USACE NWK LEVEE SAFETY & NATIONAL LEVEE INVENTORY & REVIEW

Presented by:
Jennifer Wood, R.G.

March 29, 2018

"The views, opinions and findings contained in this report are those of the authors(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation."
OUTLINE

- USACE Levee Safety
  - Portfolio of levees
  - Risk & Risk Framework
  - FY18 Activities
  - Risk Assessment Results and Communication
  - Risk Management Activities

- National Levee Database
  - One central database
  - Levees in KS

- Levee Inventory and Review
  - Authorization
  - I&R levees
  - Key Activities
  - Timeline
  - Current Status
Levee Safety Program – Mission is to ensure levee systems provide benefits to the nation by working with sponsors and stakeholders to assess, communicate and manage flood risks to people, property and environment.

Coordination with other Corps of Engineers Programs

- Planning
- Flood Risk Management (Silver Jackets, FPMS, etc.)
- Civil Works Project Management (specific authorized projects)
- Regulatory Program
- Emergency Response
- Missouri River Recovery Program
- 33 USC 408 Alterations
- Dam Safety
### WHAT LEVEES ARE WE TALKING ABOUT?

<table>
<thead>
<tr>
<th>Authority/ Portfolio</th>
<th>Miles (Estimated)</th>
<th>Identified in the NLD?</th>
<th>Condition Assessed?</th>
<th>Characterized Benefits and Flood Risks?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federally authorized, USACE Operated and Maintained</td>
<td>4,000</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Federally authorized, USACE Constructed, Local O&amp;M</td>
<td>8,000</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Non-USACE levee (locally constructed, local O&amp;M) accepted into USACE Rehabilitation Program (P.L. 84-99)</td>
<td>2,200</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Non-USACE levees outside of USACE programs identified from state inventories; FEMA programs;</td>
<td>~15,000</td>
<td>Yes</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Non-USACE levees in state or community not identified</td>
<td>unknown</td>
<td>No</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>
RISK INFORMED DECISION MAKING

- Framework for decision making to inform actions related to levee systems
- Transparent decisions under conditions of uncertainty
- Levee system approach is primary to all activities
- Levee segments and features are integral to excluding flood waters from the leveed area
SO WHAT IS RISK?

HAZARDS
What are the hazards and how likely are they to occur?

PERFORMANCE
How will the levee perform in the face of these hazards?

CONSEQUENCE
Who and what are in harm’s way?
How susceptible to harm are they?
How much harm is caused?

RISK = f (HAZARD, PERFORMANCE, CONSEQUENCE)
FY18 LS ACTIVITIES

- Routine Inspections – Federal and Non-Fed levees
- Work by Other Reviews – technical review of project located w/in 300-500 ft of levee centerline
- Section 408 reviews
- Periodic Inspections/SLRAs –
  - Fairfax-Jersey Creek
  - Lawrence
- Periodic Inspections
  - Osawatomie
  - Auburndale
  - North Topeka
  - Soldier Creek RB2
- Communication of Risk information
  - Communicate to levee sponsors
  - Upload all levee system summaries and risk characterization into the NLD
- Support to other internal/external programs
Levee System Summary
Manhattan, Kansas Levee
Manhattan, Kansas

U.S. ARMY CORPS OF ENGINEERS

September 19, 2017

Project Description: The Manhattan, Kansas levee is a levee system that reduces the occurrence of flooding in Manhattan, Kansas. The levee system includes two pumping plants, three closure gaps, and 5.35 miles of earthen levee along the Kansas River, Big Blue River, and Wildcat Creek. The levee is up to 18 feet high. The levee was designed and constructed by the Corps of Engineers and was turned over to the local sponsor (City of Manhattan, Kansas) in 1963 for operations and maintenance. The area behind the levee features significant residential, commercial, and local government development. The leveed area daytime population is estimated to exceed 10,000, and estimated property values are over $1.3 billion. The levee faced record flood levels in 1993 when river levels reached within several feet of the top of the levee.

A risk assessment was completed by USACE to identify risk factors for this levee system and determine what actions would best manage the overall risk. The risk associated with a levee system is based on a combination of the likelihood of flooding, the expected performance of the levee during floods, and the number of people and structures located behind the levee.

Risk Characterization: The likelihood of a flood overtopping this levee in the next year has been estimated as 0.5% (one chance in 200). This is equivalent to a 14% likelihood of water overtopping the levee over the life of a typical 30-year mortgage. This is a high likelihood of overtopping given the development behind the levee. The risk assessment identified some performance concerns with levee underseepage due to the foundation conditions beneath the levee and observed performance during the 1993 flood. Flooding of the levee could lead to flood depths up to 15 feet, which would result in large consequences due to the high population at risk and property values behind the levee. Recommended risk management activities include continuing good operations and maintenance practices, monitoring levee performance during periods of high river stages, and ensuring emergency plans are reviewed and updated regularly. Efforts should also be made to inform those that live or work behind the levee of their flood risk.

<table>
<thead>
<tr>
<th>What is driving the risk? (Listed in order of priority)</th>
<th>What is being done about it? (Risk Management)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levee underseepage concerns during high river stages (equivalent to 1993)</td>
<td>Local sponsor has addressed some areas of concern. Authorized levee project will address other areas.</td>
</tr>
<tr>
<td>High population at risk and property value in the leveed area</td>
<td>Local officials have taken efforts to improve community awareness and evacuation planning efforts. This levee has an advanced flood warning system with warning sirens.</td>
</tr>
<tr>
<td>High likelihood of overtopping</td>
<td>Authorized levee project will raise portions of levee when implemented</td>
</tr>
</tbody>
</table>

What is important to Know? Levees reduce the risk of flooding, but do not eliminate it. USACE works with the City of Manhattan to assess, manage, and communicate levee risks. USACE recommends residents and business owners develop their own emergency plans, follow instructions from local officials during flood emergencies, and encourage elected officials to make sound flood risk management decisions.

U.S. ARMY CORPS OF ENGINEERS—KANSAS CITY DISTRICT
Management measures should be focused on the factors driving the risk for the levee system.

<table>
<thead>
<tr>
<th>HAZARDS</th>
<th>PERFORMANCE</th>
<th>CONSEQUENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reservoir Operations</td>
<td>Improve O&amp;M</td>
<td>Elevating Structures</td>
</tr>
<tr>
<td>Channel Conveyance Modifications</td>
<td>Monitor Levee Performance</td>
<td>Relocation</td>
</tr>
<tr>
<td>Bridge Enlargement</td>
<td>Erosion Protection</td>
<td>Buyout/Aquisition</td>
</tr>
<tr>
<td>Clearing Snagging &amp; Debris</td>
<td>Overtopping Resilience</td>
<td>Flood Proofing</td>
</tr>
<tr>
<td>Interior Drainage Features</td>
<td></td>
<td>Flood Warning System</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flood Insurance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Emergency Preparedness Plans</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Land Use Regulation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evacuation Plans/Drills</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Zoning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communication for Awareness</td>
</tr>
</tbody>
</table>
National Levee Database

Levees of The Nation

The Nation

Click on a state below or on the map to zoom in.

Select other territory types from the drop-down menu.

- Alabama
- Alaska
- American Samoa
- Arizona
- Arkansas
- California
- Colorado
- Commonwealth of the Northern Mariana Islands
- Connecticut
- Delaware
- District of Columbia
- Florida

8,771 Levee Systems
2,169 USACE
0.602 Non-USACE

29,051 Miles of Levees
14,440 USACE
14,012 Non-USACE

46,549 Levee Structures

54 years Average Levee Age

BROWSE THESE LEVEES

Map showing levees across the United States.
One central database:

- **Dashboard**
  - Program goals, metric displays, and critical information reporting

- **Risk Screening**

- **Inspection/Field Collection**

- **Federal/State/Tribal**
  - Data provided by Federal, State and Tribal Partners

- **Condition and Risk Information**
  - Inspection; Screening; Consequence; Performance Data

- **Engineering**
  - Location; inundation maps, cross section; attributes

- **LIS**
  - Levee Inspection and other field collection data

- **LST**
  - Levee Screening Tool

- **Shared Tools**
  - Critical Data

- **NLD**
Levees of Kansas

170 Levee Systems
81 USACE
89 Non-USACE

596 Miles of Levees
443 USACE
153 Non-USACE

1,810 Levee Structures

58 years Average Levee Age

Browse These Levees
Project Description

The Manhattan, Kansas levee is a levee system that reduces the occurrence of flooding in Manhattan, Kansas. The levee system includes two pumping plants, three closure gaps, and 5.35 miles of earthen levee along the Kansas River, Big Blue River, and Wildcat Creek. The levee is up to 18 feet high. The levee was designed and constructed by the Corps of Engineers and was turned over to the local sponsor (City of Manhattan, Kansas) in 1963 for operations and maintenance. The area behind the levee features significant residential, commercial, and local government development. The leveed area daytime population is estimated to exceed 10,000, and estimated property values are over $1.3 billion. The levee faced record flood levels in 1993 when river levels reached within several feet of the top of the levee.

Risk Characteristics

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<th>Levee Safety Action Risk Classification</th>
<th>Moderate</th>
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<tr>
<td>People at Risk</td>
<td>7650</td>
</tr>
<tr>
<td>Structures at Risk</td>
<td>2300</td>
</tr>
<tr>
<td>Property Value</td>
<td>$1.078</td>
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Risk Characterization Summary

The likelihood of a flood overtopping this levee in the next year has been estimated as 0.5% (one chance in 200). This is equivalent to a 14% likelihood of water overtopping the levee over the life of a typical 30-year mortgage. This is a high likelihood of overtopping given the development behind the levee. The risk assessment identified some performance concerns with levee underseepage due to the foundation conditions beneath the levee and observed performance during the 1993 flood. Flooding of the levee could lead to flood depths up to 15 feet, which would result in large consequences due to the high population at risk and property values behind the levee. Recommended risk management activities include continuing good operations and maintenance practices, monitoring levee performance during periods of high river stages, and ensuring emergency plans are reviewed and updated regularly. Efforts should also be made to inform those that live or work in the levee of their flood risk.
USACE has authorities (via WRRDA 2014) to conduct ongoing levee inventory & one-time levee review on all non-federal levee systems.

USACE has an approved FY 18 budget to conduct levee inventory & review for non-federal levee systems.

NLD indicates over 8,000 levee systems (roughly 15,000 miles of levees) beyond USACE portfolio.
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LEVEE INVENTORY & REVIEW - KEY ACTIVITIES

- **Locate:** Upload basic information for all known levees in the National Levee Database

- **Inspect:** Assess the condition of the nation’s levees by conducting field inspections

- **Characterize:** Conduct levee risk assessments to evaluate and communicate the nature of flood risk posed

- **Share information:** Develop a levee system summary

WRRDA 2014 – Title IX, Section 9004
PROPOSED INVENTORY & REVIEW TIMELINE
STATE OF KANSAS

Initial Mtg & Letter to Gov.

Levee Prioritization & Coordination w/ Levee O/O

Kick-Off Mtgs & R-o-E

Surveys, Inspections & Risk Assessments*

Brief Results & Complete Review

Nov ‘17 → Dec-Feb → March → Spring → Fall

Capture and Document Lessons Learned & Best Practices

*Surveys / Inspections will be weather dependent

Timeline is dependent on # of levees under review & complexity of each levee.
<table>
<thead>
<tr>
<th>System ID</th>
<th>System Name</th>
<th>Sponsor(s)</th>
<th>Population at Risk</th>
<th>Levee I&amp;R</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1705000018</td>
<td>Arkansas River East Bank Levee</td>
<td>City Of Wichita</td>
<td>5270</td>
<td>Y</td>
<td>Levee. City of Wichita has agreed to effort Left Voicemail with Collette Porter with Sumner County 3/7 and 3/9</td>
</tr>
<tr>
<td>1705000018</td>
<td>Cow Skin Creek South Levee</td>
<td>Undefined</td>
<td>1579</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1705000245</td>
<td>Salina, KS FPP</td>
<td>City Of Salina</td>
<td>1260</td>
<td>Y</td>
<td>Levee. City of Salina has agreed to effort</td>
</tr>
<tr>
<td>1705000047</td>
<td>Lrette Creek Levee</td>
<td>City of Parsons</td>
<td>552</td>
<td>Y</td>
<td>City of Parsons Public Works director agreed</td>
</tr>
<tr>
<td>1705000273</td>
<td>Elk City Reservoir Levee</td>
<td>Undefined</td>
<td>318</td>
<td>N</td>
<td>Not part of this effort, USACE owned and operated. Sent Email to city of Haysville, waiting on response.</td>
</tr>
<tr>
<td>1705700484</td>
<td>Cow Skin Creek Levee</td>
<td>Undefined</td>
<td>313</td>
<td></td>
<td>Left Voicemail with Collette Porter with Sumner County 3/7 and 3/9</td>
</tr>
<tr>
<td>3605000159</td>
<td>Tuttle Creek Dam Blue Rapids</td>
<td>Corps Of Engineers</td>
<td>259</td>
<td>N</td>
<td>Not part of this effort, USACE owned and operated. Ties into and is reliant on ICW levee, but is not in USACE program.</td>
</tr>
<tr>
<td>1705000482</td>
<td>Sedgwick Ditch Levee</td>
<td>Undefined</td>
<td>258</td>
<td></td>
<td>Email sent to City of Wichita to see if they know who owns possible levee -</td>
</tr>
<tr>
<td>1705000478</td>
<td>Bull Creek Levee</td>
<td>Undefined</td>
<td>251</td>
<td>No</td>
<td>City council has declined to participate. Levees believed to be buried</td>
</tr>
<tr>
<td>1705800393</td>
<td>College Creek - St Mary's</td>
<td>City Of St. Mary's</td>
<td>215</td>
<td></td>
<td>Sent Email to city of Haysville, waiting on response.</td>
</tr>
<tr>
<td>1705000484</td>
<td>Cow Skin Creek Levee</td>
<td>Undefined</td>
<td>174</td>
<td></td>
<td>Left Voicemail with Collette Porter with Sumner County 3/7 and 3/9</td>
</tr>
<tr>
<td>3605000123</td>
<td>Ft. Riley Forsyth</td>
<td>Ft. Riley</td>
<td>154</td>
<td>N</td>
<td>Not part of this effort. Army owned</td>
</tr>
<tr>
<td>1705000109</td>
<td>Walnut River Levee S</td>
<td>City Of Augusta</td>
<td>151</td>
<td></td>
<td>Email sent to City of Wichita to see if they know who owns possible levee -</td>
</tr>
<tr>
<td>1705700393</td>
<td>College Creek - St Mary's</td>
<td>City Of St. Mary's</td>
<td>62</td>
<td>No</td>
<td>City council has declined to participate. Levees believed to be buried</td>
</tr>
<tr>
<td>1705905654</td>
<td>Arkansas River</td>
<td>Undefined</td>
<td>60</td>
<td>N</td>
<td>Sent recommendation to NLD team to remove. City verified that levee is undetermined.</td>
</tr>
<tr>
<td>1705000478</td>
<td>Sedgwick Ditch Levee</td>
<td>Undefined</td>
<td>55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1705001205</td>
<td>Walnut River Levee - Kansas City</td>
<td>City Of Arkansas Cit</td>
<td>43</td>
<td></td>
<td>This is US HWY 7. It's primary purpose is not flood control, it is not a levee.</td>
</tr>
<tr>
<td>1705000577</td>
<td>Kansas River Wabunsee 1</td>
<td>Undefined</td>
<td>35</td>
<td></td>
<td>Email sent to City of Wichita to see if they know who owns possible levee -</td>
</tr>
<tr>
<td>1705000398</td>
<td>Johnson Kansas River 2</td>
<td>Undefined</td>
<td>32</td>
<td></td>
<td>Email sent to City of Wichita to see if they know who owns possible levee -</td>
</tr>
<tr>
<td>3605000204</td>
<td>Ft. Riley Marshall Field</td>
<td>Ft. Riley</td>
<td>32</td>
<td>N</td>
<td>Not part of this effort. Army owned</td>
</tr>
<tr>
<td>1705000480</td>
<td>Arkansas River South Bank Levee</td>
<td>Undefined</td>
<td>31</td>
<td></td>
<td>Email sent to City of Wichita to see if they know who owns possible levee -</td>
</tr>
<tr>
<td>1705000470</td>
<td>Belvue Levee</td>
<td>Undefined</td>
<td>22</td>
<td></td>
<td>Email sent to City of Wichita to see if they know who owns possible levee -</td>
</tr>
<tr>
<td>1705700023</td>
<td>Wichita Valley Center Flowy Levee</td>
<td>City Of Wichita</td>
<td>22</td>
<td></td>
<td>Email sent to City of Wichita to see if they know who owns possible levee -</td>
</tr>
<tr>
<td>1705800247</td>
<td>Silver Lake Ditch Levee South</td>
<td>Undefined</td>
<td>21</td>
<td></td>
<td>Email sent to City of Wichita to see if they know who owns possible levee -</td>
</tr>
<tr>
<td>1705600247</td>
<td>Silver Lake Ditch Levee F</td>
<td>Undefined</td>
<td>20</td>
<td></td>
<td>Email sent to City of Wichita to see if they know who owns possible levee -</td>
</tr>
<tr>
<td>3605000205</td>
<td>Ft. Riley Funston</td>
<td>Ft. Riley</td>
<td>17</td>
<td>N</td>
<td>Not part of this effort. Army owned</td>
</tr>
<tr>
<td>1705000350</td>
<td>Tri-County Drainage District No. 1</td>
<td>Tri-County Drainage</td>
<td>15</td>
<td></td>
<td>Email sent to City of Wichita to see if they know who owns possible levee -</td>
</tr>
<tr>
<td>1705300247</td>
<td>Silver Lake Ditch Levee C</td>
<td>Undefined</td>
<td>13</td>
<td></td>
<td>Email sent to City of Wichita to see if they know who owns possible levee -</td>
</tr>
<tr>
<td>3605000167</td>
<td>Kirkland Kuebler-Miller</td>
<td>Organizationless Sys</td>
<td>11</td>
<td></td>
<td>Email sent to City of Wichita to see if they know who owns possible levee -</td>
</tr>
<tr>
<td>5805000006</td>
<td>El Dorado Levee</td>
<td>City Of El Dorado, K</td>
<td>11</td>
<td></td>
<td>Email sent to City of Wichita to see if they know who owns possible levee -</td>
</tr>
<tr>
<td>1705000468</td>
<td>Kansas River Levee - St George</td>
<td>Undefined</td>
<td>10</td>
<td></td>
<td>Email sent to City of Wichita to see if they know who owns possible levee -</td>
</tr>
<tr>
<td>1705000469</td>
<td>Kansas River Levee - St George</td>
<td>Undefined</td>
<td>10</td>
<td></td>
<td>Email sent to City of Wichita to see if they know who owns possible levee -</td>
</tr>
</tbody>
</table>
ARKANSAS RIVER EAST BANK LEVEE

WICHITA

WICHITA VALLEY CENTER FLDWY
SALINA, KS FPP
COLLEGE CREEK
SAINT MARY’S
Jennifer Wood, R.G.
Inventory and Review Liaison, KS

U.S. Army Corps of Engineers
Kansas City District

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Jennifer.Wood@usace.army.mil