)



Risk Assessment – Dallas Floodway

- 3 weeks (Potential Failure Mode Analysis - PFMA in Nov., First Risk Assessment in Dec., Second Risk Assessment in Jan.)
- Experts from Risk Management Center (RMC), Fort Worth District (SWF), Corps Engineer Research and Development Lab (ERDC), City of Dallas, and HNTB (City's Contractor)
- External Technical review complete
 - No major findings
- Final report to be completed



Risk Assessment – What We Learned

- Our understanding of the types of floods that generally occur in the basin
- The impact that the shorter-duration floods have on the distance that water penetrates the levees
- A better understanding of the combination of events that need to happen to cause failure
- Assumed that all current and future efforts in and around the floodway system will do no harm and meet Corps requirements



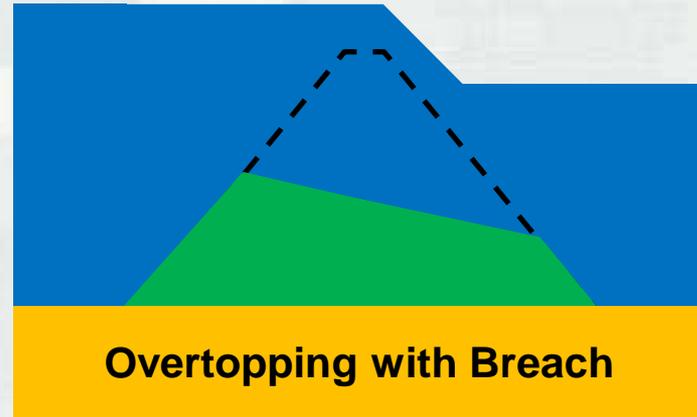
Examples of Failure Modes

Find the Weak Spot

- The Initiating Event (*flood, deterioration/aging, malfunction, earthquake*)
- The Failure Mechanism (*Internal erosion through the foundation, Gates fail to open leading to overtopping*)
- The Resulting Impact on the Structure (*rapidity of failure, breach characteristics, consequences*)



General Failure Mode Categories



 **Internal Erosion**



Principal Findings

- **Levees more resilient than originally evaluated and less risk associated with their performance**
- The team examined 13 potential failure modes
- Of those, only 2 failure modes appeared to be significant, and then only in extreme events
 - Overtopping and Breach of the East and West Levee Systems. **However, the levees have been determined to be tall enough to withstand a flood with a frequency between 1/1,000 and 1/5,000 years**
 - Overtopping of the floodwall on the East Levee



Principal Findings

- In addition, one failure mode is potentially significant – internal erosion in the foundation of the East/West levees in specific locations
 - City’s construction of cut-off walls as part of their effort to regain FEMA accreditation will likely help reduce risk associated with this potential failure mode
- These 3 failure modes are being addressed as part of the on-going System Study
- Risks for all other failure modes are tolerable



Principal Findings

- Floods are likely short duration events.
Overtopping without breach is NOT likely to fill the areas protected by the levees
- If the levee overtops **AND** breaches, the depth and area of inundation will be significant



Principal Findings

- The City of Dallas has been active in managing risks.
- They have a good surveillance plan, emergency action plan, and good lines of communication with emergency management officials.
- This should all result in good warning for any potential issues.



Recommendations

- Develop alternatives to reduce life safety risks from overtopping and breach of the system
 - Tougher not taller levees – preventing breach is more important than preventing overtopping
 - Raising levees without providing resilience would increase risks
- Develop alternatives to reduce life safety risks from internal erosion – look for cost effective measures
- The team recommends developing remote detection device alternatives to evaluate the assumptions made in the risk assessment and provide the ability for real-time safety evaluations to be made
- Revised Emergency Action Plan (EAP) to reflect information learned in the Risk Assessment



Recent Actions

- Risk Assessment helped define project conditions and identified risks to life safety
- In May, letter sent to Mayor Rawlings stating, “Initial indications suggest the levees, as they stand today after the aforementioned numerous deficiency corrections, are more resilient than originally evaluated”
 - There is less risk associated with levees performance.
 - Risk Assessment allows us to focus on critical areas
 - Risk Assessment was key to moving the System Study forward.



Recent Actions

- May 23-24, 2012, City & Corps held a Feasibility Scoping Meeting
 - Discussions were held on the risks identified by the Risk Assessment
 - Measures were proposed to address the significant risks
 - Solution might not be as extensive as previously thought (tougher not taller)



System Study Path Forward

- Next steps identified:
 - Continue to utilize Risk Assessment; incorporating results into ongoing System Study
 - Narrowing down of proposed measures
 - Determine economical viability resulting in Federal interest; justify ability to cost-share
 - Meet with other stakeholders to develop schedules for the System Study
 - Update committee in Fall with results



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