Regional Flood Risk Management
Regional 2012 Flood Season Preparedness Workshop
23 February 2012

Workshop Purpose: To clearly convey risks imposed on the system from the 2011 flood, by identifying, managing, and communicating those risks through the use of regional tools

8:00 Welcome & Introduction
- MG Peabody
- Memphis District Commander

8:15 NWS Spring Forecast – Ben Weiger

8:30 Regional Risks
- 2012 Flood Season Preparedness Introduction – Hank DeHaan
- Risk Identification – Jeff Stamper
  - MR&T damage, inundation maps, life safety, economic risk, environmental risk
- Risk Management – Ben Robinson
  - Construction, interim measure, flood fight, modified operation
- Risk Communication – Gloria Piazza
  - Workshop, CorpsMap/web tools, talking points, regional communication plan

11:00 LUNCH

12:00 Case Study #1 – Souris River (St. Paul District, Terry Zien)
- District Flood Season Preparation
- Souris River Risk Identification, Management, Communications

12:30 Case Study #2 – Regional Flood Fight Center - (Rock Island District, Rodney Delp)

1:00 Case Study #3 – Len Small (St. Louis District, Mike Rodgers)

1:30 Case Study #4 – Fulton County (Memphis District, Steve Barry)

2:00 Case Study #5 – Frances MRL (Vicksburg District, Gordon Watkins)

2:30 Case Study #6 – Morganza (New Orleans District, Mike Stack)

3:00 Discussion – next steps, institutionalizing annual flood preparedness workshops

3:30 Adjournment

Regional Flood Risk Management
2012 Flood Season Preparedness Fact Sheet

With the coming flood season fast approaching and winter site conditions unsuitable for active construction, there will be many areas not fully repaired, resulting in increased risk within the system. This increased risk will require extra vigilance and advance preparedness in the coming months given the post-flood condition of MR&T levees, floodwalls, water control structures and navigation channels. Taking into account the vulnerable condition of the MR&T project and projected National Weather Service Spring forecast, the Corps mobilized a Regional 2012 Flood Preparedness Team in mid December.

Purpose:

- Proceed with priority activities prior to the next flood season (30 March 2012) to manage and mitigate risks caused by 2011 flood damages to the Mississippi River and Tributaries (MR&T) Project and other Flood Risk Reduction Projects.
- Clearly convey risks imposed on the system from the 2011 flood, by identifying, managing, and communicating those risks through the use of regional tools.
- Update partners and stakeholders on:
  1). Risk identification – what are the primary risks?
  2.) Risk management – how will risks be addressed, and
  3.) Communication - what is the best way to communicate the information to our partners and stakeholders?

Risk Identification:

- Review Reports: Post Flood Interim, MR&T After Action, and Damage Assessment
- Identify key risks from the 2011 summary of MR&T damages
- Outline life safety, economic, and environmental risks
- Present integrated information to establish and identify how the system will perform
- Standardize regional mapping protocols and produce inundation maps for high risk areas

Risk Management:

- Determine appropriate measures for identified risks
- Determine trigger points for reservoirs and floodways for potential operation modifications
- Provide maps of key MR&T risks, with associated management/mitigation information papers.

Risk Communication:

- Discuss available Web based Risk Communication Products: CorpsMap, new web pages, social media, regular meetings
- Conduct regional workshops
- Create a Regional Communication Plan

Mississippi Valley Division 2012 Flood Season Preparedness Q&A Sheet

Is the Mississippi River expected to flood this year?

According the National Weather Service at Jackson Pre-Spring Flood Outlook Conditions Briefing, there is an ***above normal flood potential*** based upon **current soil moisture conditions** and **above normal spring rainfall forecasts** across Ohio River Basin. As of now, the lack of significant snow cover and depth will not add to the magnitude of any flooding.

Is the system at an elevated risk due to the damages for the 2011 flood?

Yes, the system is compromised, but the Corps of Engineers has repaired x of the x projects identified by the damage assessment reports following the 2011 flood. They have **identified the areas that are vulnerable** if the river were to get to flood state in 2012. They are working to **manage** and **mitigate** those risks as well as **communicate** to the local and state the areas that are most at risk.

How do I know if I am at risk?

The **Operation Watershed Corps Map** site has a map showing all the sites broken down by risk class at http://geo.usace.army.mil/egis/cm2.cm26.map?map=mvd_ows. Instructions on how to use the Corps map site can be found at the site.

How do I where do I find out more information about the 2012 flood preparedness efforts?

- website
- Follow Operation Watershed on **Twitter** or "Like" us on **Facebook**.
- Mississippi Valley Division Press Releases
- State Emergency Management Agencies

Will inundation maps be available for locations along the Mississippi River?

Regionally standardized inundation maps are being generated for locations that are considered at high risk due to damages from the 2011 flood event. USACE will also be prepared to quickly produce inundation maps this spring as the needs arises for specific areas. A standard process for releasing this information is currently under development.

What is the 2012 Flood Season Preparedness effort?

The 2011 Mississippi River flood damaged many levees and flood risk reduction structures throughout the system. These damages have caused many areas to have elevated structural, life safety, and economic risks. The 2012 Flood Season Preparedness effort is moving forward with priority activities to mitigate elevated risks caused by 2011 flood damages. This effort is focused on:

- Identifying key risks in the Mississippi River Valley,
- Establishing how risks will be addressed, and
- Effectively communicating this information to partners and stakeholders.

Does the 2012 Preparedness effort change how Corps District offices prepare for the flood season?

The 2012 Flood Season Preparedness effort builds on work already being done through Corps Districts Offices to prepare for the upcoming flood season with partners and stakeholders. The 2012 effort is primarily focused on elevated risks in the Mississippi River System caused by 2011 flood damages. This effort is a regional approach to coordinate and standardize how the Corps communicates the elevated system risks and what is being done about them with partners to and stakeholders.

How does the 2012 Preparedness effort relate to overall Flood Risk Management?

Flood Risk Management can be broken into four main areas including:

1. Response to an Event
2. Recovery
3. Mitigation
4. Preparation

The 2012 Flood Season Preparedness effort falls into categories 3 and 4 above in that the Corps is working to mitigate elevated risks in the system and communicate these risks and risk management activities to better prepare for the next flood season.

What geographic area does the 2012 Flood Season Preparedness cover?

The 2012 preparedness effort is focused on the elevated risks and risk management activities along the mainstem Mississippi River within the boundaries of U.S. Army Corps of Engineers Mississippi Valley Division.

How To Guide

1. Reload the map: To “refresh” or “reload” the map, just click on the browsers refresh button. F2 on your keyboard will return your geospatial extent to the default extent for your map, collapse the layer folders and turn off all layers.

2. Re-center the map: You can “pan”, or re-center, around the map by clicking on the Pan tool located above the map, then dragging to your point of interest on the map image.

3. Zoom in: You can zoom in by clicking on the Zoom-In tool located above the map, then clicking at your point of interest on the map image, or dragging a box that delinates your area of interest.

4. Zoom out: You can zoom out by clicking on the Zoom-Out tool located above the map, then clicking at your point of interest on the map image.

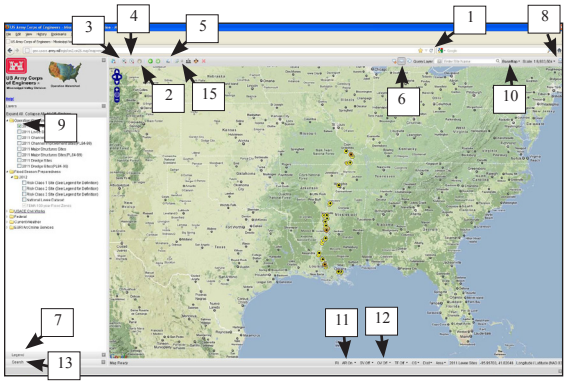
5. Go Back to the Previous View: You can return to the extent of previous views by clicking on the Previous Extent icon located above the map. There is no limit to how many previous views you can return to.

6. Find layer information: There are two ways to find more information on a layer-
By default, the last layer you turned on in the layers list becomes the active query layer. The Active Query Layer is always shown on the status bar below the map. If the active query layer is not what you want, set the query layer by using the ‘Query Layer’ pull-down menu above the map. This list is now limited to just the layers you have turned on. Then, you can select the ‘PopUp Info Query’ button which will display the layers attributes in a bubble when you hover over a feature on the map. When the bubble pops up, you can click on any ‘Link’ and another web page will open. Most of the layers will have additional clickable links.

Alternatively, you may select the ‘Table Info Query’ button, which allows you to select features on the map by clicking and dragging on the map.

7. See what the symbols mean: You can bring up a legend by clicking on the Legend bar left of the map. Only the layers that you clicked on in the layer list will be shown.

8. Print the map on the screen: You can print the map by clicking on the Print icon on the far right of the tool bar. The legend and a scale bar will also be on the map. After the map is produced, click File, Print.



9. Turn on/off data layers: In the layers list on the left side of your browser window, you may click in any of check-boxes to turn on a layer. Layers that are not appropriate to view at your current map scale will be ‘greyed-out’ and unavailable. When you zoom in further, you will see layers become available to you. You can then click the box to turn on the layer. You may check on or off as many selections as you like.

10. Change the Base Map: You can change the base map by selecting the basemap type from the BaseMap pull-down list.

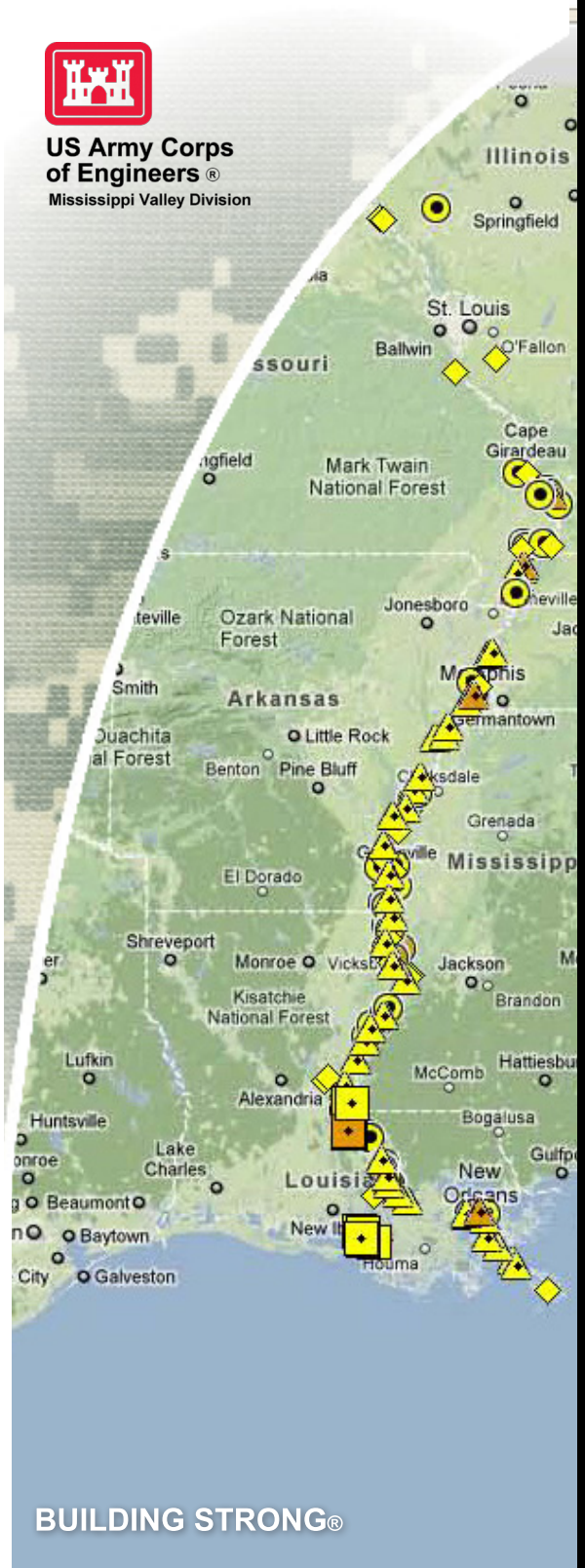
11. Turn on Auto Refresh: You can have the map refresh automatically by clicking on the AR Off below the map to toggle it on. Set the Refresh Interval by clicking on RI to the left of the AR.

12. Turn on an Overview Map: To toggle on the display a small Overview Map, click on OV Off below the map.

13. Search for a location: You may search by coordinates, addresses, zip codes, county or Google. After you select your search method, other options may become available. When the list of places is returned, click on one to see where the place is on the map. It will be marked with a green marker and a bubble.

14. Get a coordinate for a point on the map: You can click on a tool that shows you the coordinate for a location that you click on the map. Coordinate at Point Click icon located above the map.

The Mississippi Valley Division CorpsMap can be found at: www.mvd.usace.army.mil by clicking *Operation Watershed*.



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MISSISSIPPI VALLEY DIVISION CorpsMap USER'S GUIDE

The **Operation Watershed** layers depicts the geographic location of damages created by the 2011 Spring Flood in the Mississippi River Valley Basin.

The sites are color coded based off of the funding status:
yellow = unfunded / no construction
orange = funded / under construction
green = funded / construction complete

2011 Levee Sites: Sites with scour, erosion, sandboils, seepage, slides, and breaches

2011 Channel Improvement Sites: Sites including hardpoints, levee, dikes, channel, revetment, overbank, and top bank

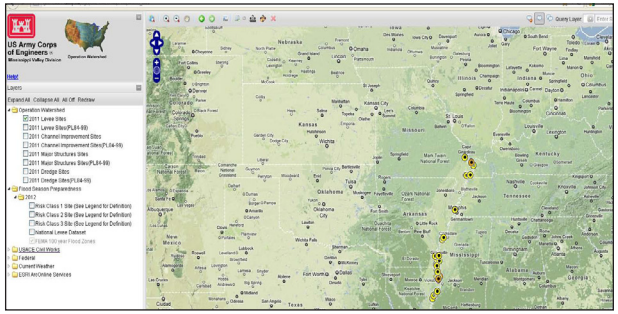
2011 Major Structures: Sites with structural damage, scour to structures, debris, and erosion

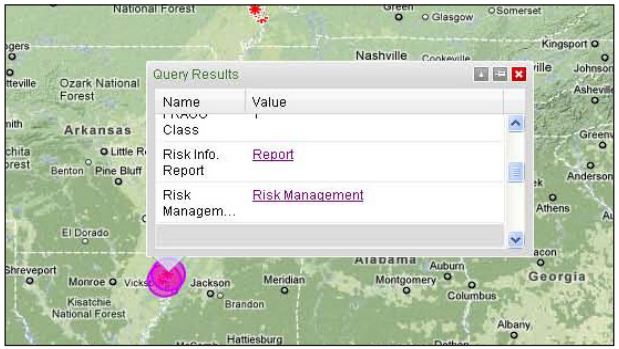
The addition of (PL84-99) on the layer designates that the site is covered under the PL84-99 program.

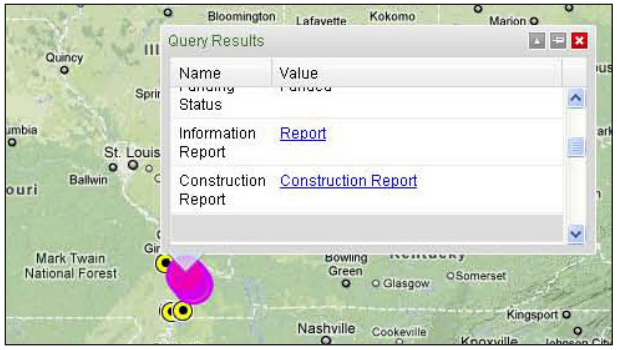
Each site can be queried and will display a pop-up window with more information. The pop-up window may contain two links that launch a pdf report; a information report and/or a construction fact sheet. The information reports are write-ups of the site and its damage. The construction fact sheets relate to sites that are currently under construction and describes the construction status.

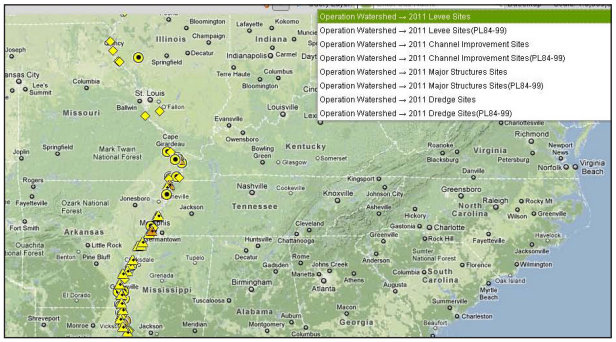
To query a site:
-Select the query button - - and draw a box around the site
-A pop-up window will display relative information and possible report links
-Always clear the selection when finished with one site

Querying site when multiple layers are turned on:
-Select the query button
-Select the drop down arrow next to the query buttons, then select the layer of interest
-Draw a box around the site and a pop-up window will display with more information









Flood Season Preparedness
The Risk Class layers are the same sites identified in the Operation Watershed sites. In this layer they are classified by their Risk classification. These sites can be queried and will show reports related to risk and flood preparedness.

Each site can be queried and will display a pop-up window with more information. The pop-up window may contain two links that can launch a pdf report; a risk information report and/or a risk management report that explains what the risks are and what is being done to address them.

Risk Class 1 Site: High Potential for Loss of Life. Only critical repairs for breached or severely damaged Civil Works Projects where the probability of inundation combined with a probable loss of life results in extremely high risk.

Risk Class 2 Site: Significant Potential for Loss of Life and Significant Economic Damage. Only critical repairs for damaged Civil Works Projects where the probability of failure during the next high water event combined with the probability for loss of life and significant economic damages results in very high risk.

Risk Class 3 Site: High Impact to Navigation or Indirect Potential for Loss of Life. Critical repairs for damages that are directly impairing safe navigation at high-use (over 10M tons at ports or 2.5B ton-mile for inland waterways) systems. (e.g. dredging critical harbors and navigation channels, critical gate repairs, debris removal, etc.). It is not anticipated that any more than the previous 12 months average width and depth will be restored during this effort.

OR

Critical repairs for damaged Civil Works Projects where failure during the next high water event could potentially disrupt essential lifeline services or access to these services (e.g. Severe damages to key transportation links that would prevent access to medical facilities at a time critically injured people need access the most.)

Levee Integrity

The following conditions are examples of conditions that will lessen the integrity of a levee system and may result in a Corps of Engineers determination that the levee system does not meet Corps of Engineers standards:

- Burrow holes (animal or man-made)
- Tree growth and excessive vegetation growth (roots degrade structure/tree weight causes undue stress)
- Erosion
- Encroachments
- Deteriorated pipes

Repair Requirements

The following lists a few, but not all, considerations for PL84-99 repairs:

- If emergency supplemental funds are not congressionally authorized for PL84-99 repairs, repairs will be prioritized by HQUSACE.
- Rehabilitation Assistance projects must have a favorable Benefit-to-Cost Ratio (i.e., > 1.0) in accordance with the Principles and Guidelines contained in Chapter 6, ER 1105-2-100, regarding National Economic Development (NED) Benefit Cost Analysis.
- It is the levee sponsor's responsibility to comply with all federal, state and local environmental laws, regulations and policies,
- It is the levee sponsor's responsibility to provide borrow materials to repair their respective levee. Levee districts are encouraged to be proactive and seek lands available for borrow prior to a flood event.

When additional soil is required in order to complete the repair, a borrow site is required. A borrow site is a location where soil is removed to be used in the repair of damages

Things To Remember

- **Levees do not eliminate flood risk.**
- **The number one goal of the Levee Safety Program is life safety.**
- **It is important to communicate accurate and timely information about the risk of living and working behind levees so informed decisions can be made about safety.**
- **Levee safety is a component of a broader flood risk management approach.**
- **A sustainable, system-wide, and collaborative approach is the most effective way to manage and assess levees and other flood risk reduction methods.**
- **A levee system is only as strong as its weakest link.**
- **Levee safety is a shared responsibility.**

National Levee Database

The National Levee Database (NLD) allows users to search and visualize attributes of levees and floodwalls relevant to flood fighting, design, construction, operation, maintenance, repair and inspection.

To access the database, visit http://nld.usace.army.mil

For more information on the PL84-99 Rehabilitation Inspection Program, visit http://www.mvr.usace.army.mil/publicaffairsoffice/LSP1/LSPPL84-99Program.htm

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PUBLIC LAW 84-99 (PL84-99)

PL84-99

Public Law 84-99 (PL84-99) Rehabilitation and Inspection Program provides reimbursement for specific damages to levees that result from high-water events.

Federally authorized levee systems constructed by the Corps and locally maintained are automatically eligible for the Public Law 84-99 (PL84-99) program upon completion of construction of the project.

For non-Federal levee systems, the PL84-99 program is a voluntary program. If the levee sponsor of the non-Federal levee system requests to be included in PL84-99, the Corps will conduct an inspection and determine if the levee system meets the required minimum technical criteria.

Once accepted into the program, the levee sponsor commits to maintain the levee to a standard level that is acceptable to the Corps. Proper operation and maintenance of the levee prevents routine damages and reduces the possibility of levee breach.

USACE inspects levees enrolled in PL84-99 routinely (every 1-2 years) and periodically (every 5 years) to identify deficiencies that might affect the levee's ability to perform. Ratings given to a levee system as a result of the USACE inspections are used to determine if a project is "active" in the PL84-99 Rehabilitation and Inspection Program.

A levee system must maintain an "Acceptable" or "Minimally Acceptable" rating to remain active.

Responsibilities of the sponsor and the Corps are set out in the program guidance documents and applicable project partnership agreements. To view the Levee Owner's Manual for Non-Federal Flood Control Works, visit: www.mvs.usace.army.mil/LeveeOwnersManual.pdf.

PL84-99 and Inspection Results

The objectives of the Corps' levee inspections are to ensure the levee system will perform as expected; identify deficiencies or areas that need monitoring or immediate repair; assess the integrity of the levee system in order to identify any changes over time; collect information in order to make informed decisions about future actions; and determine eligibility for federal rehabilitation funding for the levee in accordance with PL84-99.

The Corps of Engineers conducts routine inspections as well as periodic inspections. Periodic inspections are conducted every five years.

Based on the inspection results, levee systems will receive a rating of Acceptable ("A"), Minimally Acceptable ("M") or Unacceptable ("U").

An "M" rating means there is one or more items rated as Minimally Acceptable or one or more items rated as Unacceptable and an engineering determination concludes that the Unacceptable items would not prevent the system from performing as intended during the next flood event.

Levees with an "A" or "M" rating remain active in PL84-99. A levee system with "U" rated items but a overall rating of "M," remains active in PL84-99 during the time allowed to make needed corrections (typically two years). If the sponsor does not present the Corps with proof the deficiencies were corrected within two years, the system becomes inactive in PL84-99.

"U" rating means one or more items are rated as Unacceptable and would prevent the system from performing as intended. A "U" rating makes the levee system inactive in PL84-99. The Levee System will be considered "active" in PL84-99 when the Corps confirms the "U" rated deficiencies are corrected.

The Corps of Engineers will provide assistance during a flood fight to levee systems regardless of the rating they receive.

Repairs Under PL84-99

U.S. Army Corps of Engineers policy regarding repairs to levee systems and flood control projects damaged by floods is as follows:

Federally constructed or enhanced & locally maintained systems (in PL84-99 program):

Qualifying damages will be repaired by the federal government at 100 percent federal cost. Pending letter of request by maintaining authority and funding by Congress.

Non-federally constructed & locally maintained systems (in PL84-99 program):

Qualifying damages will be repaired by the federal government at 80 percent federal/20 percent local cost share (pending letter of request by maintaining authority and funding by Congress).

Federally constructed or enhanced/locally maintained systems AND non-federally constructed or enhanced/locally maintained systems (NOT in PL84-99 program):

Are not eligible for rehabilitation funds under PL84-99 rehabilitation and inspection program.

NOTE: Repairs can only be made to restore the levee system to pre-event conditions. No improvements or enhancements with federal funding are authorized.

Risk Assessments

Risk assessments are an important element of the Levee Safety Program. In order to be able to assess, communicate, and manage risk as part of the Levee Safety Program mission, it has to be quantified to understand it better. A risk assessment does this, by moving beyond the inventory and inspections, which are the foundational elements of the safety program.

A risk assessment asks: what is the range of possible undesirable events (flood, storm or earthquake, etc.), how will the infrastructure perform in the face of these events; and what are the consequences if the infrastructure doesn't perform as intended--life-loss is paramount concern.

The use of risk assessments complements traditional approaches to levee safety (such as factors of safety), it does not replace them. Good standards for design, construction, and operations remain critical to levee safety as key methods to address the uncertainty in a dynamic environment.

A risk assessment provides a better understanding of the likelihood, performance and consequences; improves how risks can be discussed and raises awareness; and helps establish priorities and solutions that effectively address these risks. Additionally, a risk assessment informs a well-formulated, well-justified federal and local investment that addresses life safety.

Overlap with NFIP

FEMA's levee activities are focused on mapping for NFIP purposes and the Corps' Levee Safety Program is focused on levee reliability and communicating the associated risks. Often times the distinctions between these two programs are misunderstood.

The Corps encourages communities to consider all options to minimize flood risk and to purchase flood insurance. Both the Corps and FEMA agree the local community is responsible for providing the documentation to demonstrate a levee meets NFIP criteria. It's a community choice to participate in the NFIP and often times the community has O&M responsibility for the levee.

See www.FEMA.gov for more information.

Things To Remember

- **Levees do not eliminate flood risk.**
- **The number one goal of the Levee Safety Program is life safety.**
- **It is important to communicate accurate and timely information about the risk of living and working behind levees so informed decisions can be made about safety.**
- **Levee safety is a component of a broader flood risk management approach.**
- **A sustainable, system-wide, and collaborative approach is the most effective way to manage and assess levees and other flood risk reduction methods.**
- **A levee system is only as strong as its weakest link.**
- **Levee safety is a shared responsibility.**

National Levee Database

The National Levee Database (NLD) allows users to search and visualize attributes of levees and floodwalls relevant to flood fighting, design, construction, operation, maintenance, repair and inspection.

To access the database, visit
http://nld.usace.army.mil

For more information on the Corps Levee Safety Program, visit
www.mvr.usace.army.mil/publicaffairsoffice/LSP1/LSPHome.htm

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USACE LEVEE SAFETY PROGRAM

Levee Safety Program

There is always a level of risk for those who live or work behind a levee. The purpose of the U.S. Army Corps of Engineers (USACE) Levee Safety Program is to develop a clear picture of the condition of our nation's levees, communicate the risk associated with the systems to our stakeholders and the public, and encourage informed decision making in the interest of life safety.

In 2006, the U.S. Army Corps of Engineers (USACE) created its Levee Safety Program with the mission to assess the integrity and viability of levees and recommend courses of action to make sure that levee systems do not present unacceptable risks to the public, property and environment. USACE subsequently launched a major effort to create a levee safety organization; build an infrastructure inventory through the National Levee Database (NLD); develop a methodology for performing technical risk assessments of existing levee infrastructure; and review and revise current related policies and procedures associated with levees.

Several types of levees participate in the program:

- Levees that are built, operated and maintained by the U.S. Army Corps of Engineers
- Levees that are built by the U.S. Army Corps of Engineers and turned over for operation and maintenance by a local sponsor
- Levees that have been constructed by a non-federal entity and are enrolled in the Corps' Rehabilitation and Inspection Program

Levee Inspections

The objectives of USACE levee inspections are to ensure that the levee system will perform as expected; identify deficiencies or areas that need monitoring or immediate repair; to continuously assess the integrity of the levee system in order to identify any changes over time; to collect information in order to make informed decisions about future actions; and to determine eligibility for federal rehabilitation funding for the levee in accordance with PL84-99.

Routine Inspections, also referred to as annual inspection or Continuing Eligibility Inspection, are performed on an annual basis to ensure the levee system is being properly operated and maintained.

Periodic Inspections are conducted by a multidisciplinary team, led by a professional engineer. Periodic inspections include a detailed, comprehensive and consistent evaluation of the condition of the levee system and will be conducted every five years. Components of the Periodic Inspection include evaluating routine inspection items; verifying proper operation and maintenance; evaluating operational adequacy, structural stability and, safety of the system; and comparing current design and construction criteria with those in place when the levee was built.

Inspection process steps:

1-Pre-inspection data is gathered and analyzed by the inspection team.
2-USACE or an engineering contractor conduct an inspection of the levee system. (The local sponsor is invited to attend the inspection).
3-The inspection team relays their findings to the District LSO.
4-The LSO makes his preliminary determination of the rating, which is then provided to the local sponsor.
5-The local sponsor has 60 days to respond to USACE to refute or provide additional information pertaining to deficiencies found during the inspection while USACE performs Quality Assurance of the inspection report.
6-After 60 days, the LSO makes a final system rating determination, which is relayed to the local sponsor.
7-For "Minimally Acceptable" or "Acceptable" levee systems in which deficiencies have been noted in the report, the local sponsor has a specified time-frame to address the issues, up to a maximum of 2 years.

Inspection Results

Inspections identify deficiencies that, when fixed, will not only make the levee better, it will strengthen the entire system.

Based on the inspection results, levee systems will receive a rating of Acceptable ("A"), Minimally Acceptable ("M") or Unacceptable ("U").

An "M" rating means there is one or more items rated as Minimally Acceptable or one or more items rated as Unacceptable and an engineering determination concludes that the Unacceptable items would not prevent the system from performing as intended during the next flood event.

The system remains active in PL84-99 during the time allowed to make needed corrections (up to a maximum of two years). If the sponsor does not present USACE with proof the deficiencies were corrected within the designated time-frame, the system becomes inactive in PL84-99.

"U" rating means one or more items are rated as Unacceptable and would prevent the system from performing as intended.

A "U" rating automatically makes the levee system inactive in PL84-99. The Levee System will be considered "active" in PL84-99 when "U" rated deficiencies are corrected by the local sponsor and verified by USACE, or when a System-Wide Improvement Framework is approved.

The Corps of Engineers will provide assistance during a flood fight to levee systems regardless of the rating they receive.

Interim Risk Reduction Measures

An Interim Risk Reduction Measures (IRRMs) plan contains actions to reduce life safety risks posed by a levee system while long-term solutions are being pursued.

IRRMs are a critical part of responsible, adaptive flood risk management and recognize the dynamic nature of flood risk.

Even levee systems that may not pose high risks can benefit from IRRMs. Many IRRMs are good practice for levee operators and maintainers regardless of the levee condition.

In establishing IRRMs, the prevention of loss of life is the highest priority.

The sponsor or organization who operates and maintains the levee system is responsible for developing and implementing IRRMs.

USACE districts may advise levee sponsors on their IRRMs via available partnership opportunities, for example, through Levee Safety Program activities; Silver Jackets interagency teams; Planning Assistance to States; or, Floodplain Management Services.

• Example non-structural IRRMs include: levee system-specific flood warning and emergency evacuation plan; emergency response training and exercises; floodplain management plan; and public communication plan.

• Example structural IRRMs include: seepage control measures; target grout program; overtopping resiliency features; erosion protection; and stability berms. (Structural IRRMs may warrant the need for a 408 permit).

Things To Remember

- **Levees do not eliminate flood risk.**
- **The number one goal of the Levee Safety Program is life safety.**
- **It is important to communicate accurate and timely information about the risk of living and working behind levees so informed decisions can be made about safety.**
- **Levee safety is a component of a broader flood risk management approach.**
- **A sustainable, system-wide, and collaborative approach is the most effective way to manage and assess levees and other flood risk reduction methods.**
- **A levee system is only as strong as its weakest link.**
- **Levee safety is a shared responsibility.**

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SYSTEM-WIDE IMPROVEMENT FRAMEWORK

System-Wide Improvement Framework

Public Law 84-99 (PL84-99) Rehabilitation and Inspection Program provides reimbursement for specific damages to levees that result from high-water events.

USACE inspects levees enrolled in PL84-99 routinely (every 1-2 years) and periodically (every 5 years) to identify deficiencies that might affect the levee's ability to perform. Ratings given to a levee system as a result of the USACE inspections are used to determine if a project is "active" in the PL84-99 Rehabilitation and Inspection Program.

A levee system must maintain an "Acceptable" or "Minimally Acceptable" rating to remain active.

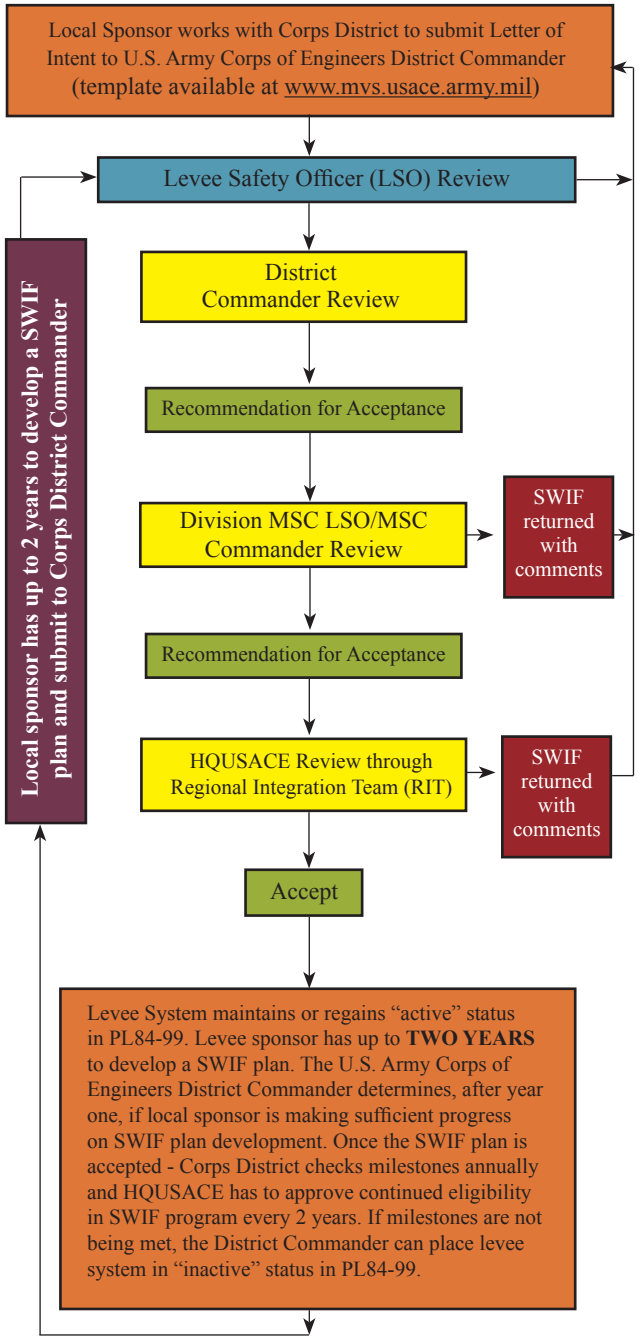
Some items on a levee system found to be "Unacceptable" or "Minimally Acceptable" might be complex to correct. Developing and implementing solutions to address such deficiencies may require a multi-year effort and coordination between multiple entities.

The U.S. Army Corps of Engineers is making the System-Wide Improvement Framework (SWIF) process available to levee sponsors facing such challenges with their levee systems. The process allows levee sponsors participating in a SWIF to remain eligible for PL84-99 rehabilitation assistance funding while addressing deficiencies.

Levee sponsors are responsible for operation, maintenance, repair, replacement and rehabilitation of the levee system. The SWIF does not alter those responsibilities.

The SWIF establishes a process within which levee sponsors engage with federal, state, and local agencies and organizations in longer-term system-wide improvement efforts. The SWIF is intended to optimize flood risk reduction by identifying solutions that efficiently use resources, prioritizing improvement and corrective actions based on risk, and establishing a time-frame for coordinating overlapping or complementary program requirements.

SWIF Process



SWIF Requirements

A SWIF can be used to address the following:

- A levee system that has engineering deficiencies in addition to "Unacceptable" inspection items
- Improvements for multiple levee systems
- Complex natural resource considerations that require additional time and coordination to ensure that the imperatives of both levee safety and environmental requirements are adequately served
- Additional time and coordination to protect the rights of Tribes pursuant to treaty and statute

A levee sponsor's SWIF must include:

1) Identification of levee system(s)

2) Description of proposed levee improvements and justification on how SWIF optimizes flood risk reduction

3) A plan and schedule for interagency collaboration, including environmental and/or Tribal consultation if applicable

4) Documentation of project specific agreements, between levee sponsors and USACE or other agencies related to levee modifications

5) Documentation of any regional considerations, approaches, and tools to be used during implementation of the SWIF

6) Description of interim maintenance standards that will be implemented to mitigate consequences of uncorrected "Unacceptable" inspection items

7) IRRM plan, including a risk communication plan that addresses the risk to life increased by system-wide deficiencies

8) Schedules and milestones that will be used to monitor progress and to determine continued eligibility for PL84-99 rehabilitation assistance while the SWIF is being implemented

9) Demonstration that FEMA has been informed of the SWIF. * *The SWIF process does not constitute an extension of accreditation for FEMA purposes*

US Army Corps of Engineers
St. Paul District

Information Paper
PL84-99 Souris River- Velva, ND

OPERATION WATERSHED RECOVERY – CRITICAL REPAIR SITES

Contacts
Joe Schroetter, MVP Project Manager
Ph. (651) 290-5417 fax (651) 290-5258
joe.l.schroetter@usace.army.mil
Mark E Koenig, MVP Emergency Manager
Ph. (651) 290-5205 fax (651) 290-5212
mark.e.koenig@usace.army.mil

OVERVIEW

DISTRICT: St. Paul District
TYPE: Severe Levee Erosion and Scour
FRAGO CLASS: 2 – Significant Potential for Loss of Life
RISK: 1,084 residents, $34.9M in Total Property Value
REPAIR: Reshape levee, repair scour area, place riprap.
EST. REPAIR COST: $1,660,000

2011 Flood History

The Souris River flows from Saskatchewan, Canada, into North Dakota and then back into Canada. Above normal precipitation during summer and fall 2010 left much of the eastern portion of Saskatchewan saturated. Winter 2010 and 2011 then saw snowfall significantly above normal throughout the basin. The Souris River basin in Canada received heavy snowfall on top of 200 percent of normal moisture in many areas. The Souris River in the Velva area started to rise in April 2011 and continued to rise throughout May 2011. Excessive rainfall throughout the basin contributed to the flooding issues. The National Weather Service issued a warning for all Souris River locations to prepare for one of the lengthiest flood events in history.

Damage Assessment

The Velva Flood Control project functioned well through all flood events in April and May. The city placed closure structures in its levees as per the project O&M manual as the water stages increased. On June 19 the National Weather Service notified communities throughout the Souris River basin that significant flows would be forthcoming from Canada due to 5 to 7 inches of rain that fell. On June 22 the city of Velva requested assistance from the Corps to raise its levees. Over the next 6 days the Velva levee system was raised in anticipation of the forthcoming flood. The Souris River peaked at 29,700 cfs at Sherwood, eclipsing the previous record of 14,800 cfs in 1976. On June 27 the river crested in Velva. Even though potions of Velva's Federal Flood Control Project received significant damage, the levees held and the city remained protected.

Figure 1. View of damaged levee from the 2011 flood fight looking upstream. The old channel followed the left alignment. The current channel follows the right alignment.

Flooding of the Souris River scoured approximately 1,400 lineal feet of stream bank and riprap along the descending bank of the river downstream from the Highway 42 bridge. Nearly 4.4 acres of land was lost to the flood, and the river changed its course so that it eroded a private road outside the Federal project limit and left one home without access. Erosion of the left bank has redirected flow toward the right bank levee causing extensive erosion on the Federal levee system. The toe of the levee along the right bank has eroded away, and the levee face is near vertical.

Risk and Consequence

If the Velva Levee System were to fail at the described location, the population at risk would be 1,084. The value of the nonresidential structures is $4,170,900, and the value of the approximately 480 residential structures is $30,789,900.

Critical Repairs

The extensive erosion of the left bank of the river has redirected flow toward the right bank levee, eroding over 450 feet of the permanent levee project. Surveys indicate that a large scour hole is present in the river and runs along the base of the levee for more than 280 feet. The toe of the levee in this reach has eroded away, and the levee face is near vertical and needs to be stabilized. Stability has not been checked, but it is likely compromised under these conditions. During flows less than the 25-year event significant erosion will continue and additional levee section will be lost; at this time it is unknown if flows from the 25-year event will lead to failure, however it will cause the

situation to worsen and failure is possible. Flows greater than the 25- year event could lead to failure as the newly created river channel will continue to direct high flows directly into the unprotected levee and accelerate erosion.

Special Considerations
This project was authorized under the Flood Control Act approved 31 December 1970 (Public Law 91-611) and the 1982 Energy and Water Development Appropriations Act (Public Law 97-88. The city of Velva has acquired the necessary ROW for the project.

Acquisition Strategy

Small Business set aside dependent upon contractor availability.

Schedule
The schedule is critical as the winter months are approaching. A contractor can place rock while the ground is frozen but any reshaping of the federal levee will not be completed until after next year's spring thaw.

Solicitation: 15 December 2011
Contract Awarded: 01 February 2012
Anticipated contract duration: 30 days
Scheduled completion: March 2012

Picture taken in 2010.

Normal flow is within the channel and parallels the levee with no erosion.

Picture taken at the height of the flood event in Velva (June 2011).

High flows have eroded over 4 acres on the north side of the channel and redirected river flow perpendicular into the levee.

Current direction of channel flow
Scour areas

Picture looking downstream. The gate well shown was originally 50 feet from the channel. The original designed called for a 3:1 side slope to the channel. One third of the original levee is lost. The levee is now a 1 to 1 slope.

Picture looking downstream showing the severe erosion on the north side of the channel. The new flow of the channel is shown with the red arrows.

Picture looking upstream showing the eroded levee and scour areas on the south side of the channel. Fill and concrete rubble were placed during emergency operations in an attempt to halt erosion. As stated in the photo above, one third of the original levee is lost. The levee is now a 1 to 1 slope.

US Army Corps of Engineers
St. Louis District

Information Paper
Len Small

OPERATION WATERSHED RECOVERY – CRITICAL REPAIR SITES

Contacts
Mike Rodgers, PL84-99 Project Manager
Ph. (314) 331-8215 fax. 314-331-8355
Micheal.T.Rodgers@usace.army.mil
Scott D. Whitney, MVD Regional Flood Risk Manager
Ph. (309) 794-5386 fax (309) 794-5710
scott.d.whitney@usace.army.mil

OVERVIEW

DISTRICT: St. Louis District
TYPE: Breach
RM: RM 28.5
FRAGO CLASS: II – Significant Potential for Loss of Life and Significant Economic Damage
RISK: 200 homes, 17,000 acres
REPAIR: Levee setback length of breach
EST. REPAIR COST: $6,500,000.00

Damage Assessment
Severe flooding in the spring of 2011 caused a breach in the Len Small levee. 1,300 feet of levee has been breached along with associated bed scouring. Additional damages include two slides, and a gravity drain collapse.

Risk and Consequence
If this breach is not repaired, the entire levee district will remain unprotected from any flood occurring at a 50% (2-year) frequency or higher. In addition to 200 residences, 17,000 acres of corn, soybeans, and wheat would also be at risk. The total value of damages from a flood event without repairs would be $1,573,266

Figure 1: Aerial view of the Breach during the flood

Critical Repairs
The reset recommendation for this site includes a levee setback of approximately 2,500 feet. The levee will be repaired to the existing levee elevation of 340.0 feet (NAVD 88). Additionally, two slides and a gravity drain will be repaired.

Special Considerations
IDNR WRP land is directly behind the breach section of levee. Coordination is ongoing. Len Small D&LD is non-Federal so WIK will be identified to meet the 80:20 cost share requirements.

Schedule
Anticipated contract duration is 180 days

Acquisition Strategy
8(A) set aside

US Army Corps of Engineers
Memphis District

Information Paper
Island 8, KY

OPERATION WATERSHED RECOVERY – CRITICAL REPAIR SITES

Contacts
Regina Kuykendoll Cash, MVM MRL Project Manager
Ph. 901-544-3680
regina.kuykendoll-cash@usace.army.mil
Scott D. Whitney, MVD Regional Flood Risk Manager
Ph. (309) 794-5386 fax (309) 794-5710
scott.d.whitney@usace.army.mil

OVERVIEW

DISTRICT: Memphis District
TYPE: Levee Damage – Boil and Seepage
LM: 5/17+00 – 11/37+60
FRAGO CLASS: 2 - Significant Potential for Loss of Life and Significant Economic Damage
RISK: 13,700 residents, 6,700 Structures
REPAIR: Relief Wells
REPAIR COST: $6,300,000

Damage Assessment
During the 2011 Flood of the Mississippi River and Tributaries, a problem area in the mainline levee was identified by officials at the Corps of Engineers around Fulton County, KY. In this area, under-seepage was heavy resulting in multiple sand boils which jeopardized the integrity of the levee section in this area. In response to this situation, Corps officials used Contract labor to construct a temporary rock dam on the land side of the levee, creating an artificial water berm in the area to mitigate under-seepage. This rock dam was constructed in 3-4 days at a cost of roughly $700,000 and was successful in protecting the levee section and preventing catastrophic failure in this area. Other assessments revealed heavy seepage throughout the limits with large sand boils with as big as 8 in to 10 in throats moving some coarse sands in standing water approximately 100 ft from the toe of the berm between stations 5/45+00 – 6/0+00. Numerous sand boils and pin boils were noted in the field. Some of the boils had throats greater than 6 in.

Risk and Consequence
According to the data found on the Levee Screening Tool, the total population at risk within System 3 is approximately 13,700 people with 6,700 structures and an estimated Property Value of $1,315,743,130. Any failure of the Hickman-Obion Levee would adversely impact the communities of Hickman, Tiptonville, Wynnburg, Ridgely, Bogota, and areas surrounding Reelfoot Lake. Public utilities including Hospitals, Schools, and a Federal Penitentiary would all be damaged. Public roads including State Highways 78, 311, 1282, 157,21,22,79 as well as Interstate I-155 would be closed and severely impacted.

Figure: Water within 5 feet of top of floodwall at Hickman Sector

Critical Repairs
The preliminary repair recommendation for this site includes 111 relief wells. The estimated cost of this repair is $6,300,000.

Special Considerations
During the inspection, riverside levee slopes could not adequately be assessed due to the height of existing vegetation. The areas experiencing the most intense underseepage, such as Island 8, have had seepage control projects designed and reviewed for environmental impacts The constraint for these project actually moving forward to construction has been landowner ROW issues. Sponsor must provide all ROW.

Schedule
Complete P&S 7 May 12, RTA 15 May 12, Award 2 Jul 12

Acquisition Strategy
Competitive 8(a)

US Army Corps of Engineers
Vicksburg District

Information Paper
Francis Sand Boil (Rosedale)

OPERATION WATERSHED RECOVERY – CRITICAL REPAIR SITES

Contacts
Kent Parrish, MVD Regional MRL Team Leader
Ph. 601-631-5006 fax. 601-631-5151
Kent.D.Parrish@usace.army.mil
Scott D. Whitney, MVD Regional Flood Risk Manager
Ph. (309) 794-5386 fax (309) 794-5710
scott.d.whitney@usace.army.mil

OVERVIEW

DISTRICT: Vicksburg District
TYPE: Levee Damage – Boil and Seepage
RM: 615.5L (STA. 151+00)
FRAGO CLASS: 2 - Significant Potential for Loss of Life and Significant Economic Damage
RISK: 67,180 residents, $2.8B infrastructure
REPAIR: Eleven 8" relief Wells
REPAIR COST: $474,000

Damage Assessment

A large, high energy sand boil was identified moving significant quantities of silt and fine sand material at the toe of a 200 foot seepage berm. The boil was bagged by the Levee Board with prison labor for initial containment and subsequently the sandbag ring was encircled by a larger earthen berm constructed by Corps hired labor forces. A filter of sand and stone was constructed over the boil throat to filter fines and dissipate energy. The stabilization of the boil took 4 days of 24 hr/day effort. Flow from the boil was estimated at approximately 300gals/min. This boil appeared to have the potential to result in backward erosion and piping that could eventually lead to loss of berm and levee foundation material. Two additional sand boils were identified approximately 100 – 150 feet from the berm toe. These boils were classified as moderate energy levels and moved approximately 5-7 cubic yards of material. These boils were also bagged by the local prisoners. Heavy seepage and numerous pin boils were noted and monitored along the slope and toe of the berm upstream and downstream of these boils for a reach of approximately 2,000 feet.

Risk and Consequence

If the East Bank Mississippi River Levee System were to fail at the Francis site, the population at risk would be 67,180. The value of the non-residential structures is $561,855,000, and the value of the 22,599 residential structures is $2,261,510,000.

Figure 1: Francis Initial Sandbag Ring

Critical Repairs

Remediation, for at least a 500 ft reach of this area, is recommended prior to the next high water season.
The preliminary repair recommendation for this site includes eleven 8 inch diameter relief wells, 100 ft deep, 50 ft spacing, located at the existing berm toe. The estimated cost of this repair is $474,113.

Special Considerations

The Francis site, is covered under the 1998 MRL SEIS.(Work item 616-L). The current US Fish & Wildlife Service letter, concerning T&E species on this site, will need to be updated before further construction can proceed. 404 water quality permits, and mitigation for impacted areas have been completed for this project area. Cultural resources surveys have not been completed for item 616-L. In the event that the project design is not the consistent with the above SEIS, an EA will be completed. This segment of EBMRL has recently been certified, but if left unrepaired, the sandboil site at Francis could decertify this portion of levee. Based on preliminary estimates for the recommended repair, all of the ROW that will be required to install the relief wells is already owned by the Board of Mississippi Levee Commissioners

Schedule

Final Design completed – 30 May 2012
RTA – 31 May 2012
Contract Award – 31 Aug 2012

Acquisition Strategy

Work will be combined with another similar MRL projects (Winterville).

US Army Corps of Engineers
New Orleans District

Information Paper
Morganza Control Structure

OPERATION WATERSHED RECOVERY – CRITICAL REPAIR SITES

Contacts
Gary Hawkins, MVN District Program Manager OW-R
Ph. (504) 862-2565 fax. (504) 862-1572
Gary.L.Hawkins@usace.army.mil
Scott D. Whitney, MVD Regional Flood Risk Manager
Ph. (309) 794-5386 fax (309) 794-5710
scott.d.whitney@usace.army.mil

OVERVIEW

DISTRICT: New Orleans District (MVN)
TYPE: Structural Impairment – Unable to monitor/relieve excess hydrostatic pressure in the soil beneath structure
RM: PLD 0185+00 to 0195+00
FRAGO CLASS: 1– High Potential for Loss of Life.
RISK: 241,978 residents, in excess of $12B
REPAIR: Install new piezometers and new relief wells
REPAIR COST: $2,420,000

Damage Assessment

90% of the existing relief wells and piezometers are inoperable and result in uncertainty in any engineering analysis required for the operation of the structure. The Morganza Control Structure (MCS) has only one of ten piezometers currently functioning properly. The 25 year event occurs at elevation 59.4 (structure opened at elevation 59.5 in 2011), which is a fully loaded headwater on the structure. Fully functional piezometers and relief wells are required to analyze the stability of the stilling basin. If the stilling basin is compromised then operation of the structure is limited to avoid undermining and potential loss of the structure. In the recent 2011 flood event the amount of hydrostatic pressure (uplift) beneath the structure could not be determined with this limited data. Instability of the structure, the soil founded stilling basin in particular, became an issue. The relief wells have not functioned properly since installation and continue to show poor performance; therefore we are unable to count on relief of excess pressure. Because we were unable to monitor or alleviate excess pressure the operation of the Control Structure was limited to a conservative differential head. This altered the way the spillway was operated and limited flexibility, a stability failure was possible if river stages changed rapidly. Excess uplift could displace the downstream stilling basin which would lead to the undermining of the control structure. This structure forms the authorized MRL line of flood protection, compromise of the structure would result in the Mississippi River flowing down the Atchafalaya Basin similar to what was experienced at the Old River Low Sill Structure in 1973.

Figure 1: Typical Morganza Piezometer condition

Risk and Consequence

If MCS suffered a stability failure the Mississippi River would flood the entire Atchafalaya Basin including the cities of Morgan City, Berwick and other surrounding communities.. Such a failure would severely impact the future operations of the other three water control structures: Old River Auxiliary, Old River Control and Bonnet Carre. If MCS were to fail, the population at risk would be 241,978. The residential structures at risk in this system are 95,385 and non residential structures are 805 at an approximate total value of $12.9B. Failure to provide interim level of protection creates tremendous economic hardship on the local economy and in particular the Morgan City, Berwick and surrounding communities.

Critical Repairs

Recommended repair is to drill and install 10 new piezometers and 12 new relief wells. The estimated cost of this repair is $2,420,000.

Special Considerations

No mitigation costs are expected as result of construction of this action.

Schedule

Morganza Control Structure repairs are scheduled to award four months after receipt of funds. The construction duration is anticipated to take seven months after award.

Acquisition Strategy

Morganza Control Structure is planned to be advertised via a MATOC Low Bid Contract.