



LEVEE SAFETY UPDATE

National Levee Inventory & Review Effort

By Ms. Jamie McVicker, P.E., Levee Safety Production Center

The U.S. Army Corps of Engineers (USACE) is leading an effort to conduct an inventory and one-time inspection and risk assessment of levees beyond the USACE portfolio to learn more about the benefits and risks of the nation's levees. This activity was authorized by the Water Resources Reform and Development Act of 2014. USACE is partnering with state agencies, tribal nations and their levee operators/owners on a volunteer basis to enhance the inventory reflected in the National Levee Database and accomplish one-time inspections and risk assessments on levees.

Outreach to prospective state partners has been accomplished for 46 states and three territories, and efforts are currently underway to contact federally-recognized tribes throughout the nation. To date, 153 levees have been identified for levee review (inspection and risk assessment) through coordination with local levee own-

ers/operators. Additionally, 122 levees have been assigned to USACE technical teams, each of which is in a different stage of review completion. More than 600 levees have been added to the National Levee Database.

A better understanding of these non-USACE levees is helping identify: previously unknown issues, repair and rehabilitation needs, partners for flood risk management, flood fighting and emergency management activities, and benefits and risks to residents and businesses. Gathering baseline information will allow USACE to more efficiently and cost-effectively identify the most critical levee safety issues, quantify the nation's risk exposure and true cost of maintaining levees, focus priorities for future funding, and have fully informed communi-

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National Levee Inventory & Review Progress Through June 2018



State	In Progress										
AL	0	HI	0	MA	0	NM	0	SD	5	WY	0
AK	0	ID	0	MI	0	NY	0	TN	0	VI	0
AZ	11	IL	11	MN	0	NC	1	TX	4	PR	1
AR	2	IN	5	MS	0	ND	0	UT	0	GU	0
CA	0	IA	1	MO	0	OH	11	VT	0	AS	0
CO	0	KS	4	MT	8	OK	5	VA	0	MP	0
CT	0	KY	0	NE	1	OR	1	WA	0		
DE	0	LA	13	NV	0	PA	29	DC	0		
FL	1	ME	0	NH	0	RI	0	WV	0		
GA	1	MD	0	NJ	0	SC	1	WI	0		

National Levee Inventory & Review Outreach



(Left—right) Clint Shealy, Assistant City Manager, Columbia Water; Gregory Tucker, Special Projects Administrator, City of Columbia; and Joseph Jaco, Director of Utilities, at the South Carolina State Liaison Face-to-Face Meeting for I&R participation. Photo by Nathan H. Bryan



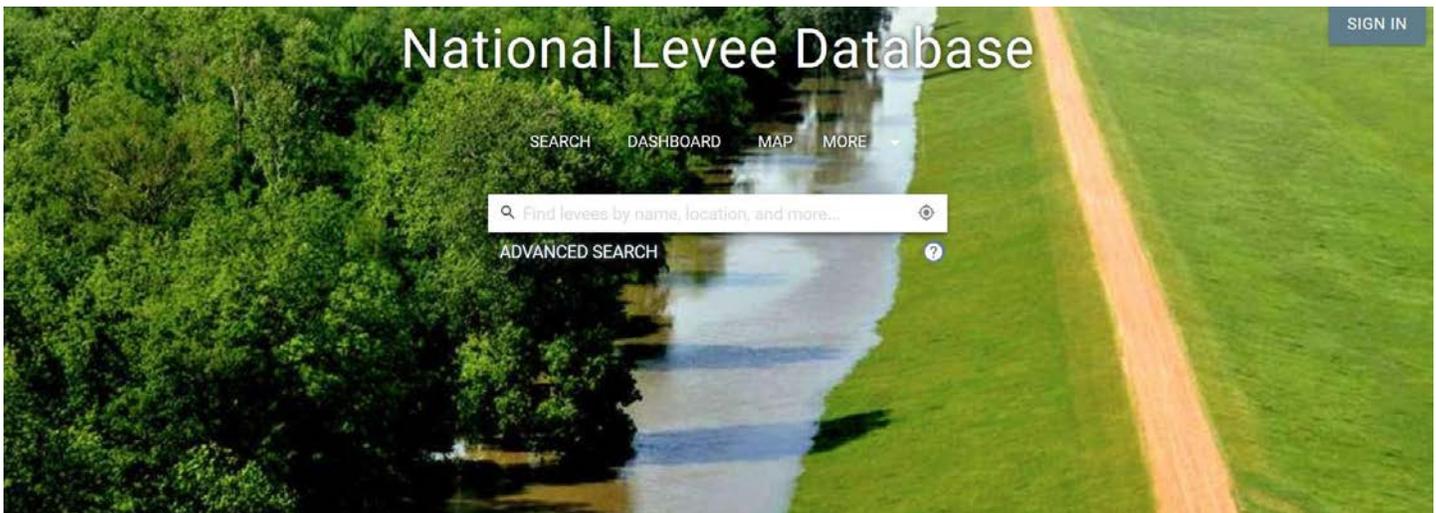
(Clockwise, left front) Mitch Hall, Dan Brubaker, and Randy Mundt. (right rear): Jason Glazener, Saul Carlson (partially hidden) and Tom Child attend the initial meeting with State representatives from North Carolina to review levee inventory data and prioritize levees for review. Photo by Almur S. Whiting IV



(Left to right) USACE Staff Tara Linville, Brian Lowe, Charley Barry, Stephen Wallington, with Brian Ball, City of Mount Vernon Engineer, and Ashley Stephens, USACE, preparing to walk the levee during the reconnaissance site visit at Mount Vernon, Ohio. Photo by Ashley Stephens



Brian Ball, City of Mount Vernon Engineer (right) discussing the levee features with USACE representatives Charles Barry and Stephen Wallington (left) on a reconnaissance site visit at Mount Vernon, Ohio. Photo by Ashley Stephens



Updated National Levee Database

By Ms. Cathi Sanders, J.D., Levee Safety Production Center

The updated National Levee Database (NLD) was officially released to the public on June 5, 2018. The new site can be found at <https://levees.sec.usace.army.mil/>

The NLD updates are centered on providing essential information about levee systems to the public and various stakeholders in the Levee Safety community. An interactive map view along with an updated ability to search and find information are all new to the NLD website. The new website design also provides users with ready access to levee risk information and visual map displays.

Several key webinars were presented prior to the NLD release to help inform stakeholders about the new information in the NLD, specifically the risk-based information, and

also the new NLD features. Internal webinars for USACE and FEMA along with specific webinars for the USACE sponsor community and finally a general public view webinar were held in May. Led by the NLD team, these webinars were helpful in addressing internal concerns, communicating with the sponsors, and allowing the public to learn more about the value of the NLD.

The response to the new NLD has been extremely positive. The first month statistics show that 2,461 unique visitors accessed the site with a total of 4,367 visits. Over 488,510 pages of the new website were viewed by visitors to the site. Responses from the levee safety community reflect a common view that the new NLD site provides valuable information in an easy to locate and user friendly manner.

Updates will continue with the new website as links to the Levee Inspection Tool and Levee Screening Tool are complete along with addition of Performance Information. Online report building assistance is also set for completion by next fiscal year. In addition, Districts adding/updating information via the new online data editing will ensure the information is current and accurate as that remains critical to the continued success of the NLD website.

If you have any comments or suggestions for the NLD or need any assistance, please contact Cathi Sanders, NLD Program Manager at Catherine.R.Sanders@usace.army.mil or the HELP Desk at DLL-CEERD-NLD-General-Support@usace.army.mil.



The National Levee Database website has an interactive map that allows you to browse levees through a variety of filters.

Levee Safety EC, Inspection ECB and ER 500-1-1

Mr. Steve Fink, P.E., HQUSACE Dam and Levee Engineering Branch

Final draft development for EC 1165-2-218 Levee Safety Policy and Procedures (LS EC) and the Engineering Construction Bulletin Levee Safety Inspection Procedures (Inspection ECB) are in full swing.

Tammy Conforti, Special Assistant for Levee Safety is leading the LS EC and Inspection ECB development. In response to the USACE internal review, Tammy and her teams are working together to make sure the activities proposed collect the right information, at the right time, for the right purpose, without overburdening the non-federal sponsors and District levee teams.

Both of these important Levee Safety governance documents are headed toward public review later this fiscal year or early fiscal 2019.

Another parallel but related and equally important activity that has just resumed is revision of Engineering Regulation 500-1-1 Rehabilitation Program (ER 500-1-1). That action

was on hold because of delayed approval of 33 Code of Federal Regulation Section 203 (33 CFR 203) that sets the sideboards for the PL84-99 Rehabilitation Program. Approval of 33 CFR 203 is expected to occur very soon.

Willem Helms, HQ PL 84-99 program manager is leading the ER 500-1-1 revision. A key change to the ER 500-1-1 related to levee safety is how PL 84-99 eligibility determinations will be made in the future. The draft ER 500-1-1 is not expected to change significantly from the version offered for review in 2016.

Efforts are currently underway to make sure the activities among LS EC, Inspection ECB and ER 500-1-1 are aligned, supportive and employ common language. Dr. Rich Varuso, Risk Management Center is representing Levee Safety assisting Mr. Helms with the ER 500-1-1 effort to help align the policies where they overlap. Dr. Varuso is also the team lead for the Inspection ECB, and is a key member of the LS EC development team.

USACE Levee Safety Program Guidance Update

Document Number	Document Title	POC/Lead	% Complete*	Current Phase	Estimated Publication Date	Status Date
EC 1165-2-218	Levee Safety Policy & Procedures	Tammy Conforti (HQ)	85%	Review	1QFY19	6/29/2018
ECB	Procedures for Site Visits and Inspections for Levees within the USACE Portfolio	Rich Varuso (RMC)	75%	Review	1QFY19	6/29/2018
EM 1110-2-1913	Levee Design Manual	Scott Shewbridge (RMC)	98%	Publication	1QFY19	6/29/2018
EM 1110-2-2502	Retaining and Floodwalls	Kent Hokens (MVP)	45%	Execution	2QFY20	6/29/2018
EM 1110-2-2902	Conduits, Pipes and Culverts	Christina Neutz (LRL)	45%	Execution	1QFY20	7/02/2018
EM 1110-2-1908	Instrumentation of Embankment Dams and Levees	Rich Varuso (RMC)	50%	Execution	3QFY19	6/29/2018

Three Methods, One Levee Risk Assessment Exercise

By Mr. Troy T. Cosgrove, P.E., Levee Safety Production Center



The Levee Safety Partnership met in St Louis to focus on sharing risk assessment methodologies. Here, the group walks through a potential failure modes analysis (PFMA). Photo by Joseph Goldstein

In October of 2017, the Levee Safety Partnership met in St Louis to focus on sharing risk assessment methodologies. The Levee Safety Partnership consists of Environment Agency (EA) from the United Kingdom, Rijkswaterstaat (RWS) from the Netherlands, and the U.S. Army Corps of Engineers (USACE). The agencies converged on St. Louis to focus their risk assessment methodologies on the Upper Wood River Levee located in Alton, Illinois, which is within the St. Louis District boundaries. The objective of the meeting was to see what lessons could be learned from observing each agency's risk assessment processes. At the end of the week, the differences among each agency's methodology was compared and contrasted and feedback was provided to each agency on strengths and areas of improvement.

The EA's methodology uses a tiered approach and starts with a basic level assessment similar to the USACE screenings. It involves a visual assessment and if items of concern are noted, more detailed investigations occur. As part of the process, the levee is subdivided into reaches based on similar loading, geometry, stratigraphy, and construction methods. The information gained from the inspection along with the

reach information is assessed using a spreadsheet based tool. The EA method uses economics as the primary means to quantify risk and currently does not consider life safety in the risk equation. The methodology does consider uncertainty in the assessment in the level of data input. The basic assessment starts with minimal data input and sensitivity analysis can be performed to determine where additional data makes significant difference to the result of the assessment.

The RWS methodology uses a three-step approach including a simple assessment using decision rules, a semi and fully probabilistic analysis, and an advanced assessment to compare the resilience of the levee to hydraulic loadings. The RWS method is data driven and information on hydraulic loading, geometry, elevation, grass cover, and soil profile of the levee and foundation are needed for their assessment. Computer modeling is used to evaluate the data and to estimate probabilities of failure. RWS does use a life safety standard (both societal and individual risk) as well as economic considerations within the assessment of the risk of their levee defenses.

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The Levee Safety Partnership completed a site visit to a levee to evaluate current conditions during a Levee Risk Assessment Exercise held in St. Louis, October, 2017. Photo by Joseph Goldstein

The acceptable individual risk is set by the Dutch government. The methodology does take into account uncertainties and the assessment is refined and investigated further if there are high uncertainties.

The USACE methodology is also scalable with screenings, semi-quantitative risk assessments, and fully-quantitative risk assessments. USACE used a quantitative risk assessment methodology at the exercise to evaluate the levee. The first step was to walk the group through a potential failure modes analysis (PFMA). The group was asked to review all pertinent

Levee Risk Communication Update

By Ms. Sara Hilbrich, The Council Oak

Districts continue to actively engage and communicate with levee sponsors about levee risk assessment results. They also continue to develop levee system summaries (LSS) for posting in the National Levee Database. To support Districts as they move forward on these efforts, the Levee Safety Public Awareness and Communication Team (PACT) offers a variety of resources.

Upon District request, the PACT will deliver a tailored Risk Communication Workshop that is based on District needs. From modules that introduce the LS Program for new staff, to intensive product development sessions, these workshops

data prior to this session. USACE then evaluated risk driving failure modes of backward erosion and piping in the foundation, overtopping with breach, and slope stability. USACE developed event trees, which map failure from initiation to breach, and identified more likely and less likely factors for each of the failure modes. The USACE method then used expert opinion elicitation to determine probabilities of failure for the risk driving failure modes. On the consequence side of the risk equation, the LifeSim model was used to evaluate the life loss and economic consequences. The annualized probability of failure and average life loss was then plotted on an f-N chart and evaluated based on the social life risk line. The USACE methodology also acknowledges the uncertainty in these assessments and attempts to quantify them in their assessment.

There are similarities and differences with each agency's methodologies. The technical exchange that occurred at the meeting allowed each agency to see how using risk assessments to evaluate their levees has progressed and where they can improve. Based on the evaluation and feedback received, each agency implemented changes to their programs. This workshop is just one example of how the USACE is striving to improve our levee safety program. The agencies did receive a Flood & Coast 2018 project excellence award in the international excellence category for their efforts on the risk assessment exercise. The agencies are also working together to publish a professional paper, which will document the exercise and feedback provided.

promise to be highly engaging. Also, the PACT is in the process of releasing several tools, including: a sample slide deck and agenda tip sheet, a comprehensive updated LSS tip sheet, a selection of Risk Management Menus and a Sponsor Guide. These products can be found as they are released in the Levee Safety folder of the PAO SharePoint site (internal to USACE).

As always, real time document writing and editing assistance remain available by emailing: Christopher.T.Baker@usace.army.mil or Stacy.M.Langsdale@usace.army.mil

Levee Safety Endowed Chair Detail a Rewarding Experience

By Mr. Will McRae, P.E., Vicksburg District Analytical and Levee Safety Section

I first heard about the Levee Safety Endowed Chair detail at a Risk Communication Workshop at the New Orleans District in 2016. I was told how great of an experience it was and was encouraged to apply by one of the previous Endowed Chairs, who had just finished his time at Headquarters. Admittedly, I was a little apprehensive to move from Mississippi all the way to Washington, D.C. for a six-month detail, but I could not have been more wrong. The Levee Safety Endowed Chair detail was one of the most rewarding experiences of my career.

When I arrived at Headquarters, I was prepared to “see how the sausage is made”, but I didn’t really know what to expect from a personnel perspective. What I found were a lot of very dedicated people working toward common goals to make the USACE Levee Safety Program great. Eric Halpin, Tammy Conforti, and Steve Fink all worked to make my experience at HQ the best it could possibly be (and no they didn’t pay me to say that). They brought me along to meetings and briefings with the most senior leaders in all of USACE and allowed me to observe and learn how some of the top decision makers in our organization think and act. I was regularly asked for my opin-

ion on important levee safety policy decisions, when before the detail started I was worried I might be coming to D.C. to be seen, not heard. I was routinely challenged to manage priorities, think outside the box, and look beyond the district boundaries that I was used to. These are common phrases we all hear from leadership, but the team I worked with for six months practiced what they preached.

My time as the Levee Safety Endowed Chair expanded my understanding of our organization and allowed me to focus on future goals, while also helping me become a better team member within the Levee Safety program. The amazing people I met from numerous districts and divisions inspired me to continue striving to make a positive impact on the Levee Safety program. I am extremely grateful for the opportunity I was given and I would highly encourage others to apply for the detail the next time you get the chance.

I would like to welcome the next Levee Safety Endowed Chair, Mr. Jesse Morrill-Winter. The baton was passed to him July 9, 2018. I’m sure he is in for a great experience over the next six months!

Fiscal 2018-2019 Training Opportunities

Levee Safety Fundamentals PROSPECT Courses

- *Levee Safety Fundamentals 2* *Davis, California* *September 18-20, 2018*
- *Levee Safety Fundamentals 1* *Kansas City, Missouri* *May 7-9, 2019*
- *Levee Safety Fundamentals 2* *Davis, California* *September 17-19, 2019*

Levee Inspection PROSPECT Courses

- *Levee Inspection 1* *New Orleans, Louisiana* *TBD**
- *Levee Inspection 2* *New Orleans, Louisiana* *TBD**

* Delayed pending Levee Inspection System (LIS) and inspection checklist integration, testing and final implementation.

The Levee Safety Update is an unofficial publication of the U.S. Army Corps of Engineers Levee Safety Program and contains information about initiatives that are under development and may change in subsequent updates. It provides levee safety program information to levee safety officers, levee safety program managers, other communities of practice and others interested in levee safety. Questions or suggestions for future issues can be emailed to: HQ-LEVEESAFETY@USACE.ARMY.MIL. Please visit our website at: <http://www.usace.army.mil/Missions/Civil-Works/Levee-Safety-Program/>