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Missouri River Levee Setbacks



from **Engineering With Nature: An Atlas, Volume 1.**

by US Army Engineer Research and Development Center



Missouri River, Iowa and Missouri, United States

The existing alignment of the Missouri River levee system has been recognized as having breach and foundation distress from underseepage and boil activity resulting from hydrologic conditions and flow constrictions. The repetitive cycle of repairing levees in place after each major flood event has lead to increased Operations and Maintenance (O&M) and Repair, Replacement, and Rehabilitation (R,R&R) costs and increased flood risk; the cycle has also raised general concern over the effective level of protection. Following the 2011 Missouri River flood event, the levee sponsors for L-575 were given the option to pursue a nonstructural alternative (NSA) under the U.S. Army Corps of Engineers (USACE) Disaster Operations Public Law 84-99 program. One NSA option is the levee setback, which relocates a segment of the levee from its current alignment near the banks of the river to a location farther back from the banks. The L-575 levee setback was completed under the USACE Missouri River Recovery Program for the middle reach due to integrity concerns. The project reconnected part of the Missouri River to its floodplain, providing

increased and improved habitat for fish and some species of vegetative communities—such as cottonwood—that are likely to reestablish with time.

Article cover: An aerial panoramic view of Missouri River Levee L-575, 2012. (Photo by Dave Crane, USACE Omaha District)

Producing Efficiencies

The project provides decreased hydrologic loading, decreased flood velocities, and reduced erosion and scour. Best management practices included levee setback placement on more suitable geotechnical foundations and increased resiliency. The economic benefits provided by a levee setback alternative are directly related to its hydrologic and geotechnical conditions.

Using Natural Processes

A levee setback alignment takes advantage of better geotechnical conditions—opening up habitat potential—and an increase in flood conveyance. Increased conveyance decreases water surface elevations and subsequent pressure on levees, thereby increasing the level of resiliency provided by the system. Decreased water surface elevations may lead to a slight decrease in O&M and R,R&R activities.



Work in 2012 repairing the middle breach in levee L-575 near Hamburg, Iowa, is substantially complete. The setback levee restores the level of risk reduction at the site to its preflood status.

(Photo by Kevin Wingert, Systems Restoration Team, USACE Omaha District)

Broadening Benefits

Increasing benefits while enhancing engineering design is one of the goals of Engineering With Nature. Some of the multiple benefits realized from levee setback practices are ecosystem sustainability; hazard mitigation; reduced navigation maintenance; increased recreational opportunities; aesthetics; cultural, spiritual, and educational opportunities; climate regulation; and additional acres of fish and wildlife habitat.



An aerial view of an intentional breach in levee L-575 near Hamburg, Iowa, 2011. The intentional breach was created by the local sponsor and approved by USACE following a full breach of the levee. The intentional breach was conducted by the sponsor to delay the time in which the area behind the levee would flood. The levee is located at River Mile 552 in Atchison County, MO.

(Photo by USACE Omaha District)

Promoting Collaboration

By working together with federal agencies, such as the Natural Resources Conservation Service, and state agencies, such as the Iowa Department of

Natural Resources, and by utilizing agencies' respective programs, such as the USACE Missouri River Recovery Program, levee sponsors and USACE realized natural ecological benefits while reducing costs.



Work repairing the lower breach in levee L-575 began recently with construction crews placing hydraulic fill into scours and beginning to build the base for the setback levee alignment. The work will restore the level of risk reduction at the site to its preflood status.

(Photo by Kevin Wingert, Systems Restoration Team, USACE Omaha District)



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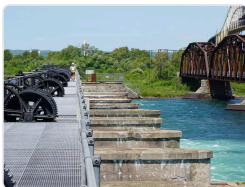
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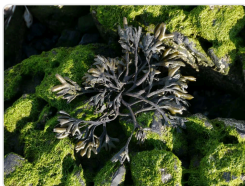
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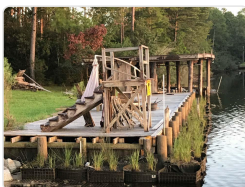
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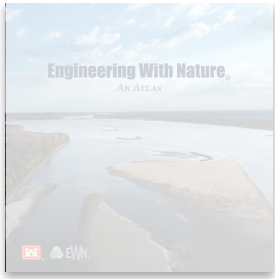


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