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Missouri River L-536 Levee Setback Story

Large-Scale Levee Setback Playbook

In March 2019, abnormal weather patterns in Nebraska, Iowa, and South Dakota caused record-setting flooding along the Missouri River, resulting in widespread catastrophic damage throughout the river valley. The Large-Scale Levee Setback Playbook (Playbook) documents how, after this historic flood, a multi-agency team worked together to complete a highly complex \$100M levee setback after floodwaters destroyed most of the left bank of Missouri River Levee Unit 536 (L-536) in northwestern Missouri. The Playbook also serves as a guide for others pursuing similar nature-based solutions that enhance flood resilience. It is organized in four distinct but complementary sections.

SECTION 1: The Story

tells the story of the historic flooding in 2019 and provides an overview of the scope and benefits of the setback, the partners involved, and project milestones.

SECTION 2: The Challenges

dives deeper into the L-536 setback project, identifying the challenges—big and small—that project partners encountered and overcame through collaborative problem solving.

SECTION 3: The Recommendations

provides recommendations from the lessons learned during the L-536 setback regarding legislation, regulation, policies, and practices that can better support levee setback projects.

SECTION 4: The How-To Guide

illustrates a process for levee sponsors considering or pursuing a similar project, as well as identifying helpful pre-disaster planning efforts.

The development of the Playbook was supported by The Nature Conservancy with experience-based contributions from project partners involved in the L-536 setback project, a nature-based solution to reduce flood risk to the community by reconnecting more than 1000 acres to the riverward floodplain and restoring more than 400 acres of wetlands.

Key Takeaways of Section 1

- L-536 experienced five full and two partial breaches and significant crest damages over 10 miles of levee during the record-setting Missouri River flooding in March 2019.
- Atchison County Levee District (ACLD) had maintained and operates its levee systems to U.S. Army Corps of Engineers (USACE) standards, making L-536 eligible for rehabilitation assistance under Public Law 84-99.
- A large-scale levee setback was determined to be the least cost, most technically feasible rehabilitation alternative to restore flood protection per USACE criteria.
- The additional hydrologic, geologic, environmental, and economic benefits associated with the setback were instrumental in bringing partners together, providing ACLD much needed real estate and funding support.
- Reconnected more than 1000 acres of floodplain and 400 acres of new wetlands providing high value habitat for fish and wildlife.
- Construction of the L-536 setback was substantially completed in summer 2021.

The Story

Defining a Large-Scale Levee Setback

The L-536 project is commonly referred to as a levee “setback” because of the physical relocation of the levee away from the river—literally setting the levee back away from the river as compared to its original alignment—to reconnect the historic floodplain. However, Public Law 84-99 defines this project, and similar large-scale multi-mile projects, as a “realignment.”

In March 2019, more than a foot of snow covered frozen ground throughout most of the Midwest—atypical conditions for the season. Starting on March 13, 2019, a historic “bomb cyclone” departed Colorado and moved across the Plains states, triggering severe storms, flooding, and a blizzard, resulting in rapid snowmelt runoff combined with several inches of rainfall that the frozen land could not absorb. The result was catastrophic: record-setting flooding of all major river systems in Nebraska, Iowa, and South Dakota, all of which drain into the Missouri River. Floodwaters inundated the Missouri River valley. The Missouri River at Brownville, NE, approximately 12 miles upstream of the L-536 project area, hit the all-time record on March 16, 2019, at 45.73 feet (see Figure 2). Highwater conditions persisted along portions of the Missouri River for many months (see Figure 3).

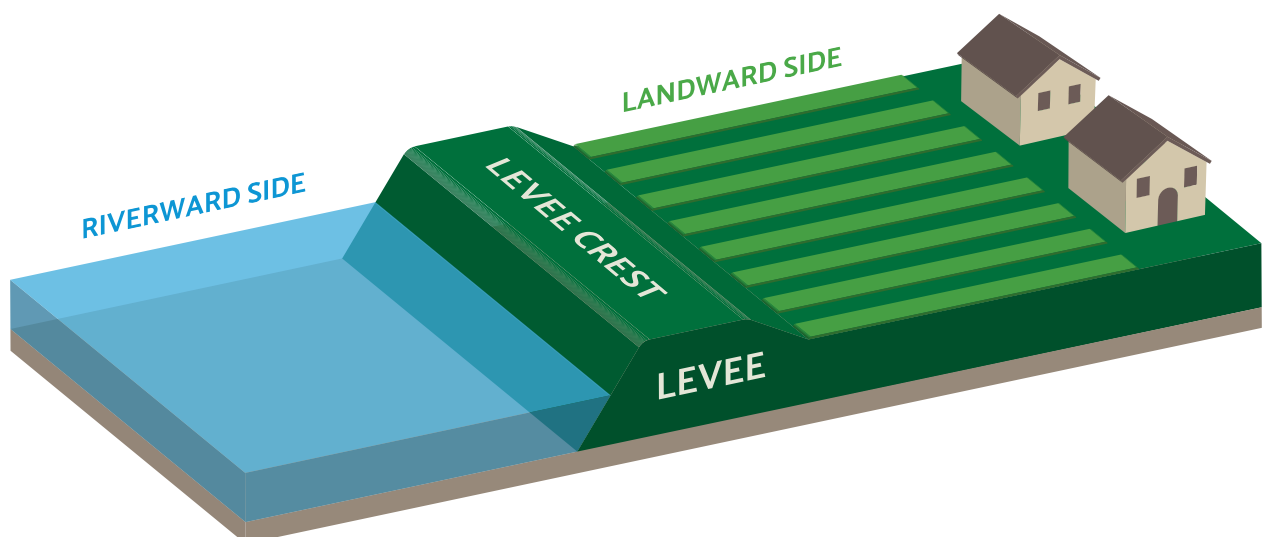
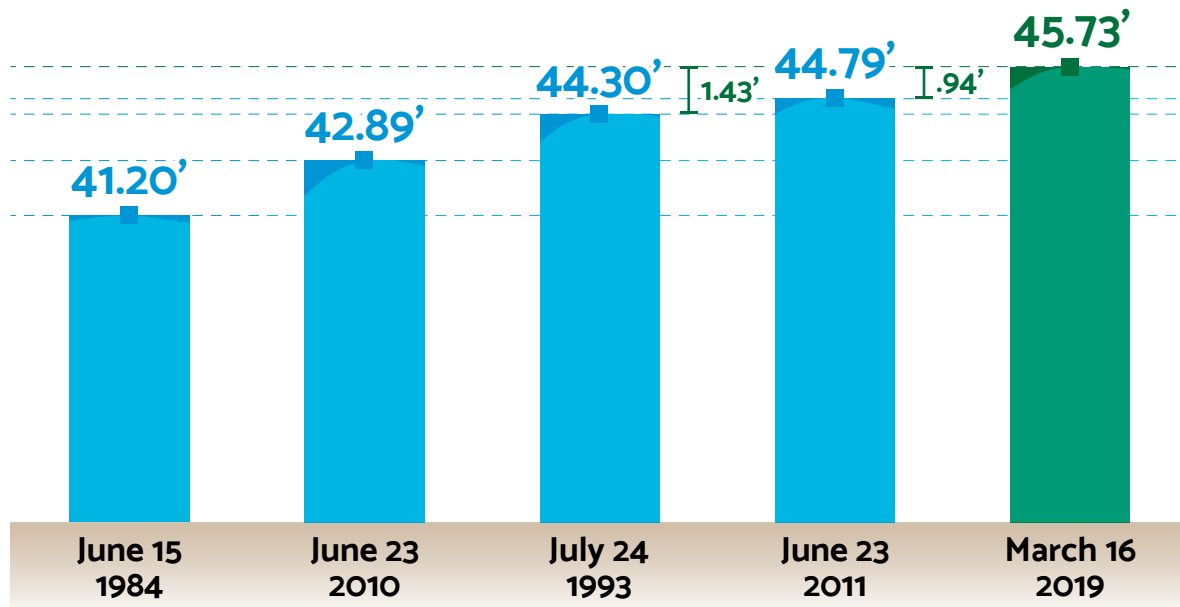


Figure 1: Levee diagram.

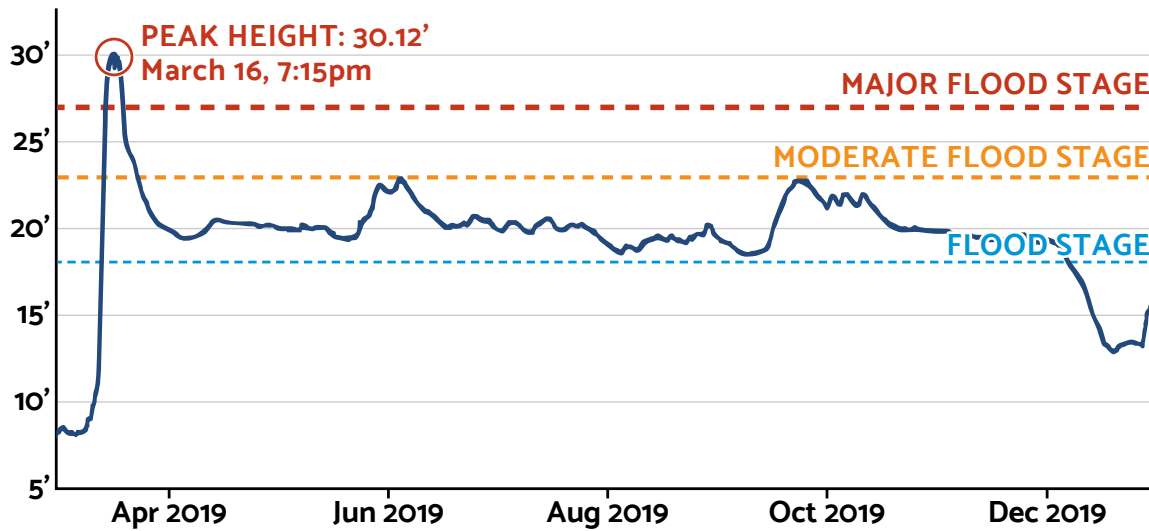
Historic Crests of Missouri River at Brownville, NE



Source: NOAA's National Weather Service Advanced Hydrologic Prediction Service

Figure 2.

2019 Missouri River Gage Height at Nebraska City, NE



Source: U.S. Geological Survey, 2021, National Water Information System data available at <https://waterdata.usgs.gov/monitoring-location/06807000/>

Note: Limited data available for the Missouri River gage at Brownville. Data provided for the nearest upstream gage at Nebraska City

Figure 3.

More than one hundred levees breached or overtopped, flooding 1.2 million acres. Interstate highways closed for months, along with 470 county and local roadways in the region. When the storm passed and officials assessed the damage, Atchison County in northwestern Missouri was left with:

56,000 acres
underwater

\$25M (est.) in lost
ag revenue

166 homes flooded

278 citizens forced
to evacuate

1,295 agricultural
buildings flooded

14 commercial
businesses underwater

216 days of US Hwy 136
bridge closure

121 miles of road destroyed

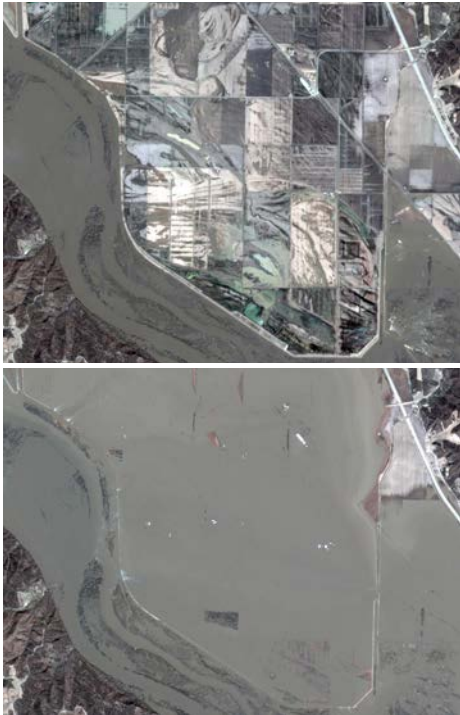
187 approx. miles of I-29 closed
between St. Joseph and Omaha

Major disruption of
BNSF railroad

Source: Atchison County Levee District

“Every flood event seemed to get worse...and 2019 was exponentially worse than all the others combined.”

- Ryan Ottmann, Atchison County Levee District Board Member



Satellite imagery of L-536 taken before (top) and during (bottom) the March 2019 flood.



Flood damage to MO-111 following March 2019 flooding in Atchison County, MO.



One of the five L-536 breaches in Atchison County, MO, in 2019.

The Atchison County Levee District #1 (ACLD), in northwestern Missouri, is one of the largest levee districts in the country (Figure 4). It is responsible for managing Missouri River Levee Units L-561, L-550, and L-536, which are located in Atchison and Holt Counties on the left bank of the Missouri River from approximate river mile 533 to 561. Originally designed and constructed in the 1950s by the U.S. Army Corps of Engineers (USACE), the three levee units consist of 54 miles of earthen levees, landside seepage berms, several toe drains, 300 relief wells, and 23 interior drainage structures.

Severe floods flowed through the ACLD in 1952, 1984, 1993, 2010, 2011, but none impacted the district as significantly as the March 2019 event. L-536 experienced five full and two partial breaches and significant crest damage.

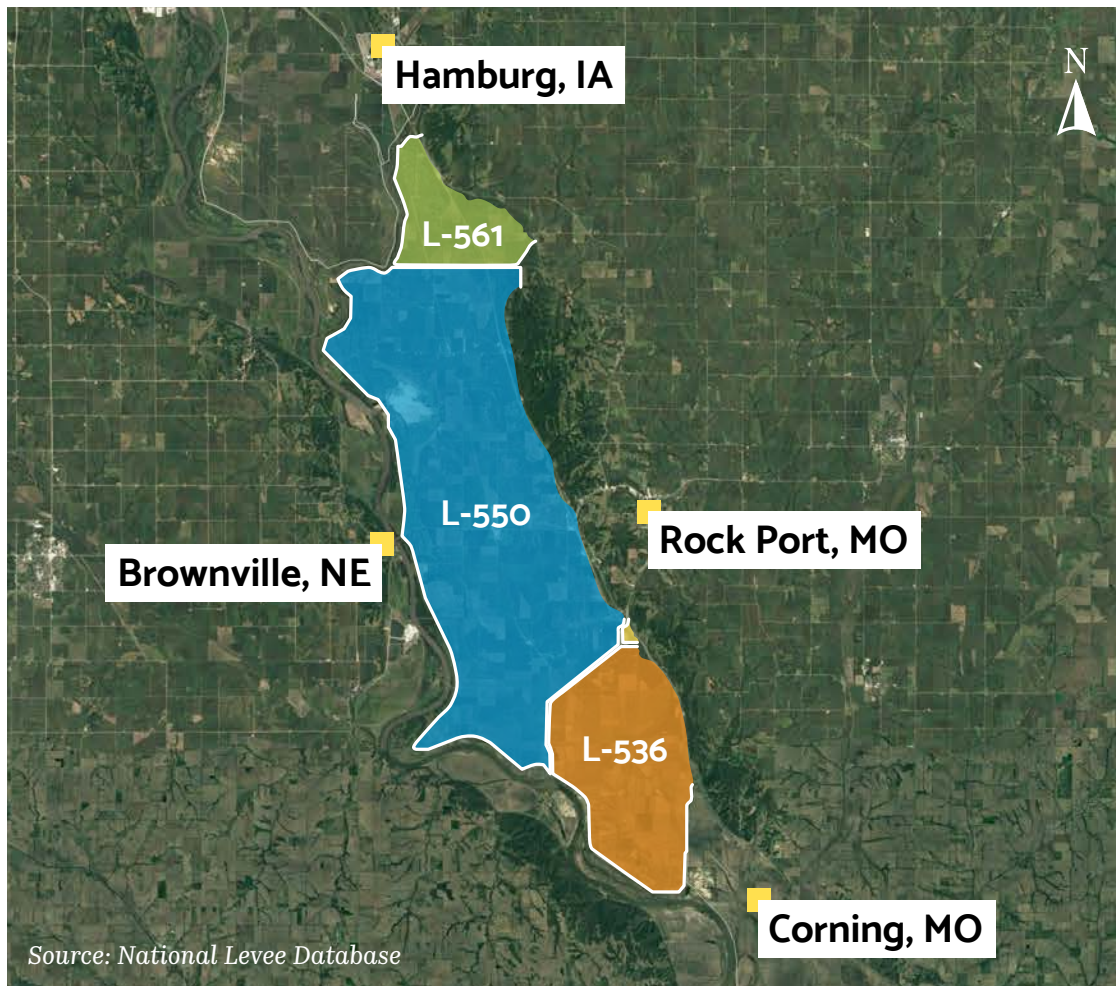


Figure 4: Atchison County Levee District System map.



Helicopter view of L-536 damage following the March 2019 flood event.

ACLD operates and maintains its levee units to USACE standards, making them eligible for rehabilitation assistance following a flood event. After previous floods, ACLD worked with USACE to identify and implement the least cost, technically feasible alternative for construction, which was often to repair the levee “in place,” or within its original alignment. However, the extent of the 2019 flood, along with memories of damages from recent flood events, prompted the ACLD Board of Directors to look holistically at its entire levee system. Embracing this systematic approach, ACLD began considering a large-scale levee setback to mitigate future damages to disaster-prone areas based on hydrologic data, and modernize the levee system, establishing a landward side slope that meets current USACE levee design standards.

Initially, ACLD considered pursuing a levee setback at L-550 because it had experienced extensive damages in previous floods. However, because L-550's breaches were contributing to the flooding of US Interstate 29 (I-29), a major regional transportation corridor, USACE began constructing immediate in-line repairs at L-550. Preliminary damage assessments also indicated levee damages between the breaches were not significant or widespread enough to justify total reconstruction. Collectively, the impacts to infrastructure, the millions of dollars already being invested in repair efforts, and the lack of widespread damage along L-550 eliminated a large-scale levee setback as the least cost, technically feasible alternative. Note: USACE beginning repairs almost immediately is a function of PL 84-99, which serves as an emergency vehicle to design and construct levee repairs to restore flood risk reduction as soon as possible.

Meanwhile, 14 miles downstream at L-536, the levee damages were determined to not be contributing to the flooding of I-29. The extended highwater conditions experienced throughout the Missouri River Valley prevented USACE from accessing L-536, delaying the damage assessment and subsequent repairs—however, initial damage assessments did indicate more widespread damage along L-536. With a little extra time, ACLD was able to consult with USACE-Omaha District, as well as with the impacted property owners, about the possibility of a setback option. In turn, the extra time enabled USACE-Omaha District to discuss the setback option with USACE national headquarters, including the Chief of Engineering. From this discussion, levee setback alternatives were included and evaluated as part of the Project Information Report (PIR).

Unable to access L-536 to fully assess the severity of damages, USACE completed a cost estimate based on past flood events for similar levee systems for use in the post-disaster PIR. The results of the assessment determined that the most cost effective and technically viable alternative for the L-536 levee was to construct a partial levee setback, rather than in-line repairs to the existing levee footprint.



Public Law 84-99 - Levee Rehabilitation and Inspection Program

Under Public Law (PL) 84-99, USACE manages a levee rehabilitation and inspection program that provides levee sponsors with technical and damage repair assistance. Flood fighting assistance is provided to all levee sponsors who request it. However, rehabilitation assistance following a flood event is only provided to levee sponsors that operate and maintain their levee systems to USACE standards.

Levee sponsors may only use rehabilitation assistance to construct the least cost, technically feasible repair alternative to restore a levee system to pre-disaster conditions. However, additional improvements can be made, at the levee sponsor's expense.

The L-536 Rehabilitation Includes:

- An in-line repair of inlet breach of 400 linear feet
 - An in-line repair of a partially breached section of 1,800 linear feet
 - An in-line repair of 4,700 feet of erosion to the crest, slopes, and berms
 - A new 25,400-foot portion of the levee setback approximately 5 miles long to eliminate four breaches in the levee
 - Drainage structure replacements
 - Relief well abandonments and levee ramp construction
 - Reconnected and restored over 1000 floodplain acres
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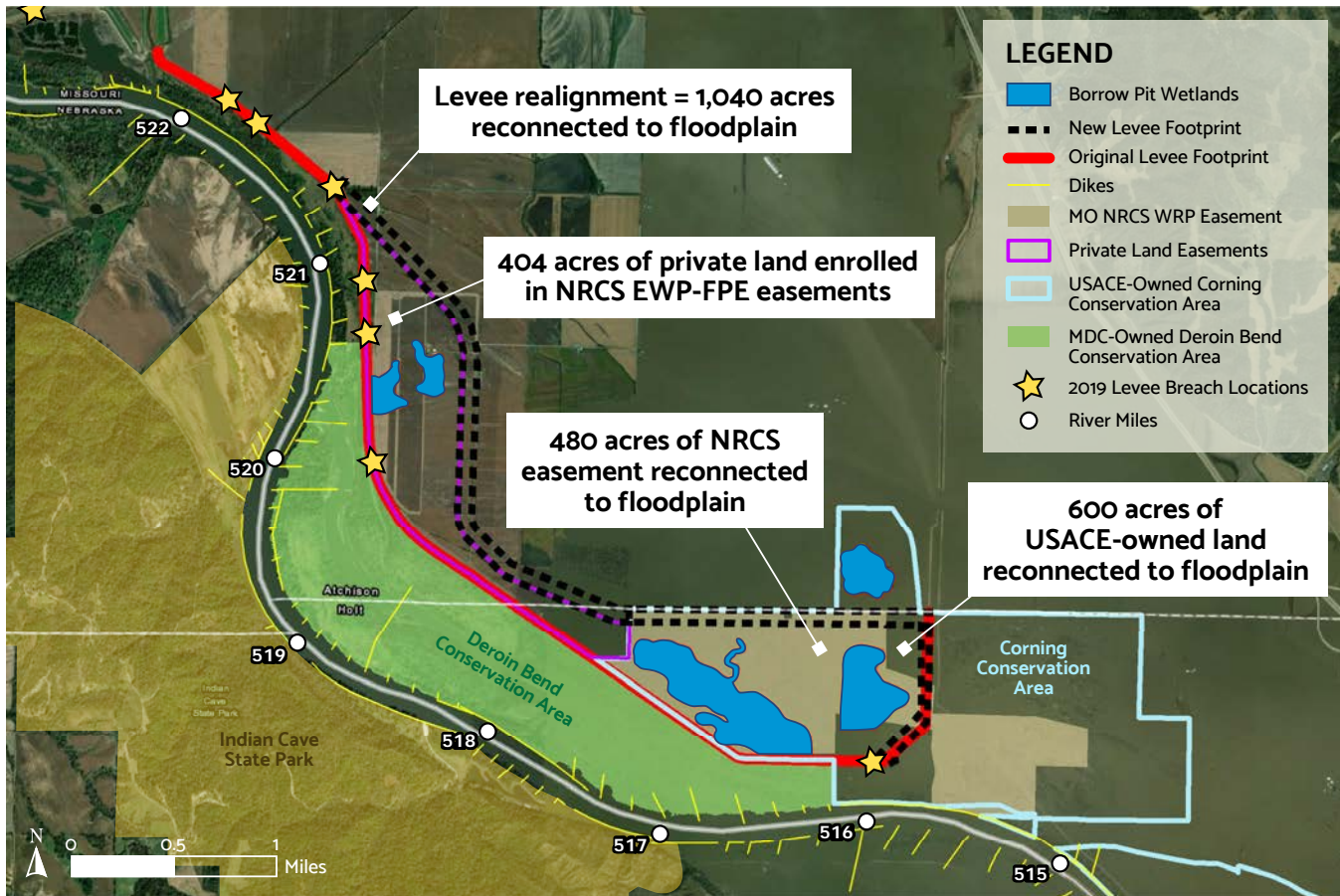


Figure 5: L-536 Levee Rehabilitation

Project Benefits

The newly built levee will protect critical transportation infrastructure, including a large section of I-29, Highway 111, and the Burlington Northern Santa Fe (BNSF) Railroad line. It also protects buildings and farmland in the region and could help reduce the costs associated with operation and maintenance of the levee, and future flood response activities. Beyond this, and instrumental in bringing project partners to the table, the L-536 setback also provides secondary hydrologic, geologic, environmental, and economic benefits:



Hydrologic and Geologic

- Increased conveyance, reducing water surface elevation in excess of 0.8 feet for the 100-year flood stage: reduced velocities within the immediate reach of the levee setback
- Reduced overtopping velocities and erosion damages using USACE's design standard for landward levee slopes of 5 horizontal:1 vertical
- Levee located on more suitable foundation soils, on higher ground, away from historic levee damages, which can reduce future underseepage and the associated levee foundation damage during a flood event



Environmental

- Over 400 acres of new wetlands from converted borrow pits and 1,040 acres of reconnected floodplain
- Use of expanded floodplain for growth of native fish; rare, declining, and species of conservation concern observed after past large-scale levee setback construction along the Missouri River
- Increased ability for floodplain production of macroinvertebrates and young fish as prey base to support local food webs
- Increased groundwater recharge
- Improved water quality by filtering agricultural runoff
- Connected to adjacent conservation land to create a habitat complex more than 7,000 acres in size (setback acres, Corning Conservation Area, Deroin Conservation Area, NRCS easements, Indian Cave State Park)



Economic

- Reduced levee repair, rehabilitation, and replacement activities, reducing levee operation and maintenance cost.
- Reduced flood risk to nearby transportation and infrastructure, lessening need for emergency operations
- More flood resilience for landward buildings and cropland
- Local jobs created during the construction phase

The Partners

The L-536 setback was successfully implemented thanks to the partnership among federal, state, and local government entities, landowners, as well as nongovernmental organizations. The partners directly involved with the planning, design, and construction of the L-536 setback are shown below:



Atchison County Levee District #1 (ACL D)

ACL D is the levee sponsor responsible for maintaining L-536. By maintaining the levee to USACE standards, ACL D was eligible for PL 84-99 rehabilitation assistance and was responsible for providing land (levee footprint) and borrow material (with which to construct the new levee) for the levee setback project. ACL D was also responsible for coordinating the setback with area landowners. Though not required by PL 84-99, the ACL D Board felt it was important to compensate landowners for land that would become riverward of the new levee. ACL D worked with project partners to find a funding solution to cover the riverward real estate costs and led those activities with landowners.



**US Army Corps
of Engineers®**

United States Army Corps of Engineers (USACE)

Through congressional direction, USACE is vested with the authority and responsibility to provide technical assistance and post-flood recovery activities to repair flood damaged levees. Numerous departments at the Omaha District level (i.e., Emergency Management, Planning, Engineering, Construction, Contracting, and Real Estate) were heavily involved in every aspect of the setback project. USACE completed environmental law compliance activities, provided construction funding, and oversaw construction. The USACE HQ Office was regularly consulted and assisted with the decision to move the project forward. Additional partnership with USACE's Missouri River Recovery Program (MRRP) allowed the MRRP's Corning Conservation Area to be incorporated into the land that would become a part of the riverward side of the setback levee.



Natural Resources Conservation Services (NRCS)

The USDA's NRCS was directly involved at the state and national level in utilizing the Emergency Watershed Protection Program - Floodplain Easements (EWPP-FPE), which was congressionally funded by a federal disaster allocation for the 2019 floods in parts of the Mississippi Basin. Private land associated with the levee setback qualified for this voluntary easement program. As an easement program, landowners still retain ownership of their land but sell all development and most land management rights to NRCS. Valuing the easement based on pre-flood disaster land values, this NRCS program was key for compensating the landowners riverward of the new levee. The NRCS headquarters acted as an agency point-of-contact for the NRCS-USACE Regional Memorandum of Understanding (MOU), and Easement Administrative Actions (EAA). NRCS also holds Wetland Reserve Program (WRP) easements on the USACE-owned Corning Conservation Area.



The Nature Conservancy (TNC)

During the 2019 Missouri River flooding, TNC was contacted by USACE - Omaha District about its potential interest in assisting with real estate acquisition for the setback project. TNC acted as facilitator for the project to discuss partner roles, identify and resolve problems, and organize sub-groups to address larger project challenges, including working with the levee sponsors and landowners to identify real estate options. As part of the project's ultimate funding strategy, TNC purchased the residual (recreational) fee title value of the riverward private lands enrolled in NRCS EWPP-FPE, lands under the old levee, and some additional lands needed for mitigating impacts to an existing NRCS WRP easement.



Missouri Department of Conservation (MDC)

MDC provided a land conservation grant to TNC for partial funding to purchase the residual fee title value of the new riverward land after it was enrolled in NRCS EWPP-FPE. The initial financial approval was to be a 20% match of the US Economic Development Administration (EDA) grant that project partners pursued to acquire the riverward lands. Though the EDA grant was ultimately not awarded, the MDC grant matched State Emergency Management Agency (SEMA) flood recovery funds. As the setback location is adjacent to MDC's Derooin Bend Conservation Area, MDC will manage the newly reconnected floodplain land. MDC advocated for the levee setback's long-term economic sustainability and the positive impacts a project like this could have across the nation.



Missouri Department of Natural Resources (MoDNR)

MoDNR operated as the state agency facilitator for the project. MoDNR assisted with the gaps in the project related to real estate funding, real estate coordination with TNC, and real estate appraisals. Additionally, MoDNR's close coordination with the multi-agency team helped expedite permit requests as needed. MoDNR served as co-chair of the Governor's Flood Recovery Advisory Work Group (FRAWG), which included a wide range of members tasked with providing recommendations to the Governor for flood recovery that would lead to innovative actions to improve future flood protection and resilience. The L-536 project was both recommended for continued support and held up as a model flood risk management solution.



Missouri River Recovery Program (MRRP)

The MRRP is a USACE program managed by the Omaha and Kansas City Districts. MRRP has two missions: 1) to identify and implement actions that will avoid a finding of jeopardy for federally listed species covered under a US Fish and Wildlife Service Biological Opinion and 2) implement the Bank Stabilization and Navigation Project (BSNP) Fish and Wildlife Mitigation Project (Mitigation Project) as authorized by the Water Resources Development Act (WRDA) 1986 and amended. USACE purchases land and constructs habitat under the MRRP. Under the MRRP, USACE owns the 1,880-acre Corning Conservation Area, located where the new levee alignment was constructed. Prior to USACE ownership, the conservation area was enrolled in the NRCS Wetlands Reserve Program, creating an overlap of federal agency real estate interests.



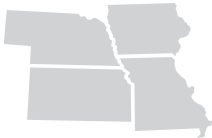
Missouri State Emergency Management Agency (SEMA)

SEMA established its recovery support functions during the 2019 flooding. Through that process, SEMA partnered with the Governor's FRAWG, and alongside MoDNR, recommended large-scale levee setback projects to state leadership. From funds allocated by the state legislature to assist levee districts with recovery from the 2019 floods, SEMA provided funds for real estate acquisition for the new levee footprint, the new riverward land (matching MDC funds), and relocation of utilities.



Northwest Missouri Council of Governments (NWMORCOG)

The NWMORCOG, or COG, is one of 19 regional planning commissions established to resolve common community problems on a regional basis. The ACLD's land appraisal consultant contacted the COG for help in determining potential funding sources, which played an important role assisting ACLD coordinate with local government and helping project partners with grant applications, environmental assessment, and economic impact information. COG provided significant assistance in the preparation of the U.S. Economic Development Administration (EDA) Federal Disaster Recovery grant application, which was ultimately unsuccessful, and coordination with EDA's regional staff.



Landowners

All five private landowners within the setback footprint whose agricultural operations were impacted, chose to participate in discussions with ACLD and USACE regarding potential levee setbacks. These landowners participated in the L-536 levee setback project by enrolling portions of their impacted farmland into a voluntary NRCS Emergency Watershed Protection Program - Floodplain Easements (EWPP-FPE). In addition, they chose to sell the residual interest on their land, after the land was fully enrolled in the easement program.



Other Agencies

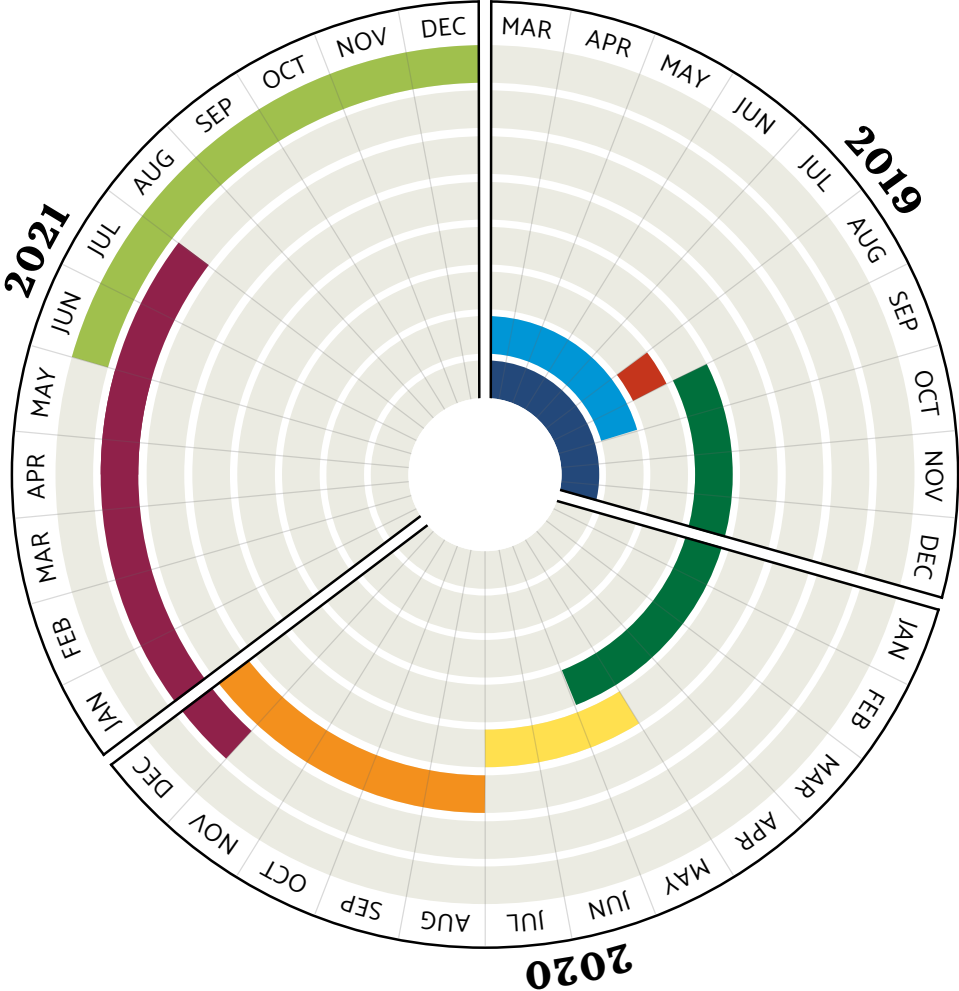
The US Fish and Wildlife Service (USFWS), Missouri State Historic Preservation Office (SHPO), and Tribal Historic Preservation Office (THPO) were all involved during the permitting and environmental compliance process. Early and often coordination with these agencies resulted in productive relationships and greatly facilitated the project advancing past potential roadblocks.

NRCS-USACE Regional Memorandum of Understanding (MOU)

Prior to this project, NRCS Central Region and USACE Northwestern Division developed a Regional MOU to promote the effective coordination and communication between the two agencies where their geographic boundaries overlap.

A provision within the Regional MOU allows one agency to initiate construction under emergency conditions to prevent or reduce imminent risk to life, health, property, or severe economic losses. This emergency provision allowed USACE to initiate levee rehabilitation while concurrently working through the NRCS EAA process for an NRCS easement impacted by the levee construction.

L-536 Setback Timeline and Milestones



- Flooding Began and Continued for Months
- Damage Assessment and USACE/ACLD Coordination
- Multi-Agency Meeting in St. Joseph, MO
- Pursuing L-536 Setback, Multi-Agency Coordination Begins
- In-Line Repairs Begin, Final Steps to Start Setback Construction
- Setback Construction, Significant Coordination Continues
- Construction Completion, Coordination Continues
- Overall Project Completion

Over the course of nearly three years, the L-536 setback was driven by numerous project partners. While it's common to view a completed project linearly—seeing logical actions neatly follow each other—this complicated undertaking required partners to orchestrate their own roles, as well as shared efforts, all at the same time. To make visible the process that brought this levee setback from flooding to the finish line, this part of Section 1 details the steps that occurred, tracking general project management, design, permitting, construction, funding, and real estate.

Flooding Began and Continued for Months



March 2019 - December 2019

- “Bomb cyclone” departs Colorado on March 13
- Historic crests observed on Missouri River, including at Brownville, NE, on March 16
- USACE deploys flood-fighting assistance along Missouri River
- Floodwaters persist along river for many months

Damage Assessment and USACE/ACLD Coordination

 **March 2019 – September 2019**



PROJECT MANAGEMENT

- ACLD submits formal application for PL 84-99 levee rehabilitation assistance
- L-536 breaches were not contributing to Interstate 29 flooding, deemed not high priority to close
- USACE conducted site visits with ACLD to discuss repair alternatives and assess damage
- ACLD discussed options with landowners
- Due to continued high water, damage assumptions documented in a PIR prepared in May 2019; in June 2019, USACE received funding from HQ to begin design and environmental compliance activities
- USACE finished DRAFT alternatives assessment, including levee setback alternatives

Multi-Agency Meeting in St. Joseph, MO

 **August 2019**



PROJECT MANAGEMENT

- TNC convened meeting with prospective partners to discuss setback opportunities at L-550, but focus shifted to L-536 setback because it was not the least cost, technically feasible alternative for L-550
- Attendees included TNC, USACE, ACLD, NRCS (MO and NE), MDC, and MoDNR

Pursuing L-536 Setback, Multi-Agency Coordination Begins



September 2019 – May 2020



PROJECT MANAGEMENT

- ACLD meets with County Commissioners in November 2019 to discuss levee setback option
- Weekly coordination calls initiated by TNC included USACE, ACLD, NRCS, MDC, MoDNR, SEMA, NWMORCOG, EDA, and others as needed



FUNDING

- TNC pursues \$1M EDA grant to fund acquisition of riverward EWPP-FPE lands; MDC provides 20% match funds for grant



REAL ESTATE

- TNC began partnering with ACLD on real estate acquisition responsibilities
- USACE and MO NRCS coordinated EWPP-FPE application ranking metrics to include criteria that supported flood resilience; there was not enough initial EWPP-FPE funding for all L-536 applications, MO NRCS requested additional funding from NRCS HQ, which was granted
- Landowners begin submitting applications for NRCS EWPP-FPE easements in fall 2019
- Setback alignment design impacted existing NRCS WRP easement; compensation for impact results in an additional real estate acquisition item requiring NRCS's EAA process



DESIGN

- USACE draft alternatives assessment concluded levee setback as least cost, technically feasible alternative
- Iterative setback alignment refinement between USACE, ACLD, and landowners
- Setback alignment largely finalized by USACE, ACLD, and landowners in April 2020

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PERMITTING

- NEPA documentation begins, NRCS signs on as a Cooperating Agency



CONSTRUCTION

- USACE begins developing construction contracts for in-line repairs with setback as a contract option in case the necessary real estate could not be secured
- ACLD obtained real estate for in-line repairs in April 2020, allowing for award of the overall construction contract in May 2020

In-Line Repairs Begin, Final Steps to Start Setback Construction



May 2020 - July 2020



PROJECT MANAGEMENT

- July 2020 established as a due date for setback to begin to beat March 2021 flood season



FUNDING

- MoDNR provides grant to TNC partners to pay for real estate appraisals



REAL ESTATE

- TNC established purchase agreement contracts with landowners to acquire the residual fee title after NRCS EWPP-FPE enrollment process is completed
- Team begins NRCS EAA process to compensate for expected WRP impacts
- EWPP-FPE applications reach NRCS “intent to purchase” milestone; in July 2020 all landowners agree to accept NRCS easement offer, meeting construction deadline
- ACLD secures permanent construction easement for the levee setback footprint, NRCS compensation acres, and all other needed temporary construction easements by July 2020



PERMITTING

- Setback construction methods begin to be developed, triggering detailed environmental law coordination for wetland impacts, tree clearing, borrow locations, etc.
- Permitting coordination remains ongoing through construction



CONSTRUCTION

- Construction contract awarded in May 2020
- Upstream in-line repairs began in June 2020
- To prevent construction site from flooding, a temporary sand ring levee is constructed around Breach F (within setback alignment) in June 2020
- With real estate secured for new levee footprint, setback contract option is awarded at the end of July 2020

Setback Construction, Significant Coordination Continues



August 2020 – December 2020



PROJECT MANAGEMENT

- USACE, MRRP, ACLD, NRCS, TNC, MDC, and County Roads coordinate to ensure public access to state and federal lands riverward of setback, finalized in November 2020



FUNDING

- Due to changes in levee design, team is unable to meet the EDA grant deadline for disaster recovery funding; pursued a much smaller, more competitive pool of EDA grants, denied in December 2020
- MoDNR coordinates SEMA funding for ACLD to remove old utility lines impacted by the setback construction and replace with new lines adjacent to the levee setback

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REAL ESTATE

- USACE's MRRP provides permission to construct on Corning Conservation Area in August 2020
- Team shifts borrow excavation focus to MRRP and NRCS conservation land due to close proximity to the project and ability to produce over 300 acres of habitat features from borrow pits; USACE, MRRP, NE NRCS, MO NRCS, MDC, and many others begin ongoing borrow collaboration
- Policy waiver from NRCS HQ is sought to allow material excavation on EWPP-FPE land prior to easement enrollment process finalization; waiver was agreed to and signed in November 2020



PERMITTING

- MoDNR expedites dredge permit approval in October 2020



CONSTRUCTION

- Levee setback construction begins August 2020
- All in-line breaches closed by August 2020, work continues throughout year
- Team learns previous assumptions about location of borrow material were largely incorrect
- USACE executes novel sand berm construction method by directly discharging sand dredged from the Missouri River into cells located on the landward side of the setback levee toe
- Eight heated winter enclosure structures (i.e., climate controlled tents) are erected during very cold winter to dry and process clay

Construction Completion, Coordination Continues



December 2020 – Summer 2021



FUNDING

- MoDNR and SEMA coordinate funding to replace the failed EDA grant application, MDC grant provided matching funds, finalized March 2021

**REAL ESTATE**

- Efforts to process the EWPP-FPE applications and NRCS EAA remain ongoing

**CONSTRUCTION**

- All in-line repairs substantially complete by January 2021
- Setback levee fully closed and provided level of protection for spring season by February 2021
- 24-hour construction operations began in January 2021 and March 2021. Clay placement, levee, face and crest was complete in March 2021 and seepage berm largely complete in May 2021
- Borrow pit wetlands grading and seeding began May 2021
- Setback levee and wetland construction substantially completed in summer 2021

Overall Project Completion

**June 2021 – December 2021****PROJECT MANAGEMENT**

- Project partners document efforts, creating large-scale levee setback Playbook

**REAL ESTATE**

- Surveys conducted for NRCS EWPP-FPE lands
- Surveys conducted for mitigation acres required for NRCS Easement Administrative Action (EAA)
- Appraisals and title work completed for TNC land purchases
- Closings for NRCS EWPP-FPE lands
- Closings for TNC land purchases

**PERMITTING**

- Permitting finalized