

2012 Flood Season Preparedness and Emergency Response Summary

TABLE OF CONTENTS

1. **SECTION I - INTENT & PURPOSE**
2. **SECTION II - 2011 FLOOD**
 - 2.1 GENERAL OVERVIEW
 - A. Introduction
 - B. Meteorological Events
 - 2.2 2011 EMERGENCY RESPONSE
 - A. Overview
 - B. Key Decisions & Emergency Actions/ Repairs Required During Flood
3. **SECTION III - DAMAGES & IMMEDIATE NEEDS**
 - 3.1 GENERAL APPROACH/ CRITERIA/ FACTORS CONSIDERED / DATA USED
 - 3.2 PHYSICAL COMPONENTS/FEATURES
 - A. MRL Items
 - B. CI Items
 - C. Dredging Items
 - D. Structures
 - E. PL 84-99
4. **SECTION IV - RECOVERY NEEDS (Critical projects)**
 - 4.1 GENERAL APPROACH/ CRITERIA/ FACTORS CONSIDERED / DATA USED
 - 4.2 PHYSICAL COMPONENTS/FEATURES
 - A. Levee Items
 - B. CI Items
 - C. Dredging Items
 - D. Structures
5. **SECTION V - RECOVERY NEEDS (Non-Critical projects)**
 - 5.1 GENERAL APPROACH/ CRITERIA/ FACTORS CONSIDERED / DATA USED
 - 5.2 PHYSICAL COMPONENTS/FEATURES
 - A. Levee Items
 - B. CI Items

- C. Dredging Items
- D. Structures
- E. Recreation Items
- F. Drainage Items

6. SECTION VI - RESERVOIRS AND FLOODWAYS

- 6.1 GENERAL OVERVIEW
 - A. Reservoirs
 - B. Floodways

7. SECTION VII – NWS SPRING 2012 WEATHER FORECAST

- 7.1 General Overview
- 7.2 Heavy Rainfall and Flooding
- 7.3 Above Normal Flood Risk Areas
- 7.4 Normal Flood Risk Areas
- 7.5 Below Normal Flood Risk Areas

8. SECTION VIII - RISK COMMUNICATION PLAN AND PRODUCTS

- 8.1 GENERAL OVERVIEW
- 8.2 COMMUNICATION TOOLS AND PRODUCTS

LIST OF APPENDICES

Appendix A - Site ID list (Arranged by district)

Appendix B - Site ID list (Arranged by state)

Appendix C - FRAGO

Appendix D - OPORD

Appendix E - Reservoirs and Floodways

SECTION I - INTENT & PURPOSE

This document has been developed to capture in general terms, the efforts the Mississippi Valley Division (MVD) U.S. Army Corps of Engineers (USACE) has undertaken to manage and mitigate risks associated with the great flood of 2011 and in preparation for the next flood event. It is intended to be used a tool and in conjunction with other products produced under Operation Watershed Recovery (OW-R) in an effort to communicate both internally and externally the risks which remain to the public in the wake of one on the largest flood events on record.

Many tables have been provided within this document in an effort to summarize and index information that the reader can easily reference and utilize in conjunction with other tools such as CorpsMap. Each damaged site included in this document has undergone extensive investigation and validation by experienced USACE personnel. The totality of damages incurred during the great flood of 2011 includes nearly 2 billion dollars worth of damages to critical infrastructure necessary to the flood risk management system benefiting both the nation's populous and the economy. Further site specific detailed information is publicly available via the Regional Flood Risk Management and CorpsMap websites (<http://www.mvd.usace.army.mil/>) and other products such as Information Papers, Risk Management Papers, and Construction Fact Sheets.

SECTION II - 2011 FLOOD

2.1 GENERAL OVERVIEW

A. Introduction.

The Mississippi River provides drainage for 41% (1.2 Million square miles) of the continental US, including all or part of 31 states. Its drainage area covers over 1.8 million square miles and is the third largest watershed in the world with the Amazon and the Congo as first and second respectively. The Mississippi river begins its journey southward in Northern Minnesota and meanders its way down the valley combining with flows from many tributaries including the Missouri, Ohio, and the Arkansas Rivers. Along the way millions of gallons of water passes by a comprehensive flood risk reduction system designed to pass the "project design flood", or the largest flood reasonably expected to occur. Utilizing the combined use of levees, floodways, channel improvements, backwater areas and reservoirs, this massive volume of water finally finds its way to the Gulf of Mexico some 2430 miles later.

Excessive precipitation throughout the Mississippi, Missouri, Ohio, and Souris River valleys combined with a higher than normal melting snowpack caused historic flooding within the division during the spring of 2011. The 2011 flood event was one of the largest ever recorded along the Mississippi River and affected multiple tributaries and watersheds within MVD. The Souris River crested six times in May through early June 2011 before receiving inflows in mid-June from a Canadian rainstorm that were 3 times greater than any that already had been passed. River stages and flow rates at many gage stations along the lower Ohio and Mississippi rivers were record setting events which tested the resiliency of the system.

B. Meteorological Events. Leading up to the 2011 spring flood event the National Weather Service predicted an active flood season for portions of the upper Mississippi valley districts based the 2010-2011 snowpack which contained a water content ranked among the highest in the last 60 years.

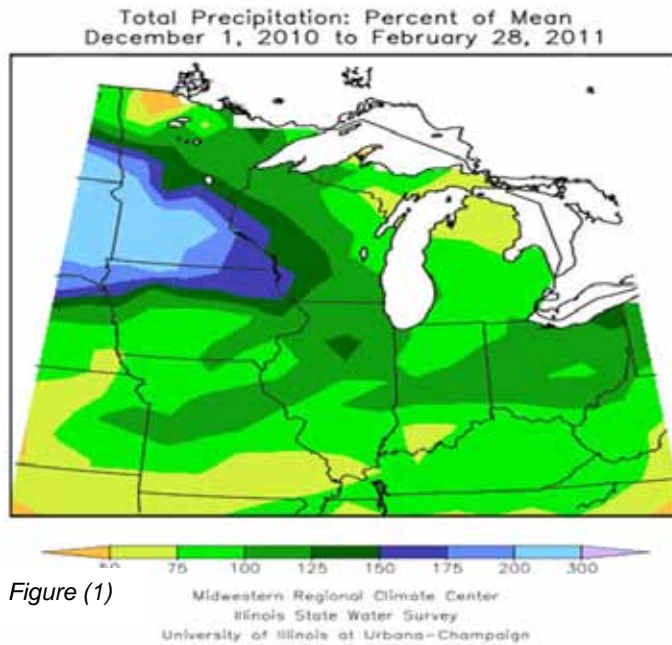


Figure (1)

In addition to the heavy snowpack, the Souris River basin received substantial rainfall in the spring and summer. Storms frequented the region approximately every four to seven days, with each delivering around 2-4 in of rain over a large area.

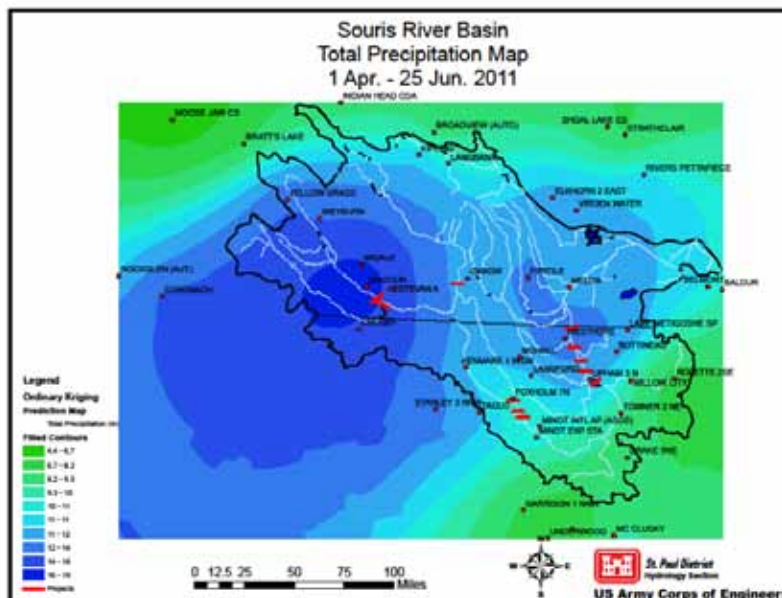


Figure (2)

National Weather Service reports show that during a two week period in late April to Early May 2011 an excessive amount of rain fell over portions of the Ohio River Valley and across northern Arkansas and southern Missouri. This meteorological event deposited more than 600 – 1,000% of normal rainfall across parts of the Ohio, White and mid-Mississippi River valleys, with rain amounts up to 20 inches at some locations.

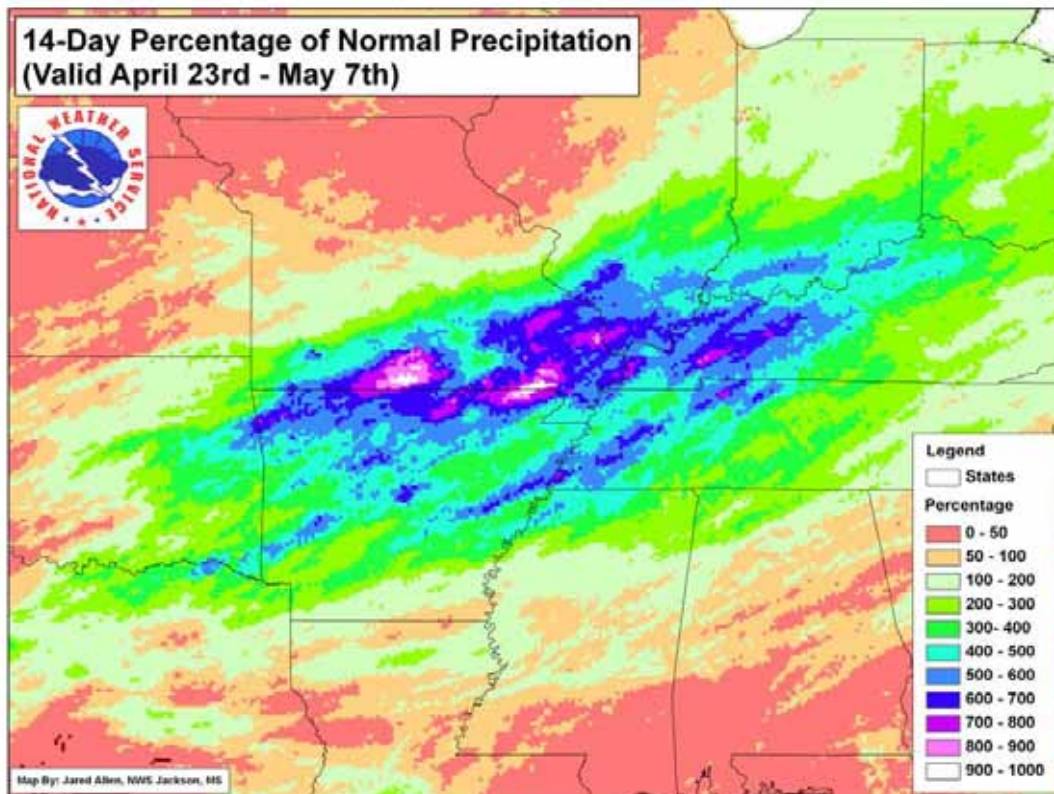


Figure (3)

The heaviest rain event unfolded April 23 through 28. In the course of these 6 days, 9 to 10 inches of rain fell in parts of southern Illinois, southern Indiana, and northern Kentucky. Parts of southeastern Missouri and northern Arkansas received more than 12 inches of rain. Several states recorded their wettest April in history, including Illinois, Indiana, Kentucky, Ohio, West Virginia, and Pennsylvania. Missouri, Arkansas, and Tennessee also recorded a top five wettest April.

2.2 2011 EMERGENCY RESPONSE

A. Overview. The 2011 Mississippi River Flood was among the largest ever recorded along the lower part of the waterway and though the system performed as designed, it experienced tremendous and prolonged pressure from this historic event. It is the Flood of Record for many gauges between Cape Girardeau, MO and the Gulf of Mexico. The 2011 flood fight is the first time the total watershed system was required to be operated in a synchronized manner to manage the highest level of water it has ever seen, in some areas this event was near the Project Design Flood. The flood waters exacerbated known weakness and created new weaknesses in the system requiring emergency response by the local levee boards coupled with technical assistance and other resources from the Corps.

Corps of Engineers emergency activities during the flood encompassed every phase of flood fighting, ranging from cooperation with local levee boards and drainage districts to the operation of floodways and backwater features. Emergency flood fight measures that were required to pass the event included ringing sand boils, constructing water berms, blocking culverts/ditches to impound surface waters, constructing erosion control measures, and raising the level of protection in some areas on the mainstem Mississippi River Levee. Reservoirs and Floodways are key components of the flood risk management system. 78 Corps reservoirs and 40 Tennessee Valley Authority reservoirs in the Ohio basin provided additional flood protection and for the first time in the MR&T project's history three floodways; Bird's Point, Morganza, and Bonne Carre were placed in simultaneous operation to help relieve the enormous stress on the much-improved levee system.

Districts aggressively pursued coordination internally and with outside agencies during this event in an effort to synchronize efforts and to share information. Coordination was accomplished in many different ways, including establishing direct liaison with certain agencies, establishing internal and external websites, using social media to inform the public, and participating in recurring meetings and conference calls.

B. Key Decisions & Emergency Actions Performed/Repairs needed during the Flood.**St. Paul District** *Table(1)*

MVP		
Date	Event	District
28-Jan-11	Declaration of Emergency signed by COL Price	MVP
26-Feb-11	Dam operations (Souris) turned over to USACE from USFWS due to anticipated rise in inflow and outflow at Lake Darling	MVP
16-Mar-11	St. Paul officials warn city of near record levels possible due to snowpack	MVP
7-Apr-11	President signs federal emergency declaration for ND; Canadian reservoirs are raising outflows in response to rainfall, will raise inflow and outflows at Lake Darling	MVP
9-Apr-11	River crests at Fargo	MVP
25-May-11	Levels continue to rise on the Souris in Minot, levee construction begins, and the city is encouraged to prepare an evacuation plan	MVP
1-Jun-11	City of Minot orders evacuation of vulnerable areas	MVP
6-Jun-11	River levels fall in Minot and contingency levees built in past few days are starting to be removed by the city. Lake Darling at 1599.97 feet. All evacuated areas now reopened but residents warned to be prepared to leave again.	MVP
20-Jun-11	Up to 5.5 inches of rain falls in Canada in the Souris basin. Discharges increased from Lake Darling to make room for water from Canada. Work on secondary levees to protect critical infrastructure in Minot.	MVP
22-Jun-11	Mandatory evacuation in Minot. Levees begin to be overtopped	MVP
25-Jun-11	Burlington evacuated	MVP

i. Lake Darling. During the 2011 event, Lake Darling dam operations (Souris River) were turned over to USACE from USFWS due to anticipated rise in inflow and outflow at Lake Darling. On 25 June, the peak inflow to Lake Darling was 29,000 cfs with a peak outflow of 25,000 cfs on the same day. Over a thirty day period, the Lake Darling pool peaked at the top of the flood control limit three times with each time corresponding to a different event.

ii. Souris River. The Souris River, after 6 crests in May through early June, received inflows in mid-June from a Canadian rainstorm that were 3 times greater than any that already had been passed. The channel and levee projects in Minot, ND were overtopped and significant scour occurred at Velva, ND. Levee and pump station repairs in Minot and scour repair in Velva are underway. Floods between the levees are expected to be successfully contained for the for the 1% chance of exceedance. If the levees are over topped by a similar event to 2011, approximately 10,000 people and 4,000 structures would be impacted.

St. Paul District (MVP) 2011 Flood Fight Funding Details

- Souris River Spring Floods: \$ 3,814,826
- Souris River Recovery: \$ 5,976,000
MVP Total Flood Fight: \$ 9,790,826



Figure (4) Levee breach on Souris River at Minot, ND



Figure (5) Levee construction at Minot, ND

4/12/12 MVD FLOOD PREPAREDNESS SUMMARY REPORT

Rock Island District Table(2)

MVR		
Date	Event	District
27-Jan-11	Release of the first NWS Probabilistic Flood Outlook Summery describing greater than normal flood potential from well above normal snow pack levels and higher than normal soil moisture conditions.	MVR
4-Mar-11	Request for Advanced Measures to provided contingency planning support.	MVR
17-Mar-11	Conducted Flood Fight Training with Public Works Officials from the Quad Cities Flood Area	MVR
17-Mar-11	Provided inundation mapping to officials of National Cemetery Administration representatives on the Rock Island Arsenal for their use in their flood fighting efforts to protect grave sights from inundation.	MVR
22-Mar-11	Declaration of Emergency signed by EM Rodney L. Delp for COL Shawn P. McGinley. The EOC transitioned from Advanced Measures Contingency Planning to Activation and Response Operations. EOC is activated to Level 2: Watch Operations.	MVR
22-Mar-11	MVR conducts flood fight refresher training for approximately 60 engineers.	MVR
24-Mar-11	NWS releases reduced Probabilistic Flood Outlook.	MVR
25-Mar-11	Conducted Flood Fight Training with Public Works Officials from the Clinton Flood Area	MVR
31-Mar-11	Inundation mapping is completed and Flood Area Engineers begin to distribute them to State and local governments	MVR
4-Apr-11	Two MVR employees sent to Fargo, ND to support flood fight operations along the Red River of the North.	MVR
19-Apr-11	Crest enters the Rock Island District AOR	MVR
22-Apr-11	Crest moves past Rock Island District - HQ Building	MVR
25-Apr-11	Crest moves out of the Rock Island District AOR	MVR
26-Apr-11	Activation of the MVR Regional Flood Fight Center to provide emergency materiel support to southern MVD Districts	MVR
27-Apr-11	MVR begins providing personnel support to southern Districts	MVR
23-May-11	The MVR-EOC returns to normal operations	MVR
14-Jun-11	Mississippi Fox Drainage and Levee District located on the Des Moines and Mississippi River overtopped-breached due to flash flooding after a localized rain event.	MVR
15-Jun-11	Declaration of Emergency signed by EM Rodney L. Delp for COL Shawn P. McGinley.	MVR
20-Jun-11	The MVR-EOC returns to normal operations.	MVR

Rock Island District (MVR) 2011 Flood Fight Funding Details

3125 FCCE Emergency Operations: \$10,797,000

MVR Total Flood Fight: \$10,797,000

St. Louis District Table(3)

MVS		
Date	Event	District
21-Apr-11	Emergency Declared and EOC activated	MVS
26-Apr-11	Congressman Carnahan toured Festus/Crystal City Levee and Cape area	MVS
26-Apr-11	Senator Durbin brief via teleconference with DE's	MVS
27-Apr-11	Congresswoman Emerson brief via teleconference with DE	MVS
28-Apr-11	Vandalia Levee overtopped	MVS
29-Apr-11	Len Small Levee on the Mississippi River overtopped	MVS
1-May-11	MG Walsh, CODEL Blunt/Emerson visit to SE Missouri	MVS
2-May-11	Wappapello Lake emergency spillway overtopped	MVS
3-May-11	MG Walsh visits Lake Wappapello	MVS
4-May-11	Congresswoman Emerson visit to Wappapello and Cape Girardeau area	MVS
4-May-11	Kaskaskia Lock on the Kaskaskia River re-opened	MVS
24-May-11	EOC closed	MVS

i. Festus-Crystal City Levee. Flood fight efforts for this preexisting slide site including monitoring during the event to insure that the situation did not worsen over time.

ii. Len Small, Vandalia. During the 2011 event, two levees (Vandalia, Len Small) overtopped and 28,500 protected acres were inundated. A total of 45 personnel provided support during this event, under FCCE funding. A total of 1,540,000 sandbags, 2 pumps, and 131 rolls of visqueen were issued.

iii. Wappapello. Record rainfalls from the 22nd of April to the 3rd of May caused Wappapello Lake to reach a record lake level and the largest releases which overtopped the emergency spillway. The activation of the emergency spillway at Wappapello resulted in infrastructure damage and had significant impacts to the Project and local community.

iv. Kaskaskia Lock. One of the five locks in the District was closed for a period of time during this flood event. Kaskaskia Lock was closed while Lock 24, Lock 25, Melvin Price Locks and Dam, and Lock 27 remained open. Daily coordination meetings with the U.S. Coast Guard, Army Corps of Engineers, Railroad (bridges), River Industry Action Committee and Mariners were held.

St. Louis District (MVS) 2011 Flood Fight Funding Details

FC&CE Total:	\$ 1,540,000
- 20 April 11:	\$ 225,000
- 21 April 11:	\$ 780,000
- 27 April 11:	\$ 465,000
- 28 April 11:	\$ 70,000
MVS Total Flood Fight:	\$ 1,540,000

4/12/12 MVD FLOOD PREPAREDNESS SUMMARY REPORT

Memphis District Table(4)

MVM		
Date	Event	District
20-Apr-11	Lt. Col. Daniel Hamilton, Memphis District Deputy Commander, on behalf of Memphis District Commander Col. Reichling, signed a Declaration of Emergency.	MVM
20-Apr-11	The Memphis District (MVM) Emergency Operations Center (EOC) was activated at Level I	MVM
24-Apr-11	The Memphis District (MVM) Emergency Operations Center (EOC) was activated at Level II	MVM
25-Apr-11	Memphis District Commander, Col. Vernie Reichling, orders crews to load pump barges with the necessary explosives to activate the Bird's Point floodway.	MVM
26-Apr-11	Phase II 24-hour patrols began	MVM
28-Apr-11	Survey and hired labor crews locate, uncover and prepared access wells on the frontline levee in anticipation of the Bird's Point floodway.	MVM
1-May-11	Gen. Walsh approves Col. Reichling's recommendation to move the barges into place and begin setting in place explosives needed to operate the Bird's Point floodway.	MVM
2-May-11	Activation of the Bird's Point floodway.	MVM
11-May-11	Phase II 24-hour patrols end	MVM
29-May-11	The Memphis District (MVM) Emergency Operations Center (EOC) enters Level I	MVM
5-Jun-11	The Memphis District (MVM) Emergency Operations Center (EOC) returns to normal operations	MVM

i. City of Cairo, IL. Major seepage in the form of three high energy sand boils with sand cones from 8 to 15 feet in height occurred in this area. Major flood fighting efforts were required starting at approximate river stage reading of 52.3 feet (10 year event) and higher.

ii. Cairo, IL Parcel 5. During the 2011 event, major seepage was observed in the form of multiple large, high energy sand boils in the sump area of the Goose Pond Pumping Station. Flood fighting methods utilized to control the seepage in this area included increasing the depth of water within the sump area of the Goose Pond pumping station and flooding adjacent lands.

iii. Above Cairo, IL Parcel 2A – Relief Wells. Hundreds of small to medium sand boils were observed During the 2011. Most of these boils had throat diameters of greater than 4 inches and cone diameters of 3 to 6 feet or greater. During the 2011 event, significant flood fighting was required starting at an approximate river stage of 52.3 feet (10 year event) and higher.

iv. Island 8 (mile 1/0+00 to mile 15/0+00). Heavy seepage and multiple large, high energy sand boils approximately 100 feet from levee toe and three large sand boils at the levee toe were flood fought in this area during the 2011 event.

v. Birds Point New Madrid Floodway – Make Safe and Stable. Following the operation of the Floodway in May 2011, the Commander, MVD, issued a memorandum directing the Memphis District to implement make safe and stability operations based on a target

elevation (stage) of 51 feet on the Cairo gage to provide a stable base for flood fight operations and subsequent reset operations by November 30, 2011. Further analysis and effort in late fall 2012 allowed protection to an elevation of 55ft on the Cairo gage to be achieved by 15 Dec 2011 through the use of HESCO bastions on the upper crevasse

Memphis District (MVM) 2011 Flood Fight Funding Details

MR&T Total: \$7,591,000
- MRL Maintenance: \$6,718,000
- St. Francis Maintenance: \$128,000
- White River Maintenance: \$745,000

FC&CE Total: \$8,100,000
- 21M MRL – M: \$2,355,000
- 21M St. Francis – M: \$4,670,000
- 24M St. Francis – M: \$1,075,000

MVM Total Flood Fight: \$15,691,000



Figure (6) Sandboil at Cairo



Figure (7) Flood fight efforts at Cairo

4/12/12 MVD FLOOD PREPAREDNESS SUMMARY REPORT

Vicksburg District *Table(5)*

MVK		
Date	Event	District
25-Apr-11	Declaration of Emergency signed by COL Jeffrey Eckstein	MVK
25-Apr-11	The Vicksburg District (MVK) Emergency Operations Center (EOC) was activated at Level I	MVK
27-Apr-11	MVK requests permission to deviate from the water control plan at Muddy Bayou in order to raise the water level at Eagle Lake	MVK
30-Apr-11	The Vicksburg District (MVK) Emergency Operations Center (EOC) was activated at Level II	MVK
2-May-11	Phase I levee patrols begin in all sectors	MVK
4-May-11	Maj. Gen. Walsh approves COL Eckstein's recommendation protect the backside of the Yazoo Backwater Levee against erosion.	MVK
6-May-11	Stabilization work at Buck Chute complete	MVK
7-May-11	Phase II levee patrols begin in all sectors	MVK
12-May-11	Overtopping of abandoned levee occurs near Wilson Point in Louisiana	MVK
13-May-11	Erosion protection for the backside of the Yazoo Backwater Levee complete	MVK
16-May-11	Natchez requests assistance with erosion protection at Silver Street	MVK
19-May-11	Erosion protection at Silver Street in Natchez complete	MVK
12-Jun-11	Phase II 24-hour patrols end	MVK
20-Jun-11	The Vicksburg District (MVK) Emergency Operations Center (EOC) returns to normal operations	MVK

i. Buck Chute. MVK addressed this hot spot using two methods: constructing a stabilization berm in the area where boils had been identified, and raising the water level at Eagle Lake to lower the hydraulic head. Vicksburg District requested a deviation from the established water control plan on 27 April in order to raise the water level at Eagle Lake to 90.0 feet. The intent was to offset the pressure caused by high riverside water levels

ii. Yazoo Backwater Levee. Several projects were required at the Yazoo Backwater Levee during this event including work to several deficient areas which were identified along the Levee, including cattle guards and portions of the levee below design grade as well as protection measures implemented for the backside of the Levee against erosion.

iii. Vidalia Area Levee Raises. Several locations along the Mississippi River Levee near Vidalia, LA were identified as deficient and in need of raising. Deficient areas required

potato ridge, HESCO, or both in order to raise the levee to the required grade and provide a minimum freeboard based on the predicted water level.

vi. Silver Street Erosion Protection, Natchez, MS. Significant erosion of the river bank occurred near Silver Street in Natchez, MS and by 15 May the erosion had begun to threaten temporary protection measures at Natchez. On 16 May emergency repairs at the site were initiated, consisting of emplacement of R200 stone on top of the existing fabric and sand bags along a 350 foot section of eroded river bank.

vii. Albemarle Levee Slide. Three significant sand boil and two slides were discovered in the Mayersville sector near the Mississippi River Levee, approximately 8 miles north of Eagle Lake. Repair included a stone dike was emplaced around the slide area which was backfilled with sand. On 21 May movement of the slide necessitated increasing the quantities of stone and sand required.

Vicksburg District (MVK) 2011 Flood Fight Funding Details:

3112 MR&T Appropriation Direct:	\$10,172,729
3125 FCCE Reprogrammed from MR&T:	\$3,470,422
3125 FCCE Emergency Operations:	\$1,350,000

MVK Total Flood Fight: \$14,993,151



Figure (8) Albemarle slide



Figure (9) Stone dike emplacement at Albemarle

New Orleans District Table(6)

MVN		
Date	Event	District
14-Mar-11	Declaration of Emergency signed by COL Edward R. Fleming. EOC activated at Level I	MVN
15-Mar-11	EOC activated at Level II Lower portions of Mississippi River were activated.	MVN
24-Mar-11	The lower Atchafalaya Basin sectors were activated for Phase 1	MVN
30-Mar-11	The upper sectors within the Mississippi River were activated for Phase 1	MVN
30-Apr-11	MVN places 122,000 sandbags to form a berm at Duncan Point,	MVN
5-May-11	Phase II flood fight was activated for sectors within the entire Mississippi River	MVN
8-May-11	Phase II flood fight was activated for lower sectors of the Atchafalaya	MVN
6-May-11	Stabilization work at Buck Chute complete	MVN
9-May-11	The Bonnet Carre Structure was opened	MVN
12-May-11	Old River Lock closed to navigation	MVN
14-May-11	MRC made decision to open the Morganza Floodway on 14 May	MVN
31-May-11	Old River Lock reopened for navigation	MVN
20-Jun-11	The Bonnet Carre Structure was closed	MVN
7-Jul-11	Morganza Floodway closed	MVN
22-Jul-11	MVN EOC returns to normal operations	MVN

i. Baton Rouge Front. The flood-side slope paving (which includes a major railroad atop of crown) experienced large cracking due to slope slough. MVN and East Baton Rouge Parish restricted the Canadian National railroad to 15mph and prohibited the stockpiling of cars and parking of trains across the Baton Rouge Front area. Flood side stability was monitored 24/7 to assess potential loss of levee slope. As the water started to cover the tracks, trains were completely restricted from use of the tracks.

ii. Duncan Point. The Duncan Point seepage area contains a sand boil which is at the landside toe of the levee. During the 2011 event excess head at the levee toe was greater than 10 feet. The lower 1/3 of the landside slope required intensive flood fight efforts including 10,000 sand bags placed by MVN and the Pontchartrain Levee District. The adjacent highway experienced spongy conditions requiring closure by the Louisiana Department of Transportation and Development. A massive aquifer in excess of 300 feet in depth exists beneath the levee overlain by a thin blanket, this blanket has been ruptured and the situation continues to deteriorate with successive high waters.

iii. Chalmette. Approximately 800lf of HESCO bastions and an additional 4ft of fill material was added between the HESCO barriers and the toe of the levee slope in order to prevent seepage from occurring at this site.

iv. Bayou Chene. Assisted the locals with the placement of a 600ft barge, sheetpile, and riprap closing to close off this 975ft bayou. This measure held back over 3.5ft of flood water, preventing backwater flooding of Morgan City, Houma, and surrounding communities.

v. Old River Control Complex. The Old River Control structures are operated to maintain the distribution of flow between the Mississippi River and the Atchafalaya River, and also prevent the Atchafalaya River from capturing the flow of the Mississippi River. The Old River Control Complex exceeded its design capacities while diverting high flows from the Mississippi River. Wave wash erosion was spotted on the banks behind the wing walls and emergency scour repairs were performed. The area was monitored for the remainder of the event.

vi. Morganza Floodway . The purpose of the floodway in conjunction with the Atchafalaya Basin Floodway is to carry flood water from the Mississippi River to the Gulf of Mexico via the lower Atchafalaya River and the Wax Lake Outlet. The structure is designed to pass up to 600,000 cubic feet per second (cfs) of water to the Gulf of Mexico, alleviating stress for mainline levees downstream along the Mississippi River. On 14 May 2011, 2 gate bays at the Morganza Control Structure were opened. Navigation notice Morganza_11-49 was issued concerning the operation of the Morganza Control Structure. Notice Morganza_11-50 was issued the following day updating the operation of the structure. From the period of 14 May to 18 May 2011, a total of seventeen (17) bays were opened reaching peaking flows of approx 180,000 cfs. On 29 May 2011 with 11 gate bays open, two areas of the sandbags on the south guide levee of the Morganza Forebay were overtopped. The Morganza Floodway was closed on 7 July 2011 and returned to normal operations when the Red River Landing gage read 45.37'.

vii. Bonnet Carré Spillway. On 09 May, the Bonnet Carre Structure per the Water Control Manual was operated to maintain flows within the Mississippi River and/or maintain safe levels of freeboard downstream. On 14 May, additional material was placed on the upper guide levee, along Airline Highway (US 61) for additional freeboard. A 1,600- foot potato ridge levee was constructed on the south side (front side) of Airline Highway. The spur levee at the far end of the spillway was overtopped into the lake, which resulted in no major consequences. A few gages and four of the original structure needles were lost during operation of the structure. On 22 May, a 26-foot section of the railroad bridge within the Bonnet Carre spillway collapsed. On 28 May the line was fully reopened to rail traffic.

Supplies issued to parishes:

Hesco Baskets	44,900 lf
Jumbo Sandbags	9,850
Sandbags	1,219,800
Polyethylene Sheeting	524

New Orleans District (MVN) 2011 Flood Fight Funding Details:

3112 MR&T Appropriation Direct:	\$7,040,903
3125 FCCE Transferred to MR&T Project:	\$13,249,130
3125 FCCE Emergency Operations:	\$3,843,418

MVN Total Flood Fight: \$24,133,451



Figure (10) Scour at Morganza Floodway



Morganza Floodway (11)

SECTION III - DAMAGES & IMMEDIATE NEEDS

3.1 GENERAL APPROACH/ CRITERIA/ FACTORS CONSIDERED / DATA USED

As the waters rose during the great flood of 2011, damage assessment teams began the task of inspecting the levees. While documenting and uploading information to be used to prepare assessments of the damages caused by the great flood, the teams identified seeps, boils, slides and other anomalies. Once the waters receded, these teams continued their assessments and prepared documents which identified the location, nature, extent, repair alternatives and estimated preliminary repair costs for these damaged areas. In order to keep data gathering consistent, all assessments utilized a Damage Assessment Report (DAR) format. 44 separate DARs were conducted to ensure that all levee reaches, structures and navigational river miles affected by this event were inspected and thoroughly documented. The reports were submitted to an oversight team to ensure the consistency, functionality and quality of the final product.

In addition to the thousands of pages of DAR information, single sheet project information papers were developed. These information papers were produced to summarize the DAR information and provide a general background on flood damages, potential consequences, repair options and a tentative schedule for repair. Based upon the severity of the damages and the guidance provided by the FRAGO classification guidance, a regionally prioritized list of projects was developed by MVD.

USACE GUIDANCE: FRAGO 1 (USACE Guidance for Emergency Repairs) to OPORD 2011-50 2011 Greater Mississippi Basin Flood Repairs and Post-Flood Assessment of Response Operations

Commanders Intent: USACE will develop, validate and prioritize the requirements to provide critical interim repairs to protect life and ensure public safety prior to the start of the next flood event or season.

RISK CLASSIFICATIONS

Class I: 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.

Class II: 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.

Class III: High Impact to Navigation (IIIa) or Indirect Potential for Loss of Life (IIIb) 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

Class IV: Other Risk and Impact Reduction Measures. Any critical repairs for damages not described in Classes I-III.

RISK MATRIX

Failure Likely Categories

High – Direct evidence or substantial indirect evidence to suggest failure has already occurred and/or is likely to occur during a flood

Moderate – The fundamental condition or defect is known to exist, indirect evidence suggests it is plausible, and key evidence is weighted more heavily toward likely than unlikely to occur during a flood

Low – The possibility cannot be ruled out, but there is no compelling evidence to suggest it has occurred or that a condition or flaw exists that could lead to its development during a flood

Remote – Several events must occur concurrently or in series to trigger failure. Most, if not all of the events are very unlikely to occur during a flood

Consequences Categories

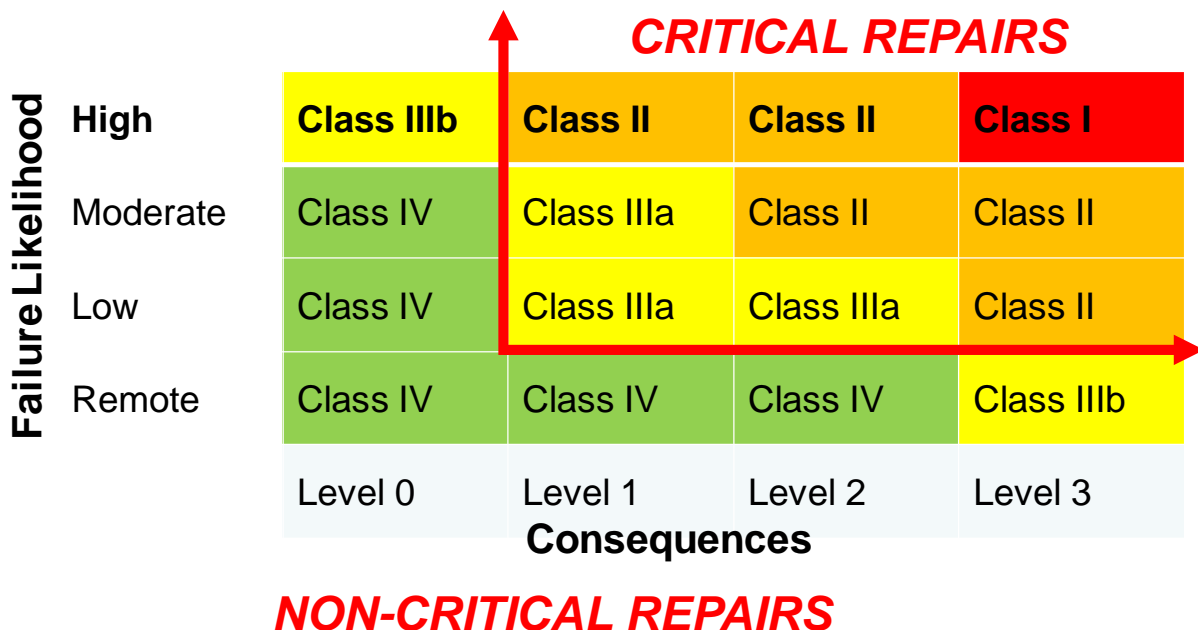
Level 0 – No significant impacts to the effected population. Relatively minor impact to navigation for high-use projects (over 10M tons at ports and 2.5B ton-mile for inland waterways projects).

Level 1 – Although people are at risk, there is only an indirect potential for loss of life. Transportation links are damaged that could disrupt lifeline services; OR Safe navigation for high-use projects (over 10M tons at ports and 2.5B ton-mile for inland waterways projects) is directly impaired.

Level 2 – Significant potential for loss of life and economic damage due to impaired navigation and property damage.

Level 3 – High potential for loss of life and economic damage due to impaired navigation and damage to critical infrastructure.

2011 Flood Damage Risk Matrix



3.2 GENERAL APPROACH/ CRITERIA/ FACTORS CONSIDERED / DATA USED

Following the development and validation of the information provided in the Damage Assessment Reports (DARs), prioritization was given using guidance from the FRAGO 1: USACE Guidance for Emergency Repairs to make a determination of immediate risk reduction measures needed to prepare the system for the next high water event. Prior to the passage of the Consolidated Appropriations Act 2012, PL 112-74 which provided \$1.7 Billion in supplemental funding, the USACE recognized the immediate urgency to self fund 29 projects within the valley at cost of \$170 million. These projects located throughout MVD and in each of the Division's six districts, include Mississippi River Levees (MRL), Channel Improvements (CI), Structures, and Dredging project features.

MVDs OPERATION WATERSHED - RECOVERY

MVD 2011 Critical Flood Repair Projects: Immediate Needs

Feature	Flood Damaged Site	CORPS DISTRICT	STATE	Estimated Cost	FY11-12 Funds Allocated
MRL	BPNM Floodway - Make Safe and Stable	MVM	MO	\$25,000,000	\$25,000,000
CI	Cache-Cairo	MVM	IL	\$26,110,000	\$26,110,000
MRL	City of Cairo, IL	MVM	IL	\$4,600,000	\$4,600,000
MRL	Cairo Parcel 5	MVM	IL	\$10,400,000	\$10,400,000
MRL	Above Cairo Parcel 2A - Relief Wells	MVM	IL	\$6,769,221	\$6,769,221
MRL	Above Cairo Parcel 2 - Slurry Trench	MVM	IL	\$1,900,514	\$1,900,514
MRL	Buck Chute	MVK	MS	\$2,640,000	\$2,640,000
MRL	Albermarle Slide	MVK	MS	\$1,006,000	\$1,006,000
MRL	Duncan Point	MVN	LA	\$8,850,000	\$8,850,000
MRL	Baton Rouge Front	MVN	LA	\$1,762,000	\$1,762,000
CI	Third District	MVN	LA	\$11,400,000	\$11,400,000
Struct	Morganza Control, Piezometers and relief wells	MVN	LA	\$2,460,000	\$2,460,000
CI	Merriwether-Cherokee, top bank and revetment	MVM	TN	\$24,115,000	\$6,800,000
CI	Presidents Island	MVM	TN	\$26,689,000	\$7,300,000
PL84-99	Souris River	MVP	ND	\$5,000,000	\$2,030,000
PL84-99	Scott County Levee Breach	MVS	IL	\$1,716,000	\$1,716,000
Dredge	Deep Draft Projects - MR Baton Rouge to Gulf	MVN	LA	\$10,000,000	\$6,000,000
Dredge	Gulf Intracoastal Waterway, LA	MVN	LA	\$3,000,000	\$3,000,000
FCCE	Tolna Coulee Advance Measures	MVP	ND	\$5,680,250	\$5,680,250
Dredge	Miss River Btwn Mo River and Minneapolis, MN	MVR	MO/IL/IA/WI	\$500,000	\$500,000
Dredge	Miss River, Cairo to Mouth of Missouri	MVS	MO / IL	\$2,000,000	\$2,000,000
CI	Chute of Island 8	MVM	KY	\$9,650,000	\$600,000
CI	Greenville Bend	MVN	LA	\$3,902,000	\$5,500,000
CI	Avondale Bend, RM 108.0	MVN	LA	\$4,700,000	\$4,700,000
CI	Avondale Bend, RM 108.3	MVN	LA	\$4,703,000	\$4,703,000
CI	Port Allen	MVN	LA	\$3,800,000	\$3,800,000
CI	Kempe Bend	MVK	LA / MS	\$10,920,000	\$12,167,000
CI	Bourgere	MVN	LA	\$23,587,000	\$147,800
CI	Richardson Landing Casting Field	MVM	KY	\$10,000,000	\$1,100,000
TOTALS				\$252,859,985	\$170,641,785

Table(8)

Data date: 6 Jan. 2012

- 1. PHYSICAL COMPONENTS/FEATURES.** The following sections provide general descriptions of priority activities which are currently underway as of 30 March 2012 in an effort to manage and mitigate risks caused by 2011 flood damages. The items have been categorized into project features including MRL, CI, Structures, Dredging, and PL 84-99 projects.

- A. Mississippi River Levee Items** - 9 MRL items were identified for a total estimated cost of \$63 Million. 2 located in MS., 2 in LA. 4 in IL., and one project located in MO. In General, the interim measures and repair work of these construction efforts consists of berms and relief wells, slide and slope stabilization, and repairs to address major seepage concerns. Additional site specific information including costs, schedules for completion, and construction updates are available via Corpsmap.

Feature	Flood Damaged Site	CORPS DISTRICT	STATE
MRL	BPNM Floodway - Make Safe and Stable	MVM	MO
MRL	City of Cairo, IL	MVM	IL
MRL	Cairo Parcel 5	MVM	IL
MRL	Above Cairo Parcel 2A - Relief Wells	MVM	IL
MRL	Above Cairo Parcel 2 - Slurry Trench	MVM	IL
MRL	Buck Chute	MVK	MS
MRL	Albermarle Slide	MVK	MS
MRL	Duncan Point	MVN	LA
MRL	Baton Rouge Front	MVN	LA

Table(9)

- B. Channel Improvement Items** - 12 CI items were identified for a total estimated cost of \$159.6 Million. 2 of the projects are located in Ky., 6 in La. 2 in Tn., and one each in IL. and Ms. In General, the repair work of these construction efforts consists of stone dike revetments, Articulated Concrete Mat and stone bank paving. Additional site specific information including costs, schedules for completion, and construction updates see is available via Corpsmap.

Feature	Flood Damaged Site	CORPS DISTRICT	STATE
CI	Cache-Cairo	MVM	IL
CI	Third District	MVN	LA
CI	Merriwether-Cherokee, top bank and revetment	MVM	TN
CI	Presidents Island	MVM	TN
CI	Chute of Island 8	MVM	KY
CI	Greenville Bend	MVN	LA
CI	Avondale Bend, RM 108.0	MVN	LA
CI	Avondale Bend, RM 108.3	MVN	LA
CI	Port Allen	MVN	LA
CI	Kempe Bend	MVK	LA / MS
CI	Bourgere	MVN	LA
CI	Richardson Landing Casting Field	MVM	KY

Table(10)

C. **Dredging Items** - 4 dredging items were identified for a total estimated cost of \$15.5 Million, in various states in MO/IL/IA/WI . In General, the repair work of these construction efforts consists of Mechanical and Hydraulic dredging. Additional site specific information including costs, schedules for completion, and construction updates see is available via Corpsmap

Feature	Flood Damaged Site	CORPS DISTRICT
Dredge	Deep Draft Projects - MR Baton Rouge to Gulf	MVN
Dredge	Gulf Intracoastal Waterway, LA	MVN
Dredge	Miss River Btwn Mo River and Minneapolis, MN	MVR
Dredge	Miss River, Cairo to Mouth of Missouri	MVS

Table(11)

D. **Structures** - 1 Structure items was identified for a total estimated cost of \$2.46 Million. Located in LA., the repair work of this construction effort consists of replacement of Piezometers and Refurbishing Relief Wells at the Morganza Control Structure. Additional site specific information including costs, schedules for completion, and construction updates see is available via Corpsmap.

Feature	Flood Damaged Site	CORPS DISTRICT
Struct	Morganza Control, Piezometers and relief wells	MVN

Table(12)

G. **PL 84-99** - 2 items were identified for a total estimated cost of \$6.7 Million. Located in ND. and IL., the repair work for these construction efforts consist of repairs to levees and pumpstations. Additional site specific information including costs, schedules for completion, and construction updates see is available via Corpsmap.

Feature	Flood Damaged Site	CORPS DISTRICT
PL84-99	Souris River	MVP
PL84-99	Scott County Levee Breach	MVS

Table(13)

SECTION IV - RECOVERY NEEDS (Critical projects)

4.1 GENERAL APPROACH/ CRITERIA/ FACTORS CONSIDERED / DATA USED

Following the development and validation of the information provided in the Damage Assessment Reports (DARs), prioritization was given using guidance from the FRAGO 1: USACE Guidance for Emergency Repairs to make a determination of critical projects needed to prepare the system for the next high water event. Critical need items were identified throughout MVD and in each of the Division's six districts. The passage of the Consolidated Appropriations Act 2012, PL 112-74 provided \$1.7 Billion in supplemental funding for the USACE to construct these critical need projects which include Levees, Channel Improvement, Structures, and Dredging project features.

MVDs OPERATION WATERSHED - RECOVERY	
2011 MVD Critical Flood Repair Projects	
Last Update: 29 MAR 2012	
Critical (FRAGO I-III A) Flood Repair Projects	No. Projects
ST. PAUL DISTRICT	3
Levee	1
Dredge	1
Structures	1
ROCK ISLAND DISTRICT	3
Dredge	1
Structures	2
ST. LOUIS DISTRICT	6
Levee	2
Dredge	4
MEMPHIS DISTRICT	26
Levee	12
Channel Improvements	9
Dredge	4
Structures	1
VICKSBURG DISTRICT	45
Levee	23
Channel Improvements	11
Dredge	10
Structures	1
NEW ORLEANS DISTRICT	35
Levee	12
Channel Improvements	13
Dredge	6
Structures	4
MISSISSIPPI VALLEY DIVISION TOTAL	118

Table(14)

4.2 PHYSICAL COMPONENTS/FEATURES - The following sections provide general descriptions of activities which have been identified in an effort to manage and mitigate risks caused by 2011 flood damages. The items have been categorized into project features including MRL, CI, Structures, and Dredging projects.

- A. Levee Items** - 50 MRL items were identified for a total estimated cost of \$386.4 Million. 11 located in Ms., 19 in La. 2 in KY., 2 in MO., 2 in TN., 1 in ND., and 7 projects located in AR. In general, the repair work of these construction efforts consists of berms and relief wells, slide and slope stabilization, and repairs to address major seepage concerns. Additional site specific information including damages incurred, recommended repairs, estimated costs, and timeline for award is available via Corpsmap.

TYPE	OW-R REPAIR/RESTORE PROJECTS	CORPS	STATE
Levee	Buck Chute	MVK	MS
Levee	Albermarle Slide	MVK	MS
Levee	Francis (Sand Boil - Rosedale)	MVK	MS
Levee	Winterville	MVK	MS
Levee	Lake Bruin	MVK	LA
Levee	Leland Chute AR 2150+00	MVK	AR
Levee	Lake Chicot	MVK	AR
Levee	Henderson	MVK	LA
Levee	Ice Box Hole	MVK	LA
Levee	Tara	MVK	MS
Levee	Avon	MVK	MS
Levee	Leota	MVK	MS
Levee	Ben Lomand	MVK	MS
Levee	Lake Jackson	MVK	MS
Levee	Greenville	MVK	MS
Levee	Lake St. John	MVK	LA
Levee	Davis Landing (Lake St. Joseph)	MVK	LA
Levee	St. Joe	MVK	LA
Levee	Willow Lake	MVK	AR
Levee	Grand Lake	MVK	AR
Levee	Wilson Point	MVK	LA
Levee	AR 2250+00	MVK	AR
Levee	Lake Chicot Pumping Station	MVK	AR

Table(15 a)

4/12/12 MVD FLOOD PREPAREDNESS SUMMARY REPORT

TYPE	OW-R REPAIR/RESTORE PROJECTS	CORPS	STATE
Levee	Above Cairo Parcel 2A - Relief Wells	MVM	IL
Levee	BPNM Floodway - Make Safe/Stable & Restore	MVM	MO
Levee	Above Cairo Parcel 2 - Slurry Trench	MVM	IL
Levee	City of Cairo, IL	MVM	IL
Levee	Cairo Parcel 5	MVM	IL
Levee	Island 8, KY	MVM	KY
Levee	Yazoo MP 89/90 to MP 92/93 (Rena Lara)	MVM	MS
Levee	Nash Levee	MVM	MO
Levee	Gammon Area boils LM 141	MVM	AR
Levee	Dyer County Levee Breach	MVM	TN
Levee	Ensley Levee Breach	MVM	TN
Levee	Cates Levee (Madrid Bend)	MVM	KY
Levee	Duncan Point	MVN	LA
Levee	Baton Rouge Front	MVN	LA
Levee	Jackson Barricks Slope Paving	MVN	LA
Levee	Belle Chase Slope Paving	MVN	LA
Levee	Chalmette Seepage	MVN	LA
Levee	Audubon Seepage	MVN	LA
Levee	Blackhawk Slide	MVN	LA
Levee	Huey P Long Seepage	MVN	LA
Levee	Old River Seepage	MVN	LA
Levee	Algiers Seepage	MVN	LA
Levee	Pt Coupee Seepage	MVN	LA
Levee	Pt Pleasant Seepage	MVN	LA
Levee	Souris River	MVP	ND
Levee	Scott County Levee Breach	MVS	IL
Levee	Len Small Levee Breach	MVS	IL

Table(15 b)

B. CI Items - 33 CI items were identified for a total estimated cost of \$227.6 Million. 4 of the projects are located in AR., 19 in LA., 3 in TN., 3 in MS., 1 in IL., 1 in KY. and 2 in multiple states. In general, the repair work of these construction efforts consists of stone dike revetments, Articulated Concrete Mat and stone bank paving. Additional site specific information including damages incurred, recommended repairs, estimated costs, and timeline for award is available via Corpsmap.

4/12/12 MVD FLOOD PREPAREDNESS SUMMARY REPORT

TYPE	OW-R REPAIR/RESTORE PROJECTS	CORPS	STATE
CI	Walnut Point/ Kentucky Bend	MVK	MS
CI	Milliken Bend	MVK	LA
CI	Cypress Bend	MVK	AR
CI	Gibson	MVK	LA
CI	Morville	MVK	LA
CI	Hardscrabble DS Ext	MVK	LA
CI	Mayersville	MVK	MS
CI	Goodrich Upstream Extension	MVK	LA
CI	Mississippi River Repairs btn 610-320 AHP	MVK	VARIOUS
CI	Big Island	MVK	AR
CI	Kemp Bend	MVK	LA
CI	Cache-Cairo	MVM	IL
CI	Chute of Island 8	MVM	KY
CI	Walnut Bend	MVM	AR
CI	Randolph Dikes	MVM	TN
CI	Merriwether-Cherokee, top bank and revetment	MVM	TN
CI	Mississippi River Repairs btn 956-599 AHP	MVM	VARIOUS
CI	Presidents Island	MVM	TN
CI	Oldtown	MVM	AR
CI	Rescue	MVM	MS
CI	Greenville Bend	MVN	LA
CI	Avondale Bend, RM 108.0	MVN	LA
CI	Avondale Bend, RM 108.3	MVN	LA
CI	Port Allen	MVN	LA
CI	Alliance	MVN	LA
CI	Third District	MVN	LA
CI	Saint Gabriel	MVN	LA
CI	English Turn	MVN	LA
CI	Saint Alice	MVN	LA
CI	Tropical Bend	MVN	LA
CI	Port Sulphur	MVN	LA
CI	Gravolet	MVN	LA
CI	Mississippi River Repairs btn 320-0 AHP	MVN	LA

Table(16)

- C. Dredging Items** - 26 dredging items were identified for a total estimated cost of \$166.4 Million, in various states in throughout the division . In General, the repair work of these construction efforts consists of Mechanical and Hydraulic dredging. Additional site specific information including damages incurred, recommended repairs, estimated costs, and timeline for award is available via Corpsmap.

TYPE	OW-R REPAIR/RESTORE PROJECTS	CORPS	STATE
Dredge	Victoria Bend Dredging	MVK	MS / AR
Dredge	Lake Providence Harbor, LA	MVK	LA
Dredge	Vicksburg Harbor, MS	MVK	MS
Dredge	Greenville Harbor, MS	MVK	MS
Dredge	Yellow Bend Harbor	MVK	AR/MS
Dredge	Madison Parish Port	MVK	LA
Dredge	Rosedale Harbor	MVK	MS/AR
Dredge	Ouachita/Black River, Dredging	MVK	LA
Dredge	Mouth of the Yazoo River, MS	MVK	MS/LA
Dredge	Red River, Dredging	MVK	LA
Dredge	McKellar Lake Dredging	MVM	TN / AR
Dredge	Sycamore Chute Dredging	MVM	TN / AR
Dredge	New Madrid Co. Harbor, MO	MVM	MO
Dredge	Elvis Stahr Harbor, KY	MVM	KY
Dredge	Gulf Intracoastal Waterway, LA	MVN	LA
Dredge	Deep Draft Projects	MVN	LA
Dredge	Deep Draft Projects - MR Baton Rouge to Gulf	MVN	LA
Dredge	Baton Rouge Harbor (Devils Swamp) -	MVN	LA
Dredge	Atchafalaya Basin, Dredging	MVN	LA
Dredge	Old River , Maintenance	MVN	LA
Dredge	Mississippi River (MVP Portion)	MVP	WI / MN
Dredge	Miss River Btwn Mo River and Minneapolis, MN	MVR	MO/IL/IA/
Dredge	Miss River btn MO River & Minneapolis, MN	MVS	MO / IL
Dredge	Miss River, Cairo to Mouth of Missouri	MVS	MO / IL
Dredge	SEMO Port	MVS	MO
Dredge	Kaskaskia Navigation Project Dredging	MVS	IL

Table(17)

D. Structures - 9 Structure items were identified for a total estimated cost of \$49 Million, in various states in throughout the division. The repair work for these construction efforts consists of repair associated with heavy scour and other damages due to operation of various structures during the flood. Additional site specific information including damages incurred, recommended repairs, estimated costs, and timeline for award is available via Corpmap.

TYPE	OW-R REPAIR/RESTORE PROJECTS	CORPS	STATE
Struct	Muddy Bayou - Roller Gate Operators	MVK	MS
Struct	New Madrid Mainline Culvert Failure, MO	MVM	MO
Struct	Morganza Control, Piezometers and relief wells	MVN	LA
Struct	Old River Aux CS	MVN	LA
Struct	Morganza Control, Stilling Basin	MVN	LA
Struct	Morganza Control, Lower Guide Levee	MVN	LA
Struct	Tolna Coulee Advance Measures	MVP	ND
Struct	UMR Locks (16-17-20-21-22) Electrical I Wall	MVR	IL, IA, MO
Struct	UMR LD17 and LD20 Machinery Supports	MVR	IL, IA, MO

Table(18)

SECTION V - RECOVERY NEEDS (Non-Critical projects)

5.1 GENERAL APPROACH/ CRITERIA/ FACTORS CONSIDERED / DATA USED

Following the development and validation of the information provided in the DARs, prioritization was given using guidance from the FRAGO 1: USACE Guidance for Emergency Repairs to make a determination of non-critical projects needed to prepare the system for the next high water event. 302 non-critical need items were identified throughout MVD and in each of the Division's six districts. The passage of the Consolidated Appropriations Act 2012, PL 112-74 provided \$1.7 Billion in supplemental funding for the USACE to construct many of these non-critical need projects which include Levees, Structures, Recreation, Drainage, and Dredging project features. This funding is however insufficient to provide repairs on some 195 of the non-critical Channel Improvement (CI) Projects.

MVDs OPERATION WATERSHED - RECOVERY	
2011 MVD Non-Critical Flood Repair Projects	
Last Update: 29 MAR 2012	
Non-Critical (FRAGO III B - IV) Flood Repair Projects	No. Projects
ST. PAUL DISTRICT	3
Structures	3
ROCK ISLAND DISTRICT	7
Dredge	6
Structures	1
ST. LOUIS DISTRICT	17
Levee	7
Structures	7
Rec. Sites	3
MEMPHIS DISTRICT	96
Levee	3
Channel Improvements	73
Dredge	9
Drainage	11
VICKSBURG DISTRICT	99
Levee	12
Channel Improvements	64
Rec. Sites	23
NEW ORLEANS DISTRICT	80
Levee	2
Channel Improvements	69
Structures	9
MISSISSIPPI VALLEY DIVISION TOTAL	302

Table(19)

5.2 PHYSICAL COMPONENTS/FEATURES - The following sections provide general descriptions of activities which have been identified in an effort to manage and mitigate risks caused by 2011 flood damages. The items have been categorized into project features including Levees, CI, Structures, Recreation, Drainage, and Dredging project features.

- A. Levees** - 24 items were identified for a total estimated cost of \$54.6 Million in various states throughout the division. In General, the repair work of these construction efforts consists of slide and slope stabilization, repairs to address seepage concerns, and repair to facilities damaged because of the flood. Additional site specific information including damages incurred, recommended repairs, estimated costs, and timeline for award is available via Corpsmap.
- B. CI Items** - 206 CI items were identified for a total estimated cost of \$562.6 Million in various states in throughout the division. In General, the repair work of these construction efforts consists of stone dike revetments, Articulated Concrete Mat and stone bank paving. Additional site specific information including damages incurred, recommended repairs, estimated costs, and timeline for award is available via Corpsmap.
- C. Dredging Items** - 15 dredging items were identified for a total estimated cost of \$8.1 Million in various states in throughout the division. In General, the repair work of these construction efforts consists of Mechanical and Hydraulic dredging. Additional site specific information including damages incurred, recommended repairs, estimated costs, and timeline for award is available via Corpsmap.
- D. Structures** - 20 items were identified for a total estimated cost of \$34.1 Million in various states in throughout the division. In General, the repair work associated with these construction efforts consists of repair to various structures due to damages incurred during the 2011 flood. Additional site specific information including damages incurred, recommended repairs, estimated costs, and timeline for award is available via Corpsmap.
- E. Recreation Items** - 26 Items were identified for a total estimated cost of \$4.5 Million in various states in throughout the division. In General, the repair work associated with these construction efforts consists of repair to various recreation sites due to damages incurred during the 2011 flood. Additional site specific information including damages incurred, recommended repairs, estimated costs, and timeline for award is available via Corpsmap.
- F. Drainage Items** - 11 items were identified for a total estimated cost of \$25.6 Million in various states in throughout the division. In General, the repair work associated with these construction efforts consists of repair to various drainage items due to damages incurred during the 2011 flood. Additional site specific information including damages incurred, recommended repairs, estimated costs, and timeline for award is available via Corpsmap.

SECTION VI - RESERVOIRS AND FLOODWAYS

6.1 GENERAL OVERVIEW - Reservoirs and Floodways are key components of the flood risk management system. The following sections provide general descriptions of physical components and operational features of the Reservoirs and floodways which are currently underway in an effort to manage and mitigate risks caused by 2011 flood damages. The items have been categorized into project features and further detailed information can be found in *Appendix(E): Reservoirs And Floodways*

A. RESERVOIRS - Overall the reservoir system is in excellent shape, which combined with their flood-tested water control manuals will serve well to protect the MR&T System for the upcoming flood season. The reservoirs sustained very little damage that would preclude them from operating fully. In addition, the overall weather conditions are very favorable for protecting against another major flood along the MR&T System. Snowpack is well below the long-term average across the Greater Mississippi River Basin. The ground saturation conditions throughout the entire basin are generally below average except for the Ohio River Basin (Figures 18 & 19). The precipitation for the upcoming season shows no significant variance from an average year, with the exception of a wet Ohio River Basin (Figure 16). In fact, the National Weather Service is forecasting drought-type conditions on the upper portions of the Upper Mississippi River Basin and drought-type conditions forming on the Upper Missouri River Basin (Figure 17). Reservoir system storage throughout the Greater Mississippi River Basin is near optimal. (See Figures 12-15). Figures and tables provided below refer to storage capacities in Millions of Acre-Feet (MAF).

B. FLOODWAYS - The floodways are also ready to protect the MR&T System, but the conditions of the floodways are less than optimal. The 2011 flood event has exposed vulnerabilities to the floodways. Birds Point/New Madrid Floodway (BPNM) has been temporarily restored to activate at a stage at Cairo of 55 ft. which is 6 ft below where the floodway would typically be activated. 55 ft. at Cairo is estimated to be less than a 25 year flood event. The other two floodways impacted by the 2011 flood event should be able to be operated for the design flood with the present interim operating plan.

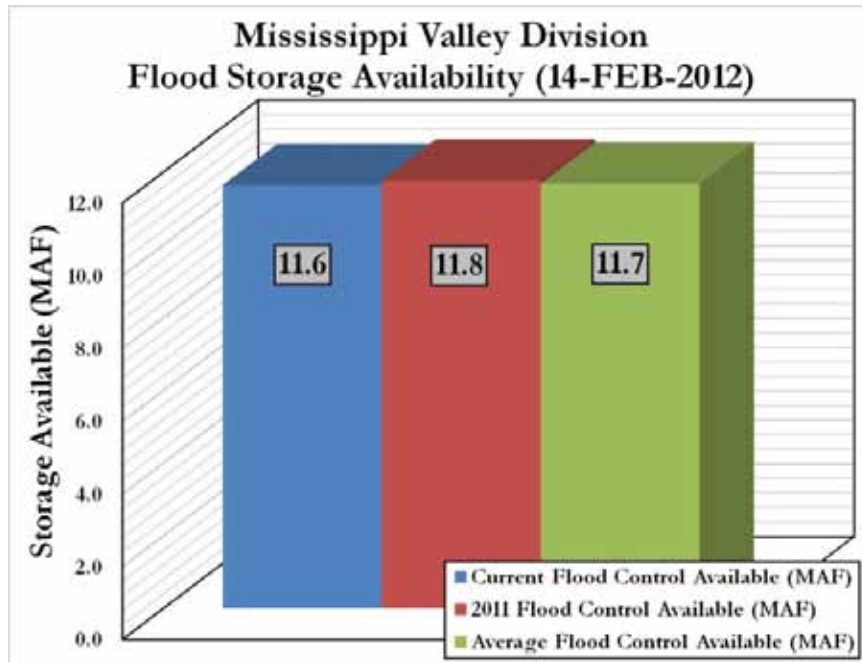
Hydrologic conditions are favorable; however the decreased protection of the BPNM floodway has heightened the potential for damages in the floodway for moderate flood events. Given the above normal soil moisture and precipitation forecast for the Ohio River Basin, it is likely that any significant flooding is likely to originate in the Ohio River Basin. Therefore close monitoring of the Ohio River System is warranted.

Mississippi Valley Division (MVD)

Table (20): Mississippi Valley Division Storage Availability.

District	Current Storage Available (MAF) (14-FEB-2012)	Storage Available Last Year (MAF) (14-FEB-2011)	Average Storage Available (MAF) (14-FEB)
St. Paul (MVP)	1.4	1.3	1.4
Rock Island (MVR)	2.4	2.4	2.4
St. Louis (MVS)	2.8	2.9	2.8
Vicksburg (MVK)	5.1	5.1	-
Division Total	11.6	11.8	11.7

Figure12: Mississippi Valley Division Storage Availability.



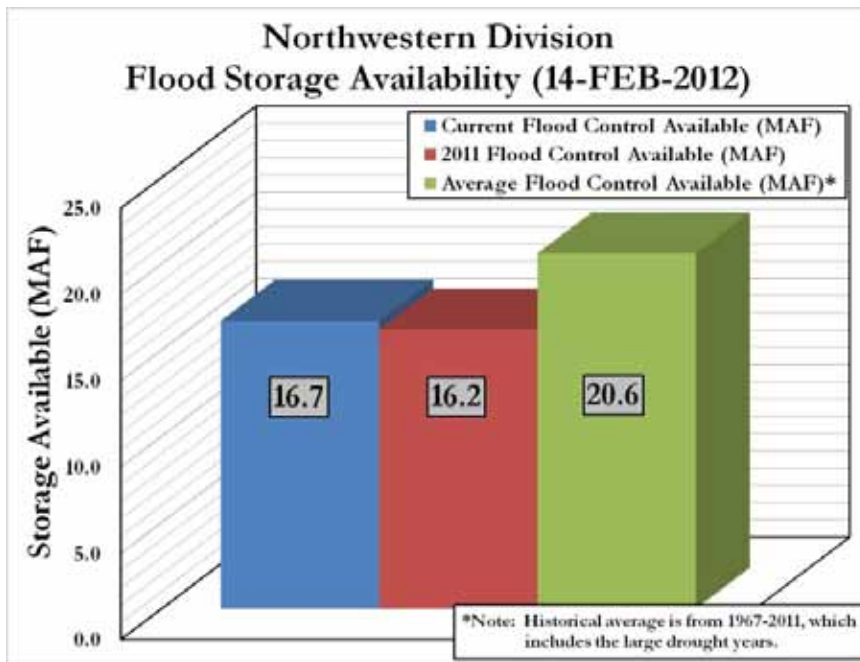
Northwestern Division (NWD)

Table 21: Northwestern Division Storage Availability.

	Current Storage Available (MAF) (14-FEB-2012)	Storage Available Last Year (MAF) (14-FEB-2011)	Average Storage Available (MAF) (14-FEB)
Mainstem Missouri	16.7	16.2	20.6 ¹

1 – Note: the average is from 1967-2011, which includes the significant drought years.

Figure 13: Northwestern Division Storage Availability.



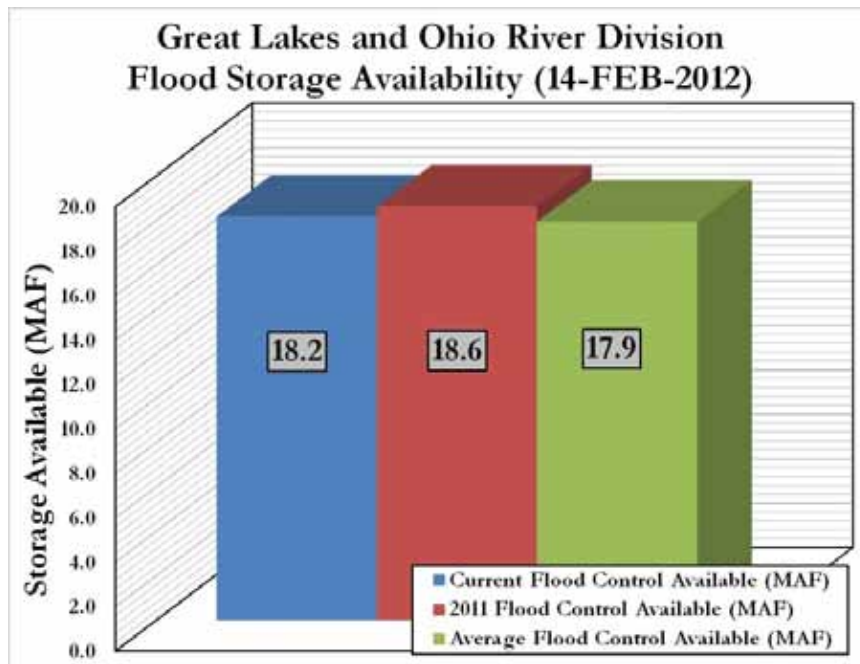
Great Lakes and Ohio River Division

Table 22: Great Lakes and Ohio River Division Storage Availability.

	Current Storage Available (MAF) (14-FEB-2012)	Storage Available Last Year (MAF) (14-FEB-2011)	Average Storage Available (MAF) (14-FEB)
System Storage	18.2 ¹	18.6 ¹	17.9 ¹

1 – Note: the average is from 2008-2011, which includes the drawdowns at reservoirs that are DSAC 1's.

Figure 14: Great Lakes and Ohio River Division Storage Availability.

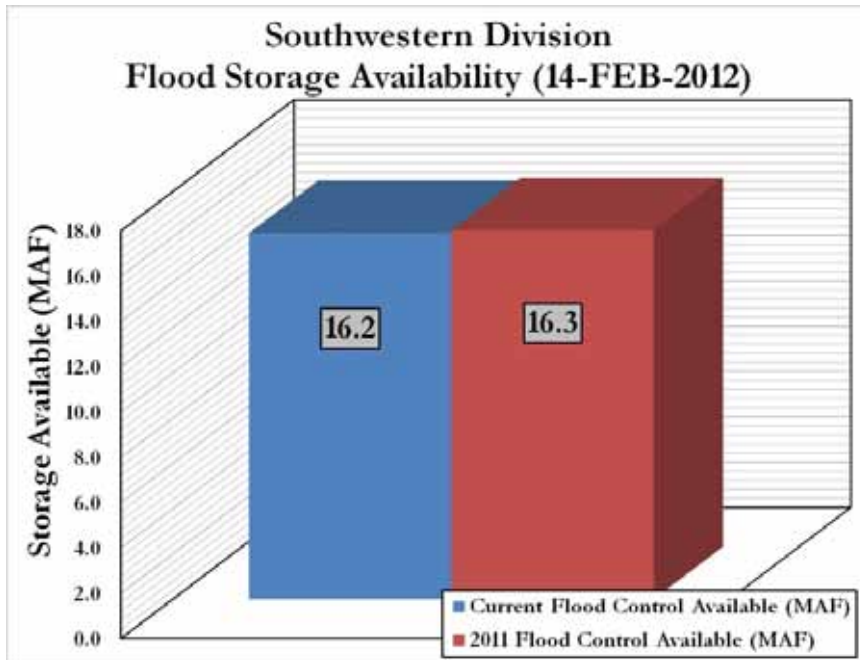


Southwestern Division

Table 23: Southwestern Division Storage Availability.

	Current Storage Available (MAF) (14-FEB-2012)	Storage Available Last Year (MAF) (14-FEB-2011)	Average Storage Available (MAF) (14-FEB)
System Storage	16.2	16.3	-

Figure 15: Southwestern Division Storage Availability.



SECTION VII – NWS SPRING FLOOD OUTLOOK (Issued Mar 15, 2012)

7.1 General Overview

An above normal risk for spring flooding exists over the Lower Ohio Valley and parts of the Central Gulf Coast in Southern Louisiana and Mississippi. Above normal precipitation this winter in parts of the Ohio River Valley has caused high soil moisture and above-normal river levels.

The forecast through April calls for above-normal precipitation in the Ohio River Valley which could lead to flooding. For the first time in 4 years, the Northern Plains are not expecting major to record snowmelt flooding. Most of the Upper Mississippi and Middle to Upper Missouri River Basins have a below normal risk of flooding. The nation's farthest northern basins of North Dakota and Montana including the Red River of the North, Souris River and the Missouri headwater have a normal risk of flooding, and will not be significantly impacted by snowpack this year.

All other areas in this map have a normal risk of spring flooding. In this category areas prone to spring flooding are expected to experience that normal level of flooding. For example, the lower Missouri valley commonly experience minor flooding each spring with little impacts. Heavy rainfall at any time can lead to river and/or flash flooding, even in areas where overall risk is considered normal to below normal.

Uncertainty associated with this flood outlook for the continental U.S. is greater than in previous years given the primary driver for this outlook is rainfall rather than snowmelt.

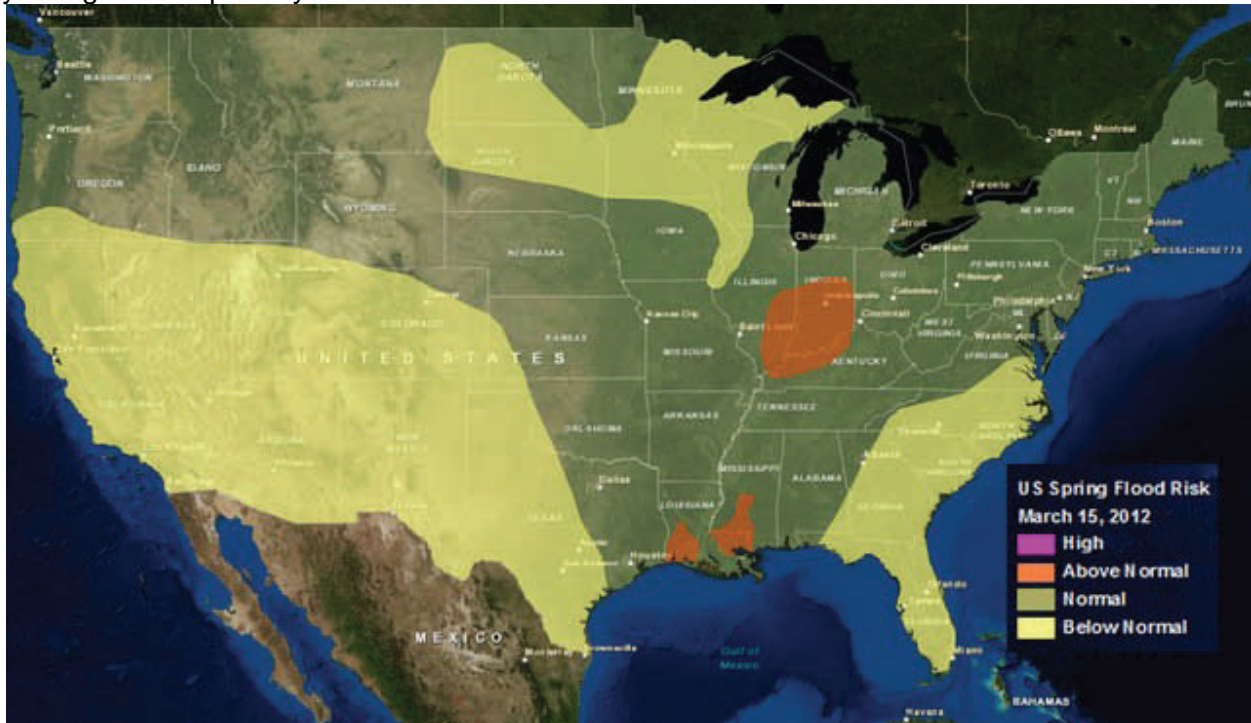


Figure 16. US Spring Flood Risk (March 15, 2012)

7.2 Heavy Rainfall and Flooding

The information presented in this section focuses on spring flood potential, using evaluation methods analyzed on the scale of weeks to months, not days. Heavy rainfall at any time can lead to flooding, even in areas where overall risk is considered normal to below normal. Rainfall intensity and location cannot be accurately forecasted beyond a few days in the future, therefore flood risk in these areas can change rapidly.

Stay current with flood risk in your area with the latest official watches and warnings at weather.gov. For detailed hydrologic conditions and forecasts, go to www.water.weather.gov.

7.3 Above Normal Flood Risk Areas

Lower Ohio Valley

Soil moisture is above normal through the Lower Ohio Valley in response to above normal precipitation (125-200%) over the last six months. April forecasts call for above average precipitation over the Ohio Valley to continue into the spring.

Central Gulf Coast

Based on current conditions and extended range precipitation forecasts, an above normal flood potential exists along the Central Gulf Coast in Southern Louisiana and Mississippi.

Streamflows in those areas are above normal in response to a series of heavy rain events over the last 30 to 45 days.

Citizens are encouraged to remain up-to-date on flood conditions by monitoring the latest forecasts from your local National Weather Service office.

7.4 Normal Flood Risk Areas

Red River of the North, Souris, and Central Plains

The Red River of the North, the Souris River Basin, and most of the Missouri River Basin (Northeast North Dakota, Northwest Minnesota, Montana, Wyoming, Northeast Colorado, Southern South Dakota, Nebraska, Northern Kansas, Iowa and Missouri) have a normal risk of flooding.

The spring flood risk in these areas is largely driven by snowmelt flooding. With the below to near-normal winter snowfall this is the first time in 4 years these areas are not preparing for major to record snowmelt flooding. The Northern Rockies of the Missouri Basin contain near the historical normal amount of snow water content for this point in winter. The Souris and Red River basins contain about one-third the amount of water in the snow as last year, ranking this season in the lower half of the last 60 years.

7.5 Below Normal Flood Risk Areas

The following regions are outlined with a low risk of long range spring flood risk, and many are experiencing drought. It is important to remember that intense precipitation at any location, regardless of past conditions, can rapidly change risk, often on the scale of hours. Deadly localized flooding during severe weather outbreaks is possible, and common, regardless of long term risk.

Always stay current with any Watches and Warnings from your local NWS Forecast Office, and follow the advice of your local emergency management officials should flash flooding effect your area. Please visit drought.gov for detailed outlooks, impacts and information related to your area.

Upper Mississippi and Upper Missouri Valleys

In stark contrast to water year 2011, precipitation this water year (since Oct 1, 2011) has been less than 50% of the normal across the Upper Mississippi and Upper Missouri Valleys.

Snowpack in these regions is well below levels needed to warrant large scale flooding, and will not play a role in this year's spring flooding across the northern US. The High Plains of the Missouri Basin contain little to no snow, in stark contrast to last year when the high plains were blanketed with a wet snowpack at this time.

7.1 General Overview

7.2 Heavy Rainfall and Flooding

7.3 Above Normal Flood Risk Areas

7.4 Normal Flood Risk Areas

7.5 Below Normal Flood Risk Areas

Figure 17: 3-Month Precipitation Outlook.

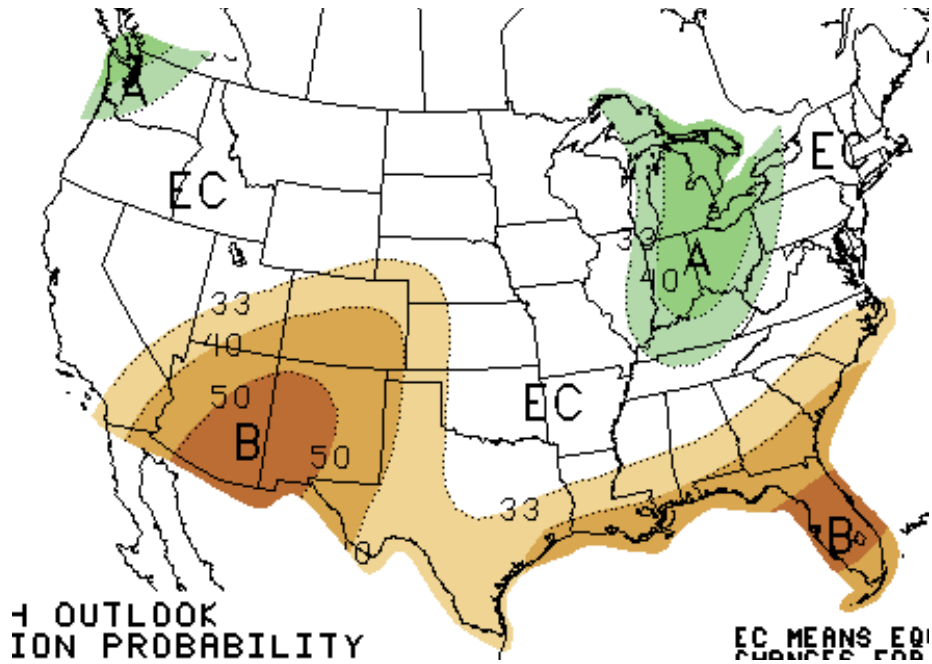


Figure 18: 3-Month Drought Outlook.

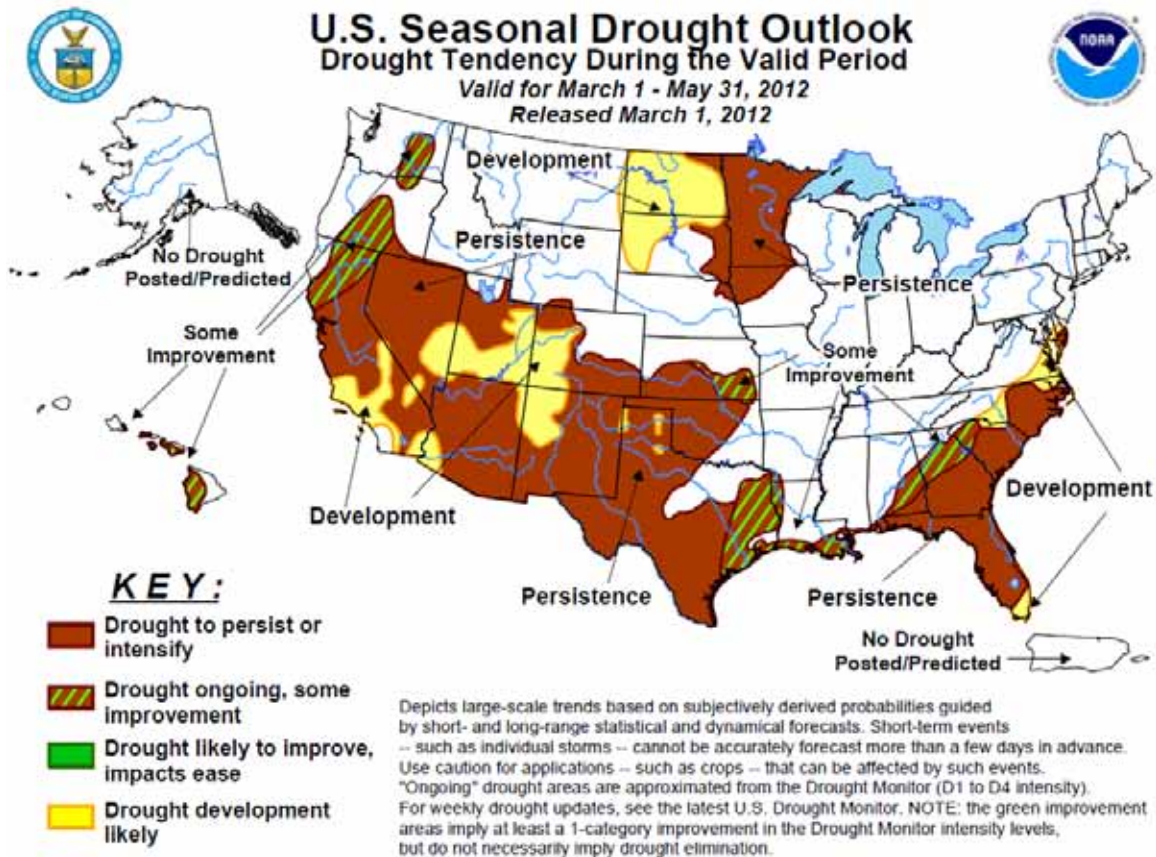


Figure 19: February Soil Moisture.

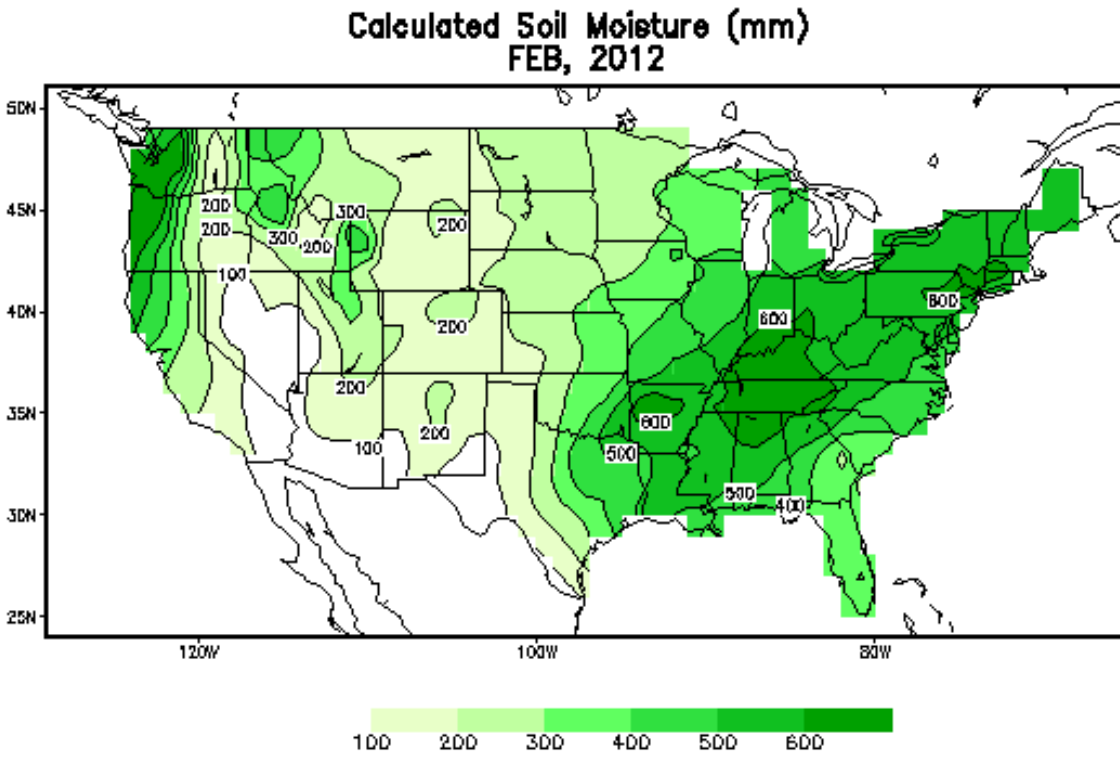
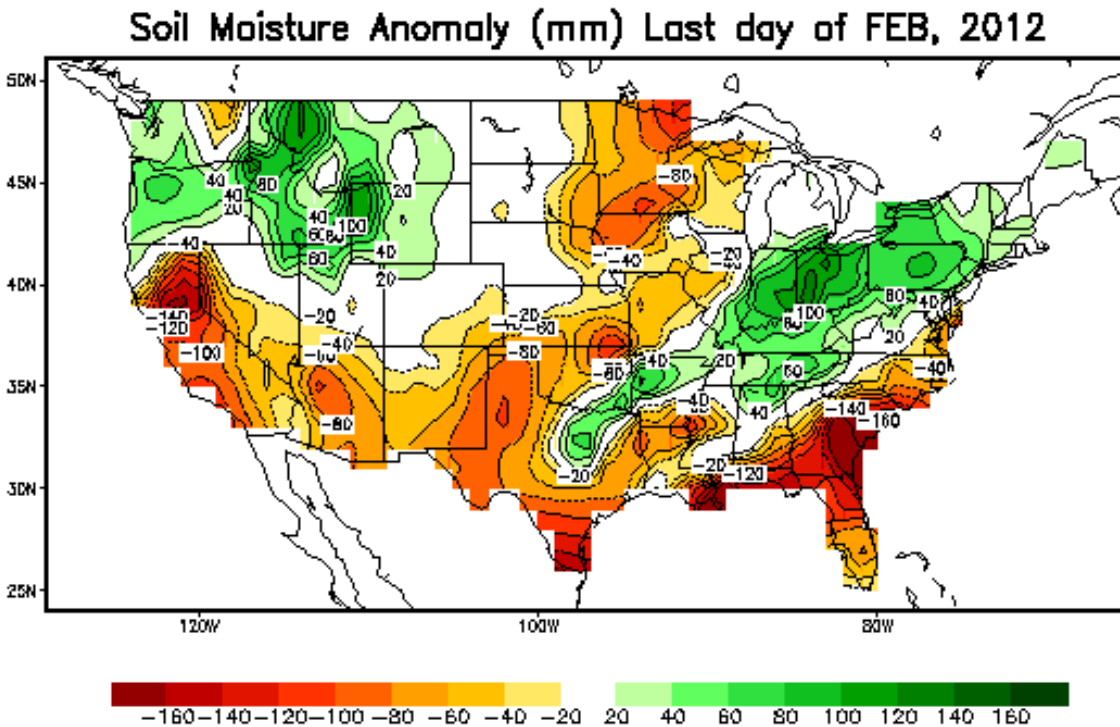


Figure 20: February Soil Moisture Departure from Normal.



SECTION VIII - RISK COMMUNICATION PLAN AND PRODUCTS

8.1 GENERAL OVERVIEW - The risk communication plan provides structure and guidance to discuss internally and with partners, stakeholders, and the public the damages caused by the 2011 flooding of the Mississippi River Valley, and the associated risks to the watershed. Documents have been produced to communicate the Corps efforts to manage, mitigate and communicate flood risks throughout the valley with, its stakeholders, the media, and the public. The public will be given the opportunity to view and understand our efforts prior to and during the upcoming flood season through the use of regional tools and products.

The major components of the risk communication strategy include principles of open and transparent communication guided by the following goal and objectives.

GOALS & OBJECTIVES:

- Discuss with sponsors, stakeholders and the public the risks associated with the system and the shared responsibility for risk management;
- Improve understanding of risk;
- Drive action to mitigate or reduce risk;
- Build the foundation for a shared responsibility approach to planning non-routine risk reduction measures

8.2 COMMUNICATION TOOLS AND PRODUCTS:

1. The following products were generated and updated through this effort to improve partner's understanding of risks within the MR&T and coordinate how risks are being addressed.

Product	Purpose	Updates
<i>Project Risk Information Paper</i>	Provides general background on flood damages, potential consequences, repair options and tentative schedule. This information is available through CorpsMap.	Annually by district
<i>Sub-system Risk Document</i>	Provides details on the elevated risks associated with a levee sub-system. This 3-4 page document includes a map, table and text discussing and comparing risks of all damaged locations in the sub-system and identifies key risk areas. This information can be requested through USACE District offices.	Biannually by MMC

4/12/12 MVD FLOOD PREPAREDNESS SUMMARY REPORT

<i>Project Risk Management Paper</i>	Describes how risks at damaged locations are being addressed through construction, interim measures, and flood fight preparation. This information is available through CorpsMap.	Biannually by District
<i>Project Construction Fact Sheet</i>	Provides monthly status of ongoing construction activity, key milestones, % completion, project challenges, and funding. This information is available through CorpsMap.	Monthly by District
<i>MR&T Estimated Level of Protection Map</i>	Displays the level of protection currently provided by the MR&T system segments along the Mississippi River. The level of protection is represented by the size of the flood the system can currently pass without significant flood fight efforts. This map and supporting information is still under development. Requests for this information may be made through USACE District offices.	Biannually by MMC office
<i>Local Inundation Maps</i>	Process to generate maps displaying time, depth, and potential consequences of inundation have been standardized by all USACE offices within the Mississippi Valley Division. Requests for hard copy inundation maps or related information may be made through USACE District offices.	Maps are generated for high risk areas and as needed based on flood conditions.

2. CorpsMap, the USACE nationwide GIS application, is the single authoritative source for geospatial data assets. Up until recent months CorpsMap was an exclusive internal Corps system. The regional GIS cadre has worked to establish one of the first External CorpsMap sites, http://geo.usace.army.mil/egis/cm2.cm26.map?map=MVD_OWS with many capabilities specific to our needs for Regional Flood Risk Management. CorpsMap has been used to communicate information about the critical damage sites in the Mississippi River Valley. The tool allows our customers, stakeholders and the public to view the damages on a map, zoom in for location and item details (dredging, levee, channel improvement, or structure items), and query to obtain information papers, risk management papers, and fact sheets on each site.

3. Websites – A new MVD regional flood risk management website has been established as a primary conduit for external communication and access to Flood Season Preparedness and Regional Flood Risk Management (RFRM) documents and information:
www.mvr.usace.army.mil/PublicAffairsOffice/frmp/rfrmp.htm .

From the main RFRM page, visitors can access and gain more information from the following links:


- a) Flood Season Preparedness: CorpsMap links, CorpsMap User's Guide, Workshop Materials, Press Releases, Regional Risk Maps, and District Emergency Management pages
- b) Interagency Recovery Task Force (IRTF): Meeting Materials
- c) District web pages
- d) Social Media Links

FOLLOW-UP ACTIVITIES: As products and information is released, Public Affairs Officers (PAOs) will identify lessons learned, any additional products needed, and feedback which will be provided to MVD. Social media pages will continue to be monitored to ensure immediate feedback. Webpages will be monitored monthly to continue the consistencies with what is updated in CorpsMap and provide the latest press releases, talking points, and other pertinent information. Information gained will be incorporated into the MR&T Post Flood Report Communication section.

EXAMPLE PRODUCTS: The following pages provide examples of products designed to effectively communicate risk information to partners and stakeholders and how elevated system risks are being addressed through construction, interim measures, flood fight preparedness.

Information Papers provide details on risks and potential consequences at damaged system locations. These regionally consistent documents will be served and quickly accessible through the public CorpsMap site.

Last Update: 31 August 2011



**US Army Corps
of Engineers**
Vicksburg District

Information Paper

Buck Chute

OPERATION WATERSHED RECOVERY – CRITICAL REPAIR SITES

Contacts

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Scott D. Whitney, MVD Regional Flood Risk Manager
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scott.d.whitney@usace.army.mil

OVERVIEW

DISTRICT: Vicksburg District
TYPE: Boils and Seepage
RM: RM 459.6 (110+00 BEL)
FRAGO CLASS: 1 – High Potential for Loss of Life
RISK: 3,996 residents, \$188.5M infrastructure
REPAIR: Berm, 30 Relief Wells, and 12 Horiz. drains
EST. REPAIR COST: \$2,640,000

Damage Assessment

In early 2010, MVK was notified of multiple boils in the project area. In early summer of 2010, the boils were sandbagged as River Levels reached flood stage and the flow of the boils increased. In February, 2011, when conditions in the project area were dry, two of the largest boils were pumped, revealing voids at boil sources as wide as 20 ft and as deep as 10 ft. The voids revealed no obvious "pipes" that continued downward or laterally from the void bottom. As River levels continued to rise and approach flood stages in March 2011, the boil area voids were backfilled with sand material, covered with a nonwoven filter fabric, and either sandbagged or earthen dams were constructed around them. In May 2011, an emergency berm was constructed over the area which encompassed the worst known boil areas. The top of the berm was constructed to approximate elevation 85.0 ft. Because of the high exit gradients for the predicted flood stages for the known boil areas, and the consequences of failure at this location, it was decided to flood the entire project site by raising water levels in Eagle Lake to approximate elevation 90.0 ft through the use of Muddy Bayou Control Structure. In order to reduce the risk of failure without raising water levels in Eagle Lake, remediation is recommended prior to the next high water season.

Risk and Consequence

If the East Bank Mississippi River Levee System were to fail at the Buck Chute site, the population at risk would be 3,996. The value of the non-residential structures is \$31,141,000, and the value of the 1,436 residential structures is \$157,396,000.




Figure 1. Aerial view of Buck Chute during 2011 flood fight.

Critical Repairs

The reset recommendation for this site includes a 1700 ft reach of earthen berm 200 to 240 ft wide and relief wells from Station 106+50 to 123+50. A 400 ft section of the berm includes a drainage and collection feature, including horizontal drains and a pervious sand layer. The item includes 30 relief wells and 12 horizontal drains. In-place berm volumes will be approximately 13,600 cubic yards of sand for the drainage feature and 150,000 cubic yards for the remaining berm.

Special Considerations

The site is covered under the 1998 MRL SEIS, as item 458-L, and covers multiple work items. The SEIS does not cover planned relief wells for this site; however, an EA was prepared to cover these wells and a FONSI signed. Coordination under Section 9 of the Endangered Species Act has been completed. The 404 water quality permit for the project has been obtained, and all project impacts have been mitigated for, as this site is part of the existing MRL mitigation program. This segment of EBMRL is not currently certified, but this fix, along with other work MVK currently has planned in the area, will allow certification of the levee system. The Board of Mississippi Levee Commissioners has acquired the necessary ROW for the project.

Schedule

Bids solicited - 10 Aug 2011
Contract Awarded - 30 Aug 2011
Anticipated contract duration 120 days. Scheduled completion in January 2012.

Acquisition Strategy

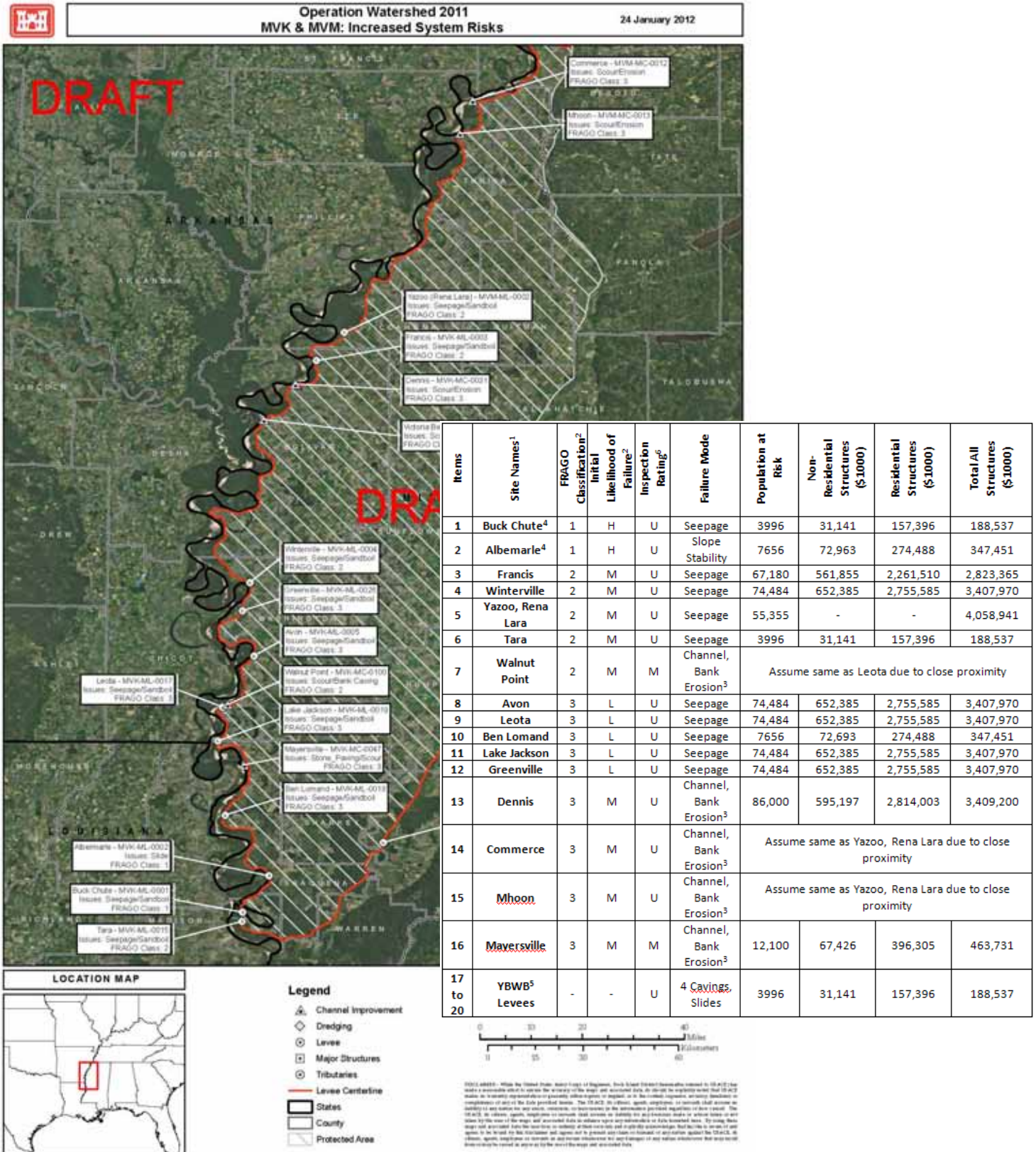
Unrestricted competitive bid awarded 30 Aug 2011 to Phylway Construction, LLC for \$3,100,225.00. This site was combined with No. 8 site, Albermarle.

FOUO


PRE-DECISIONAL

4/12/12 MVD FLOOD PREPAREDNESS SUMMARY REPORT

Sub-system Risk Document provide details on the elevated risks associated with a levee sub-system. The 3-4 page document includes a map, table and text discussing and comparing risks of all damaged locations in the sub-system.



Flood Risk Management Papers describe how risks at damaged locations are being addresses through construction, interim measures, and flood fight preparation. It is formatted into one easy to digest page describing the status of risk management efforts prior to the upcoming flood season. Distributed through CorpsMap, it will also identify mobilization activation stages and have a link to the NWS site for current stage forecasts.



**US Army Corps
of Engineers**

OPERATION WATERSHED UPDATE

2012 Interim Measures / Flood Fight Preparations

Francis

Feb. 06, 2012


Greenwood Project Office –Rosedale Sector

Vicksburg District

Risk and Consequences

Sand boils and seepage damage from 2011 flooding left this site in a condition of high risk. During the post-flood damage assessment phase, this site was listed as a FRAGO Class 2 priorities for significant potential for loss of life and significant economic damage.

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.




Risk Management Status

Flood fight measures taken place last spring will remain in place until further construction/interim measures can be implemented. Plans and specifications are currently underway with an expected Request to Advertise in June of 2012. Award date for construction contract expected in August of 2012.

Construction/Interim Measures

Remediation consist of approximately 2,200 feet of Relief Wells from Sta. 146+00 - 156+00 (Francis) and Sta. 3742+00 - 3754+00 (Above Greenville - Winterville).



Flood Fight Preparations

Mobilization of District forces to assist the Levee Board will take place in two successive phases. All flood fight roster positions have been filled and training on both traditional and innovative flood fight techniques will be conducted by 1 Apr. A meeting with the Levee Board and USACE will be conducted on 24 Feb in preparation for the upcoming flood season. Maintenance has been performed on pumps and flood fight supply inventories including sandbags and Hescos have been replenished. A request has been made to the Engineering Research and Development Center (ERDC) regarding availability to provide smartphones, utilized during last year's flood event, which use the phone's GPS, camera, and data capabilities to collect field data and automatically upload it to a server database. The sand bag rings and earthen dike placed at this site during last year's flood are still in place. These features were constructed to create a water berm to mitigate several large and small sand boils. The Levee Board has arrangements with the landowner to leave these features in place until permanent measures can be designed and constructed. The Levee Board has constructed a fence around the area to keep livestock out of the area and is keeping the grass mowed. Staging areas have been identified on site for stockpiling materials to mitigate a larger area in the event sand boils arise outside the current measures in place. Sources for materials have been identified in close proximity to the site should such need arise.

Contacts

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Area Engineer: Lamar Jenkins (662) 455-0244
lamar.jenkins@usace.army.mil

The Greenwood Area Office is located at 100 Moore St.,
Greenwood, MS 38930




Flood Fight Phase Mobilizations

Information stated below is based on the Arkansas City Gage station

Flood Stage:	37 ft.
Phase I Mobilization:	38 ft.
Phase II Mobilization:	44 ft.

[Link to NWS site for current stage forecast conditions](#)

Construction Fact Sheets Provide monthly status of ongoing construction activity, key milestones, % completion, project challenges, and funding.

 US Army Corps of Engineers	OPERATION WATERSHED UPDATE Buck Chute - Albemarle (458-L/465-L) Mississippi	Mar. 16, 2012										
Greenwood Project Office		Vicksburg District										
Schedule	<table border="0"> <tr> <td>Actual Contract Award:</td> <td>Aug. 30, 2011</td> </tr> <tr> <td>Actual Notice to Proceed:</td> <td>Sep. 14, 2011</td> </tr> <tr> <td>Orig. required const. completion:</td> <td>Jan. 12, 2012</td> </tr> <tr> <td>Current required const. completion:</td> <td>*Apr. 20, 2012</td> </tr> <tr> <td>Current scheduled const. completion:</td> <td>*Apr. 20, 2012</td> </tr> </table>	Actual Contract Award:	Aug. 30, 2011	Actual Notice to Proceed:	Sep. 14, 2011	Orig. required const. completion:	Jan. 12, 2012	Current required const. completion:	*Apr. 20, 2012	Current scheduled const. completion:	*Apr. 20, 2012	
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Current scheduled const. completion:	*Apr. 20, 2012											
*Completion date revised due to weather and river conditions.												
Progress	<table border="0"> <tr> <td>Actual Progress:</td> <td style="text-align: right;">81%</td> </tr> <tr> <td>Scheduled Progress:</td> <td style="text-align: right;">81%</td> </tr> <tr> <td>Progress Payments to Date:</td> <td style="text-align: right;">\$2,504,830.01</td> </tr> </table>	Actual Progress:	81%	Scheduled Progress:	81%	Progress Payments to Date:	\$2,504,830.01					
Actual Progress:	81%											
Scheduled Progress:	81%											
Progress Payments to Date:	\$2,504,830.01											
Funding		Image 1 — Contractor placing berm material at Buck Chute.										
<table border="0"> <tr> <td>Award Contract:</td> <td style="text-align: right;">\$3,100,225.00</td> </tr> <tr> <td>Modifications:</td> <td style="text-align: right;">\$15,000.00</td> </tr> <tr> <td>Estimated Contract:</td> <td style="text-align: right;">\$3,115,225.00</td> </tr> </table>		Award Contract:	\$3,100,225.00	Modifications:	\$15,000.00	Estimated Contract:	\$3,115,225.00					
Award Contract:	\$3,100,225.00											
Modifications:	\$15,000.00											
Estimated Contract:	\$3,115,225.00											
Scope of work												
<p>The work consists of construction items 458-L and 465-L landside seepage berms and installation of 30 relief wells at Magna Vista and Brunswick, Mississippi. Principle features of the work include, but are not limited to, degrade existing berms, degrade existing stone dikes, stone dike construction, semicompacted and uncompacted berm embankment, relief well construction, horizontal collector drains, excavation, levee surfacing, new turf establishment, erosion control, corrugated metal pipe, storm water pollution prevention, and environmental Protection.</p>												
Current Status												
<p>All relief wells, horizontal drains, sand fill and earth embankments have been completed at Buck Chute. Some vegetation has come up at Buck Chute in the areas where seeding has been completed. Rainfall and high river stages have contributed to a saturated haul road and borrow area that is preventing further work at the Albemarle site. Buck Chute is essentially complete except for turving and concrete pads around wells. Wells have already functioned during the recent high water. Contractor is still on site and will haul berm material when conditions are favorable. Both sites are stable and need no contingency plan.</p>												

Project Manager: Kent Parrish • Area Engineer: Lamar Jenkins • Project Engineer: Jason Overstreet
 Questions? Contact Lamar Jenkins: 662.455.0244 (project office), 662.466.0040 (mobile), or lamar.jenkins@usace.army.mil
 The Greenwood Area Office is located at 100 Moore St., Greenwood, MS 38930