

A background image showing a flooded street in a town. In the distance, there is a building with a clock tower and a Coca-Cola sign on a building to the right. The water is calm, reflecting the sky and the buildings.

# Hancock County Flood Risk Reduction Program Update

April 25, 2017

# Introductions

Scott Peyton: Stantec Project Manager

Steve Wilson: MWCD Project Manager

Mark Gazarek, Brian Robertson, & Timothy Bechtol:  
Hancock County Commissioners

Township Trustees

Adam Hoff: Stantec Assistant Project Manager

A map of the state of Ohio with its county boundaries outlined in brown. The counties in the northwest corner of the state are shaded in light blue, representing the Maumee Watershed Conservancy District. The Great Lakes are visible to the north and east of the highlighted area.

# Maumee Watershed Conservancy District

- Represents 15 Counties in Northwest Ohio
- Political subdivision of the State
- Oversees water management, including flood risk reduction
- Established under Ohio Revised Code Chapter 6101

# Agenda

Project Overview

Stantec's Work

- Gap Analysis
- Project Refinements
- Project Alternatives
- Benefits & Impacts Summary
- Opinions of Probable Cost
- Stantec's Recommendation

Path Forward

Questions



Blanchard St. Bridge

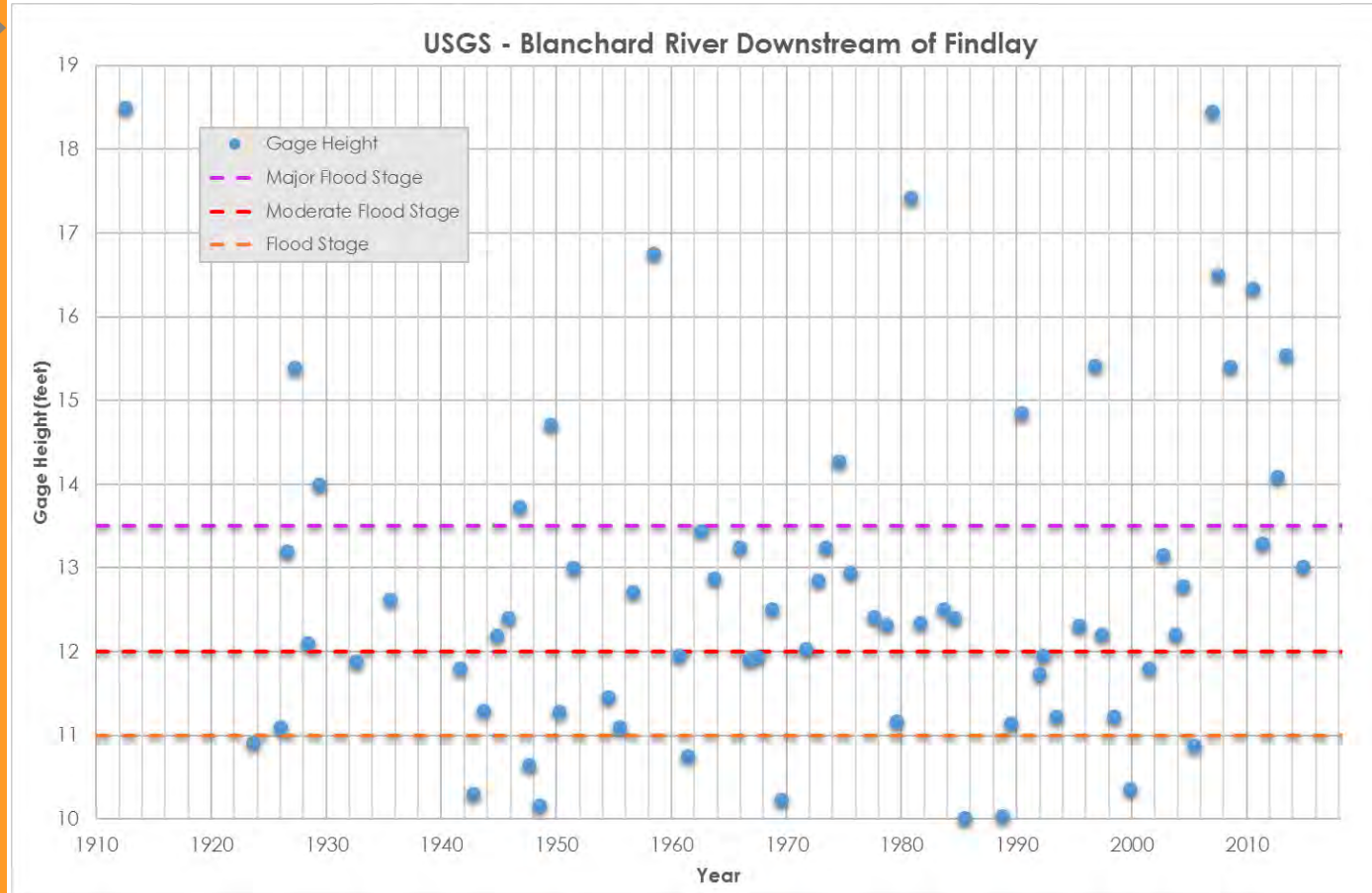
# Project Overview





# Our Challenge

Larger floods  
have occurred  
more frequently



# August 2015 Recommended Plan

## USACE Buffalo District



# Western Diversion of Eagle Creek

## USACE Opinion of Probable Cost

Eagle Creek Flows

25-year 3,000 cfs

50-year 3,500 cfs

100-year 4,050 cfs

500-year 5,400 cfs



25-Year Channel Sizing Estimates		
01	Lands & Damages	\$ 6,580,000
02	Relocations	\$ 14,590,000
06	Fish & Wildlife	\$ 1,758,000
08	Roads, Railroads Bridges	\$ 2,657,000
09	Channels and Canals	\$ 34,587,000
15	Floodway Control & Diversion Structure	\$ 8,708,000
18	Cultural Resource Preservation	\$ 692,000
30	Planning, Engineering & Design	\$ 8,182,000
31	Construction Management	\$ 3,149,000
	First Costs	\$ 80,903,000
	Interest during construction	\$ 5,671,000
	<b>Total Cost</b>	<b>\$ 86,574,000</b>

About \$20 million allocated for new bridges and roads  
Includes 27.5% Contingency



## Preliminary Scope

### Complete

- Analyze the USACE Feasibility Report to understand their findings and recommend changes to the Corps' Plan
- Perform surveys and geotechnical explorations
- Determine preferred channel alignment

### ***Not yet Authorized***

- *Prepare property acquisition plan and legal descriptions*
- *Prepare final design and construction plans*
- *Prepare necessary documents to secure regulatory permits*

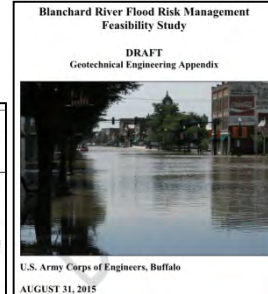
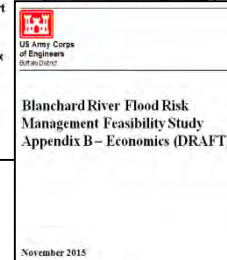
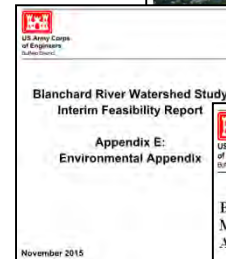
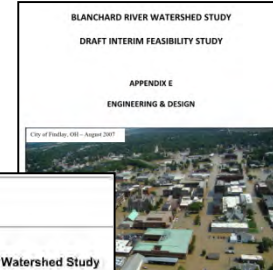
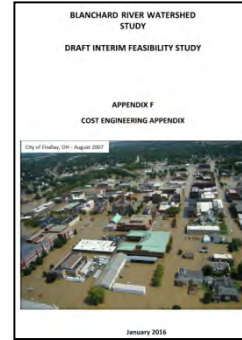
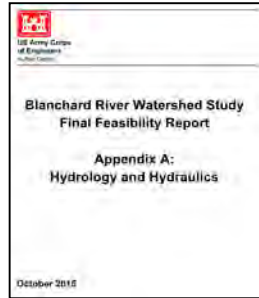
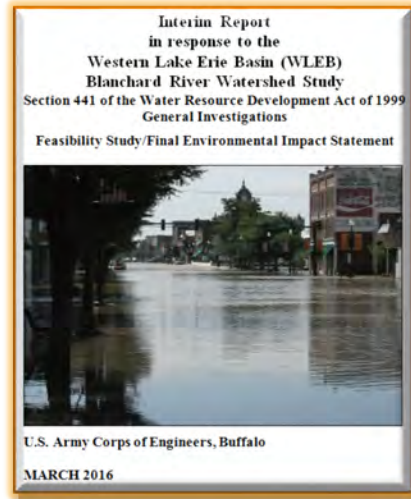
# Gap Analysis

## Data Reviewed

- Reports
- Digital Files: USACE
- Public Data: USGS, ODOT, others

## Project Components

- Hydrology & Hydraulics
- Geotechnical
- Transportation
- Cost
- Economics
- Design
- Environmental



## 4 Key Gaps

### Design and Engineering

Federally driven project objective

### Cost and Economics

BCR less than 1.0

### Hydrology & Hydraulics (H&H)

Risk based evaluation needed

Conflicting results between USACE  
model and report

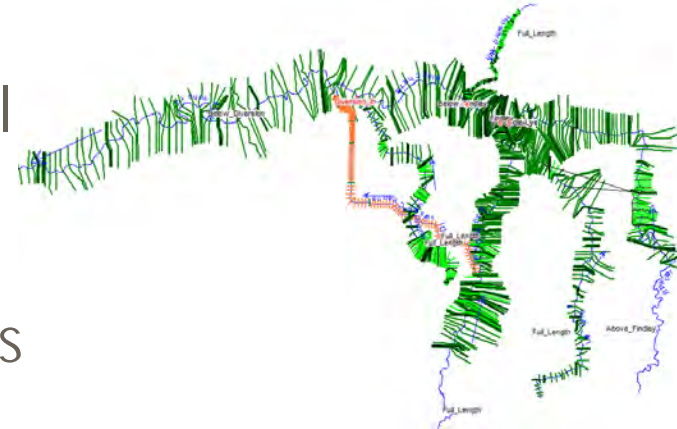
Revised  
Project  
Objective

Lower the 1% ACE event water surface elevation at Main Street and other major egress routes to permit passage of emergency response vehicles (6" -9" maximum water depth)



## Costs and Economics (BCR)

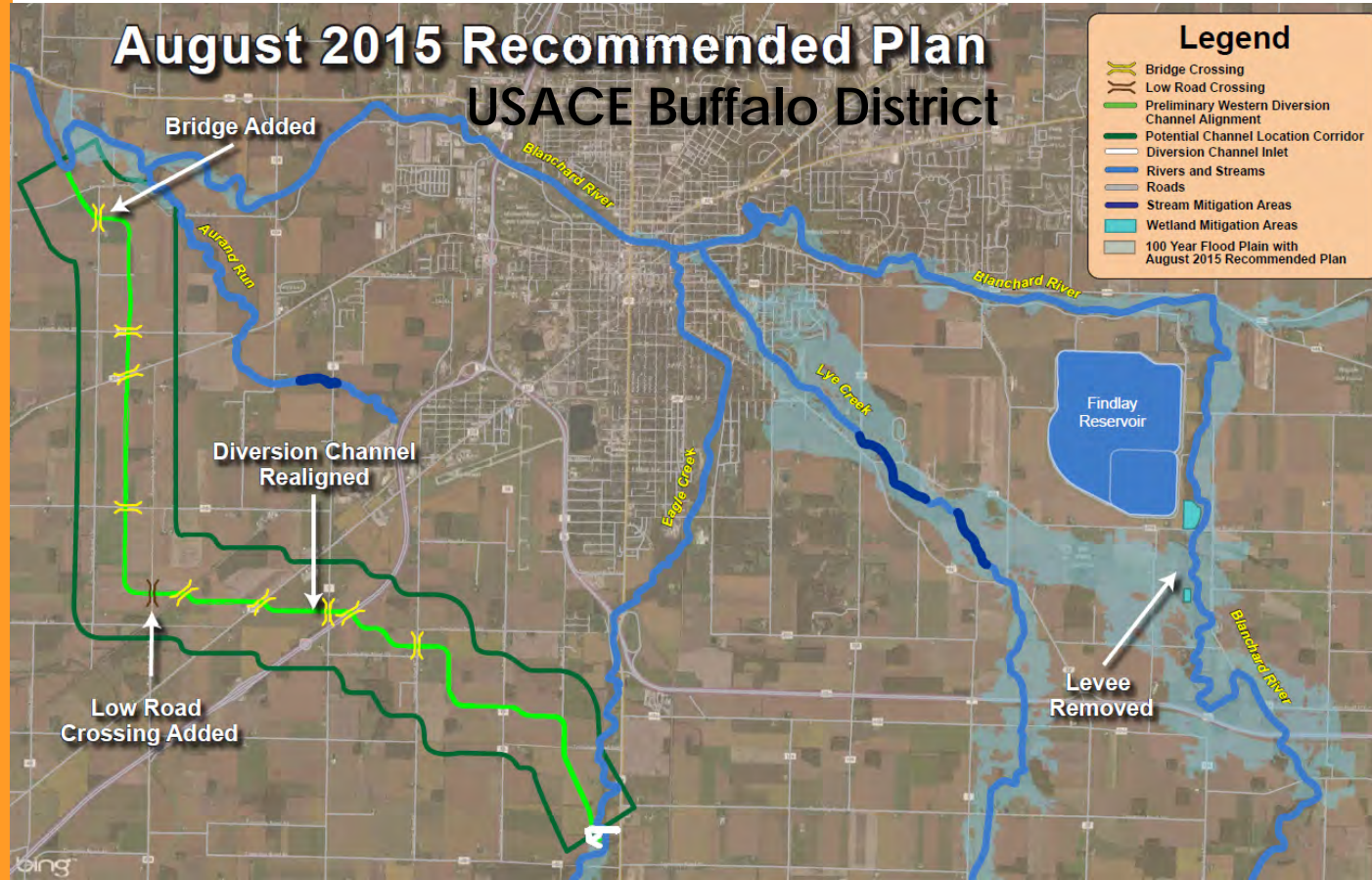
- Additional (non-federal) benefits include:
  - Road closures
  - Business losses
  - Lost income/wages
  - Temporary relocation/reoccupation costs
  - Agricultural benefits and losses
  - Others
    - Utility damages, debris removal costs, location benefits, intensification benefits, employment benefits.



# Concept Design Analysis

## Diversion Channel Refinement

Size  
Alignment  
Profile  
Inlet Location



## Preliminary Recommendations

- **This Alternative is Feasible**
- Relocate entrance and reduce channel length
- At-grade intersection with Aurand Run
- Refine profile
  - Reduce overall excavation & waste
  - Reduce rock excavation
- Update Capacity from 25-year to 100-year flows





Why  
Alternatives?

## Remaining Problems to Solve

Conflicting Model/Reporting Results

Residual Risk of Project

Double-Peaked Hydrograph

Conflicting  
Results

April 2015

# 100 Year Storm Event with Proposed Project



US Army Corps  
of Engineers  
Buffalo District  
**BUILDING STRONG®**

The 100 year flood plain is based on the results of the U.S. Army Corps of Engineers (USACE) hydrology and hydraulics model. USACE will coordinate with the Federal Emergency Management Agency (FEMA) and submit the necessary documentation for map revisions for modifications to existing flood insurance maps.



## Legend: 100 Year Flood Plain

- Existing (Reduced water levels with the August 2015 Recommended Plan)
- August 2015 Recommended Plan
- Existing and August 2015 Recommended Plan overlap



## 100 Year Flood Plain:

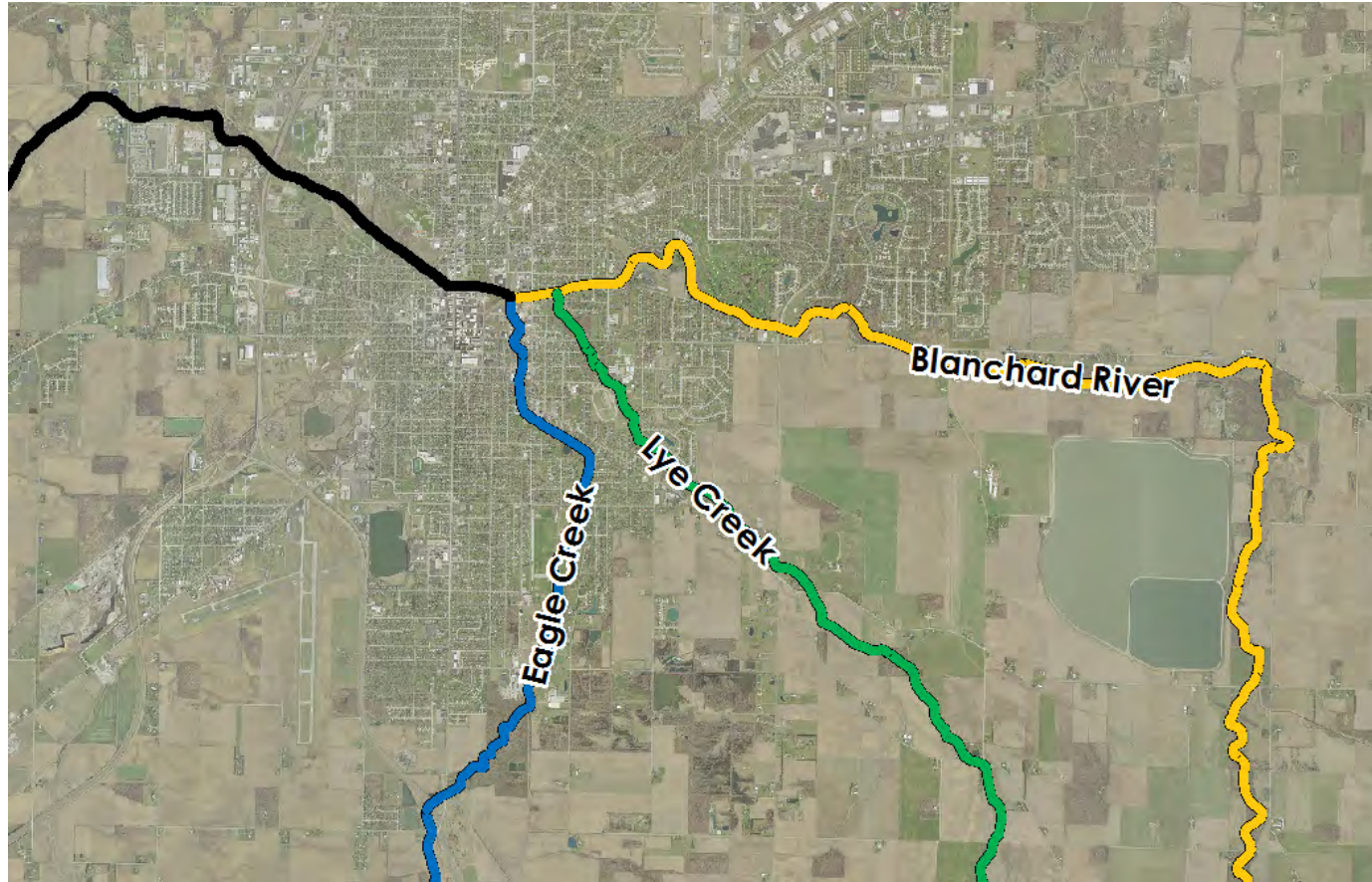
Existing  
VS.  
August 2015  
Recommended Plan



August 2015

Where does  
the water  
come from?

## Blanchard River – Eagle Creek – Lye Creek



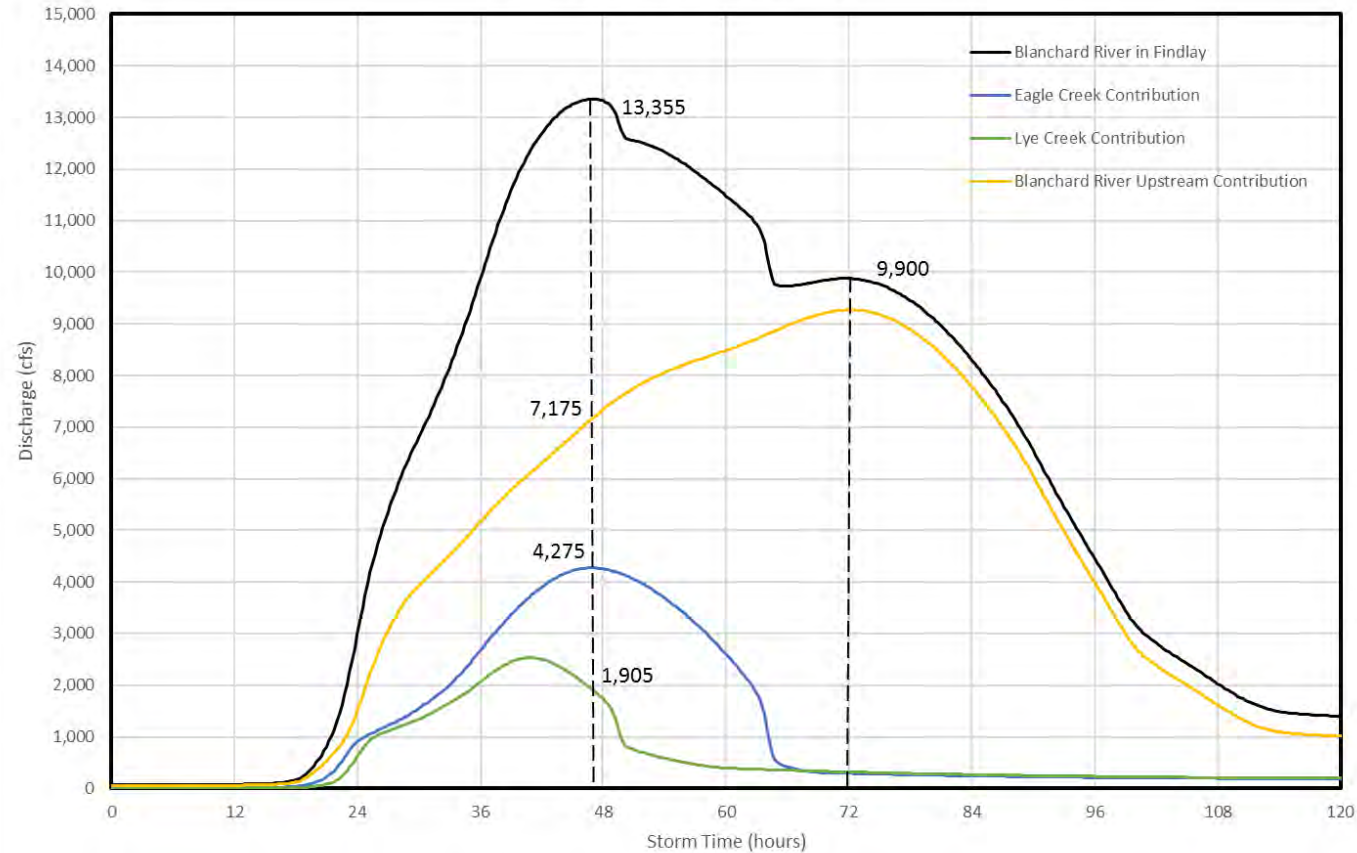


1% ACE

USACE HEC-HMS

- Existing Conditions

HEC-HMS -- Blanchard River in Findlay  
Existing Conditions  
100Yr, 24Hr = 5.26" SCS Type II





1% ACE

USACE HEC-HMS

- Existing Conditions
- USACE Plan (Expected)

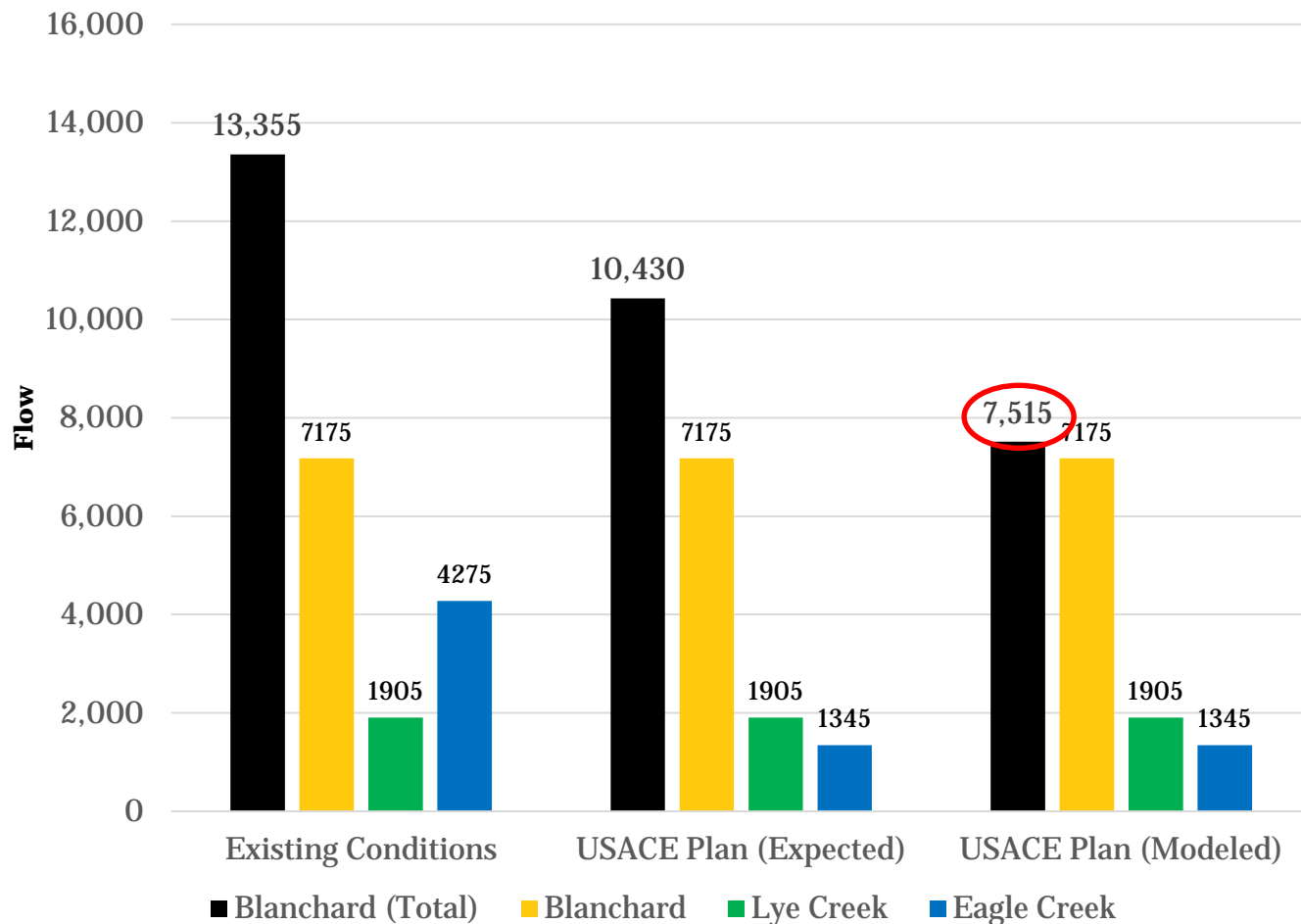
USACE HEC-RAS

- USACE Plan (Modeled)

**“The 4.6’ drop in WSE in downtown Findlay is based on a model run where the flow optimization feature did not properly converge on an internally consistent result.” - USACE**

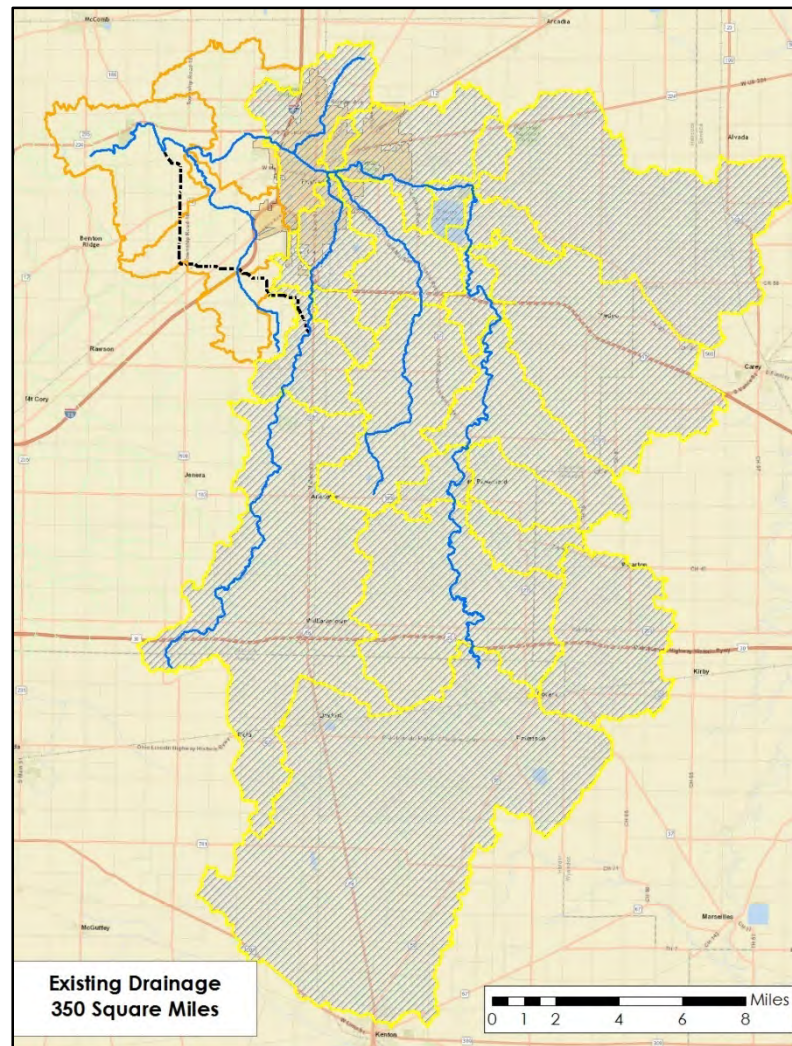


## USACE Model Flow Error



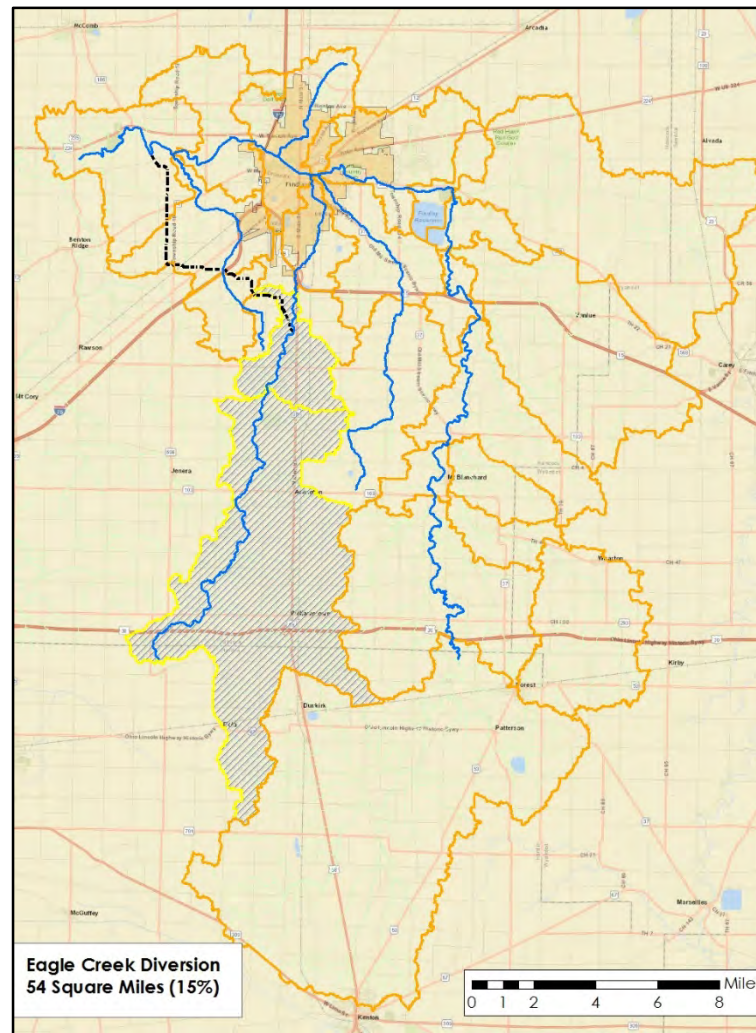
# Residual Risk

## The Blanchard River Watershed



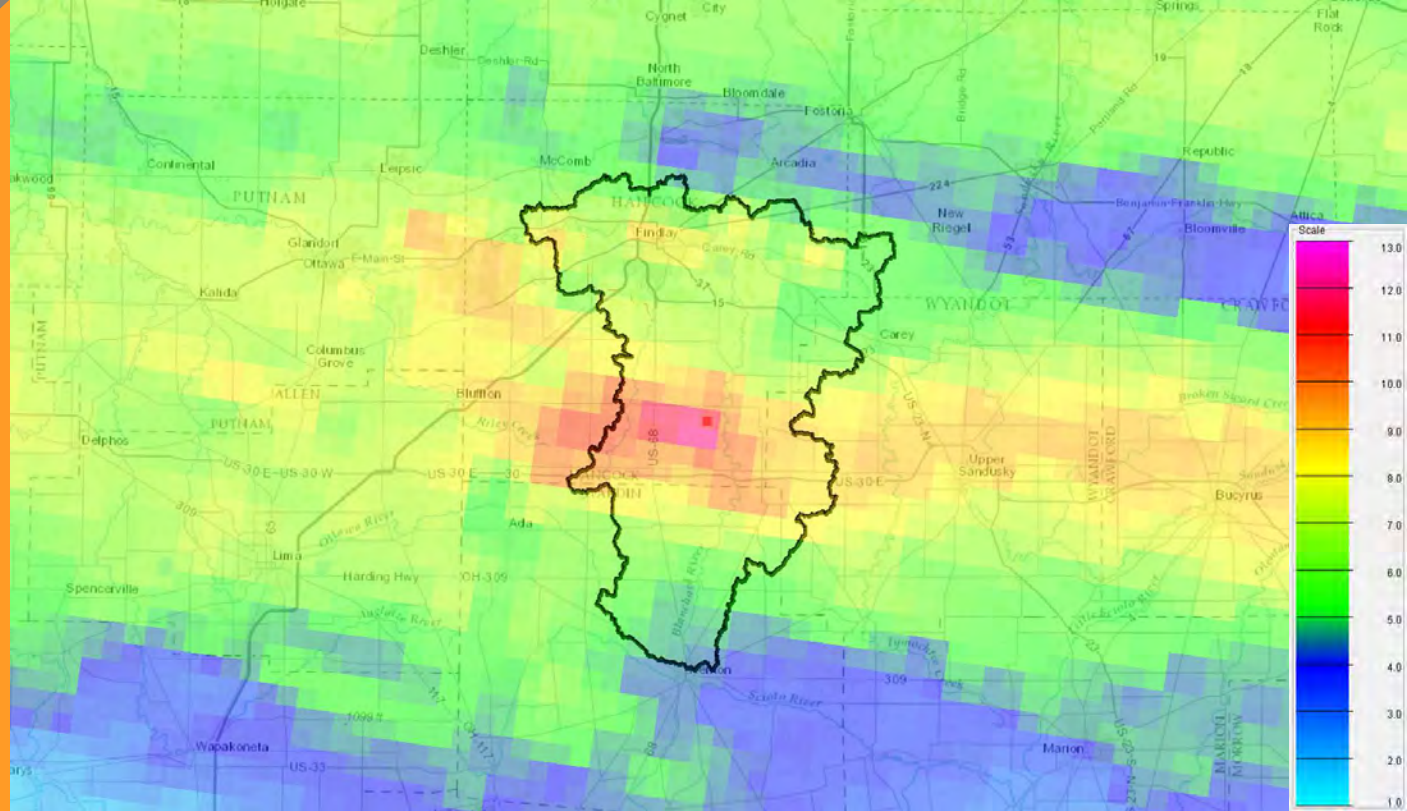
# Residual Risk

15% of  
Watershed  
Influenced



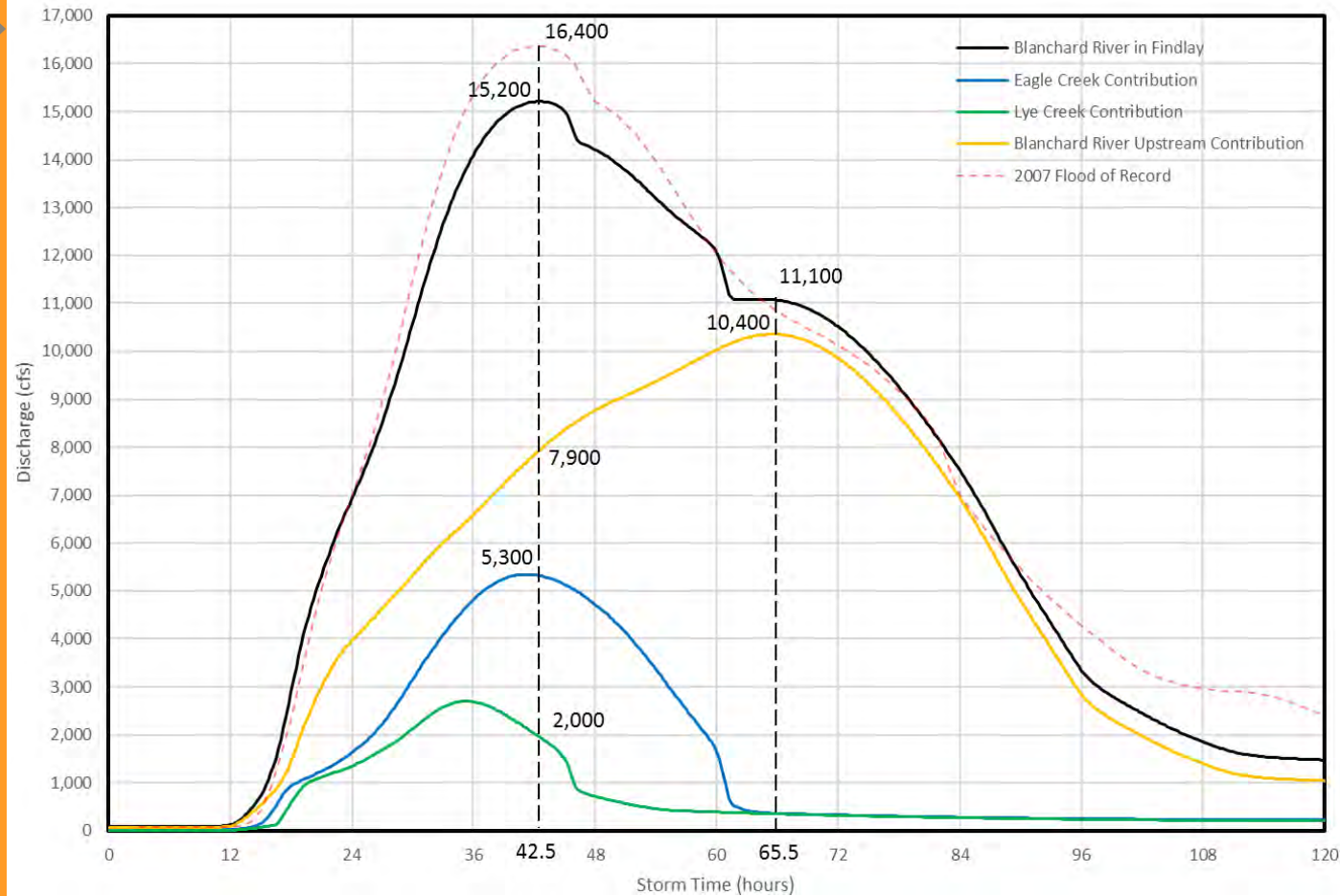
# Residual Risk

2007 Storm

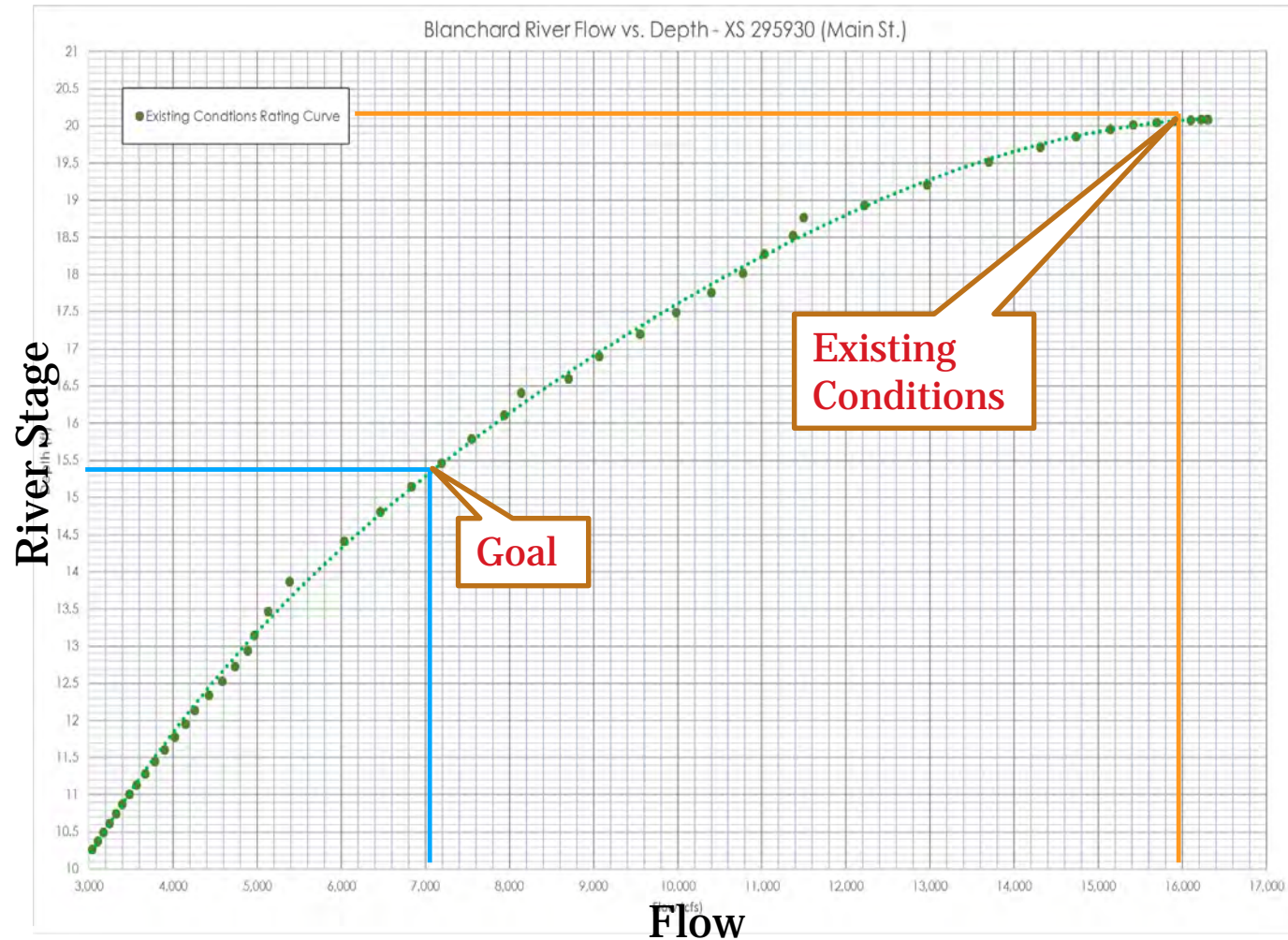




# Double Peak



# Blanchard River Rating Curve at Main Street







# Alternatives

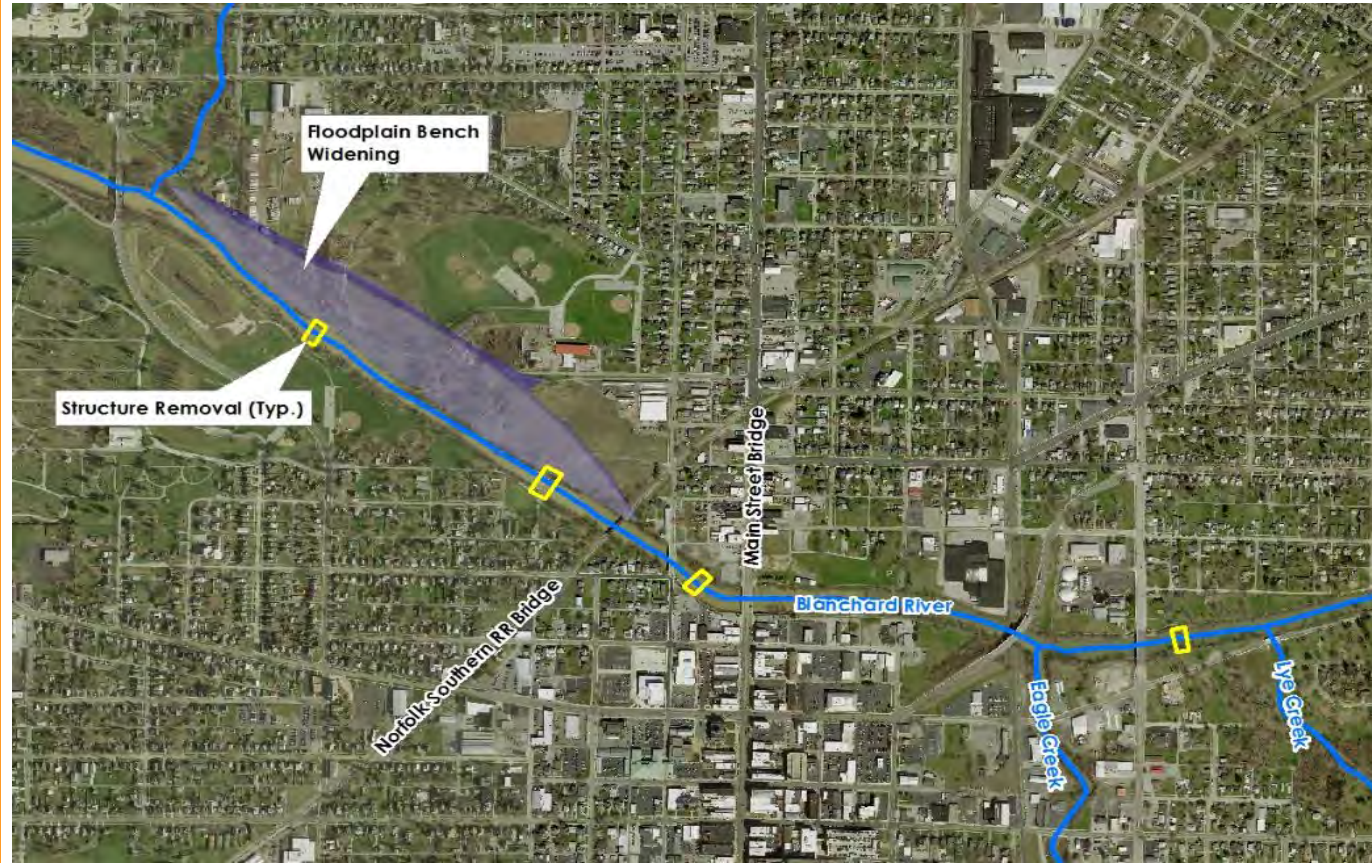
Concept  
Designs  
Reviewed

# Hydraulic Improvements

Remove Inline  
Riffles/Dams

Floodplain  
Bench Widening

Bridge  
Modifications



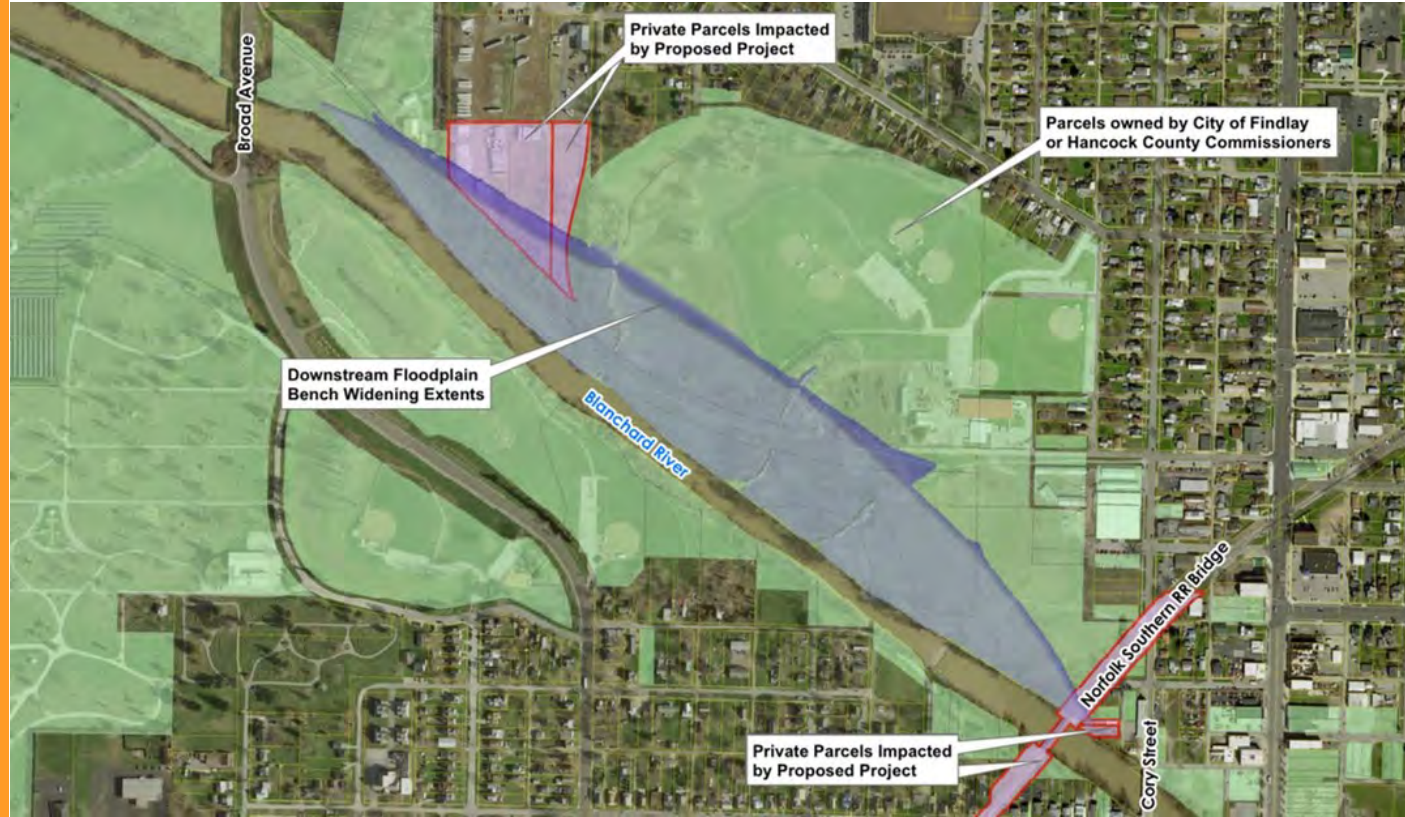
Concept  
Designs  
Reviewed

# Hydraulic Improvements

Remove Inline  
Riffles/Dams

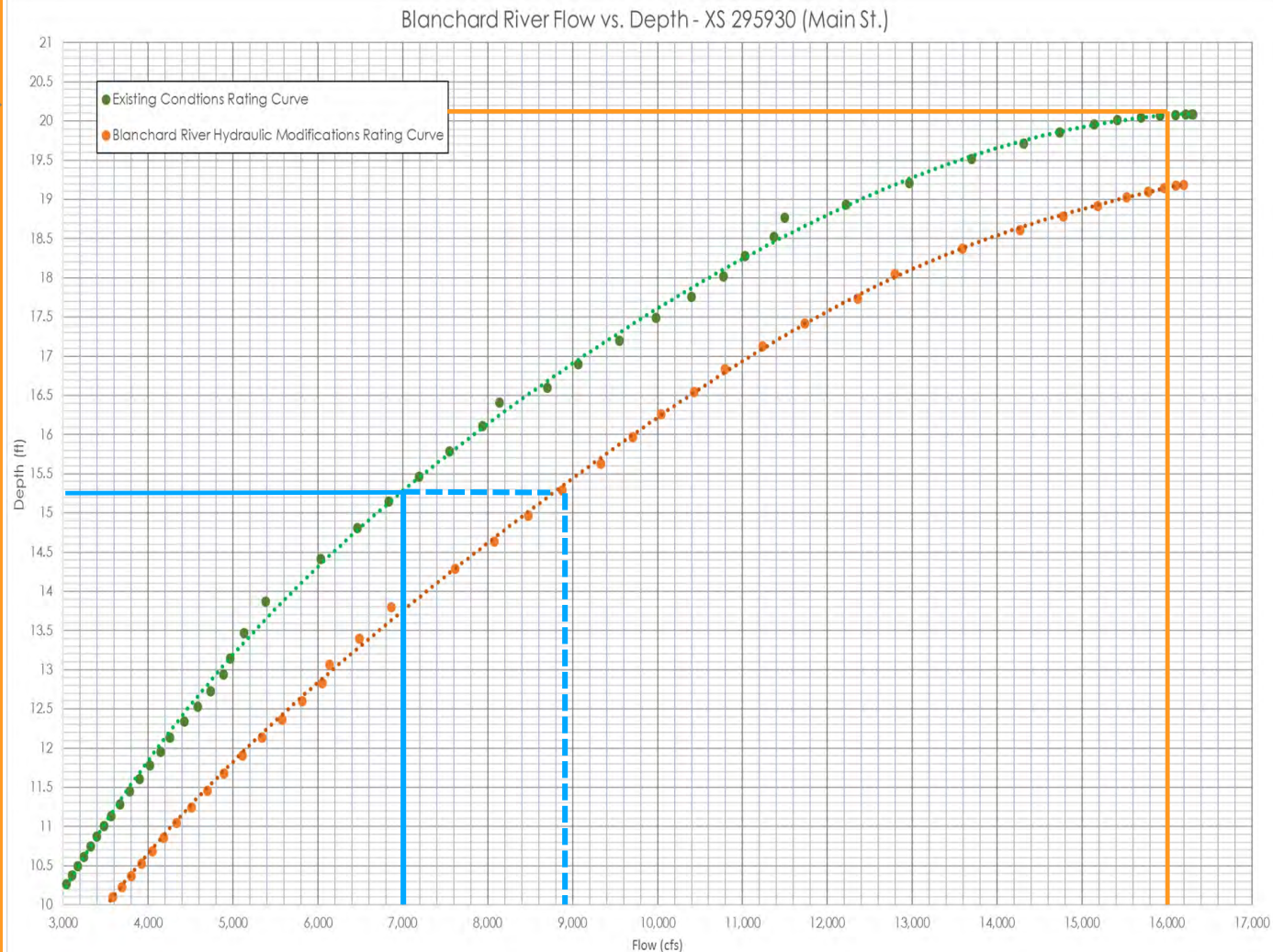
Floodplain  
Bench Widening

Bridge  
Modifications

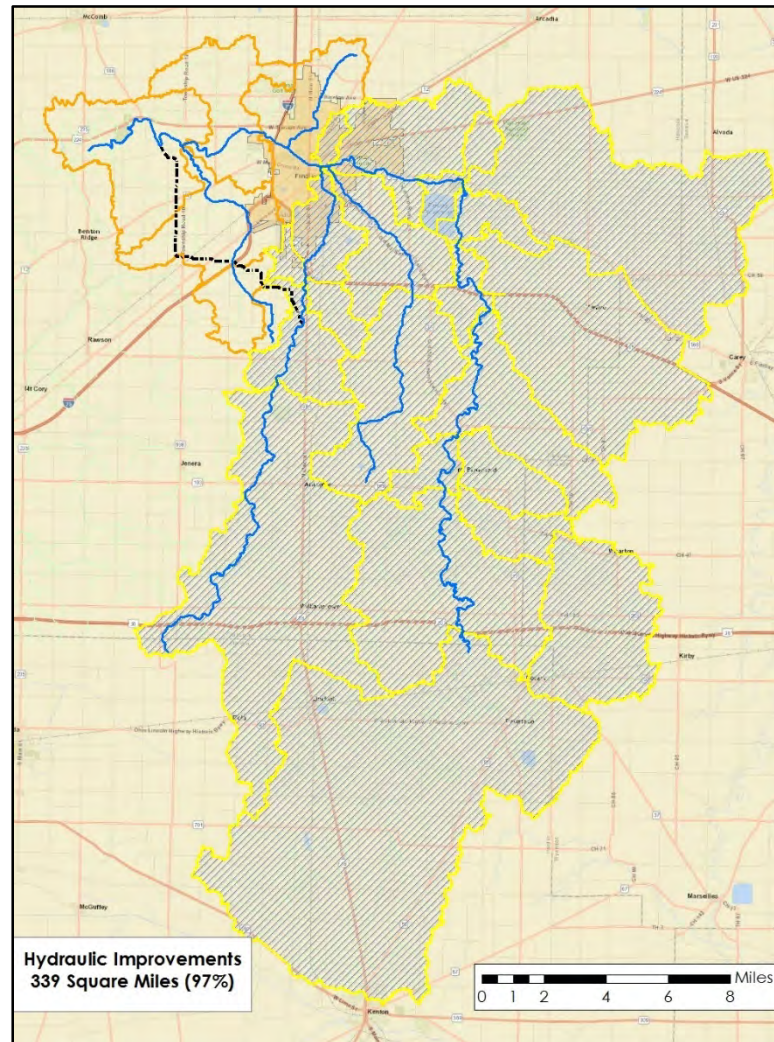




# New Blanchard River Rating Curve at Main Street



# Percent of Watershed Influenced





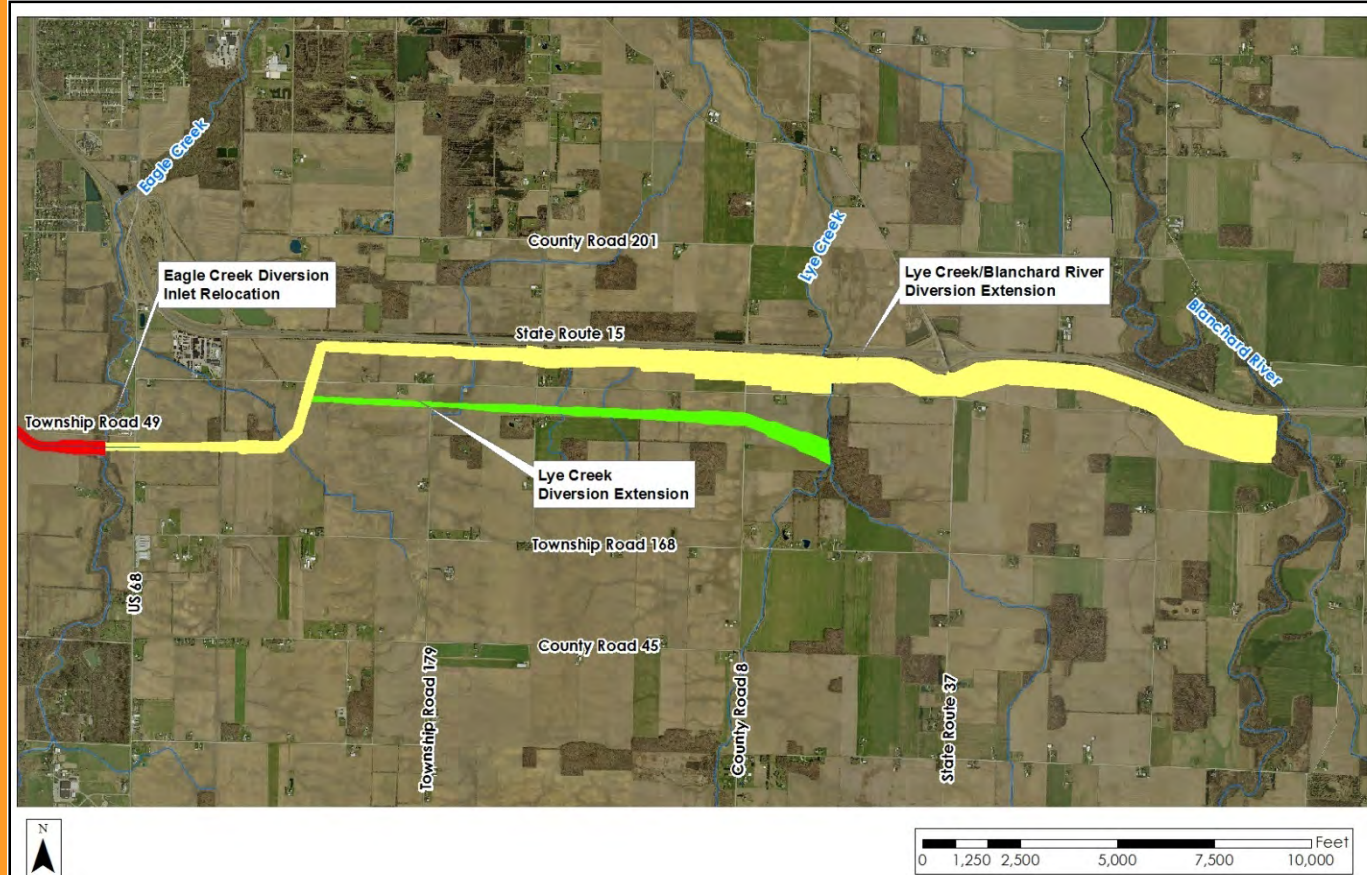
## Diversion Extension

Up to 1,200 ft wide

Between 2 and  
7 ft deep

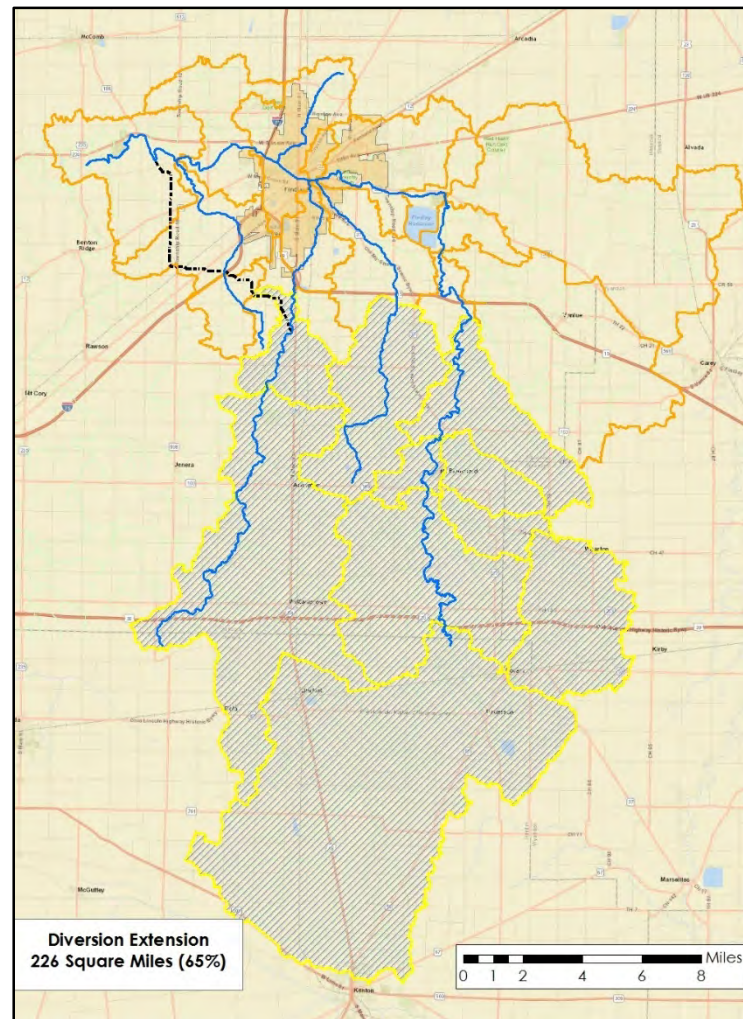
14 New Bridges  
and 5 Cul-de-sacs

# Eagle to Lye to Blanchard

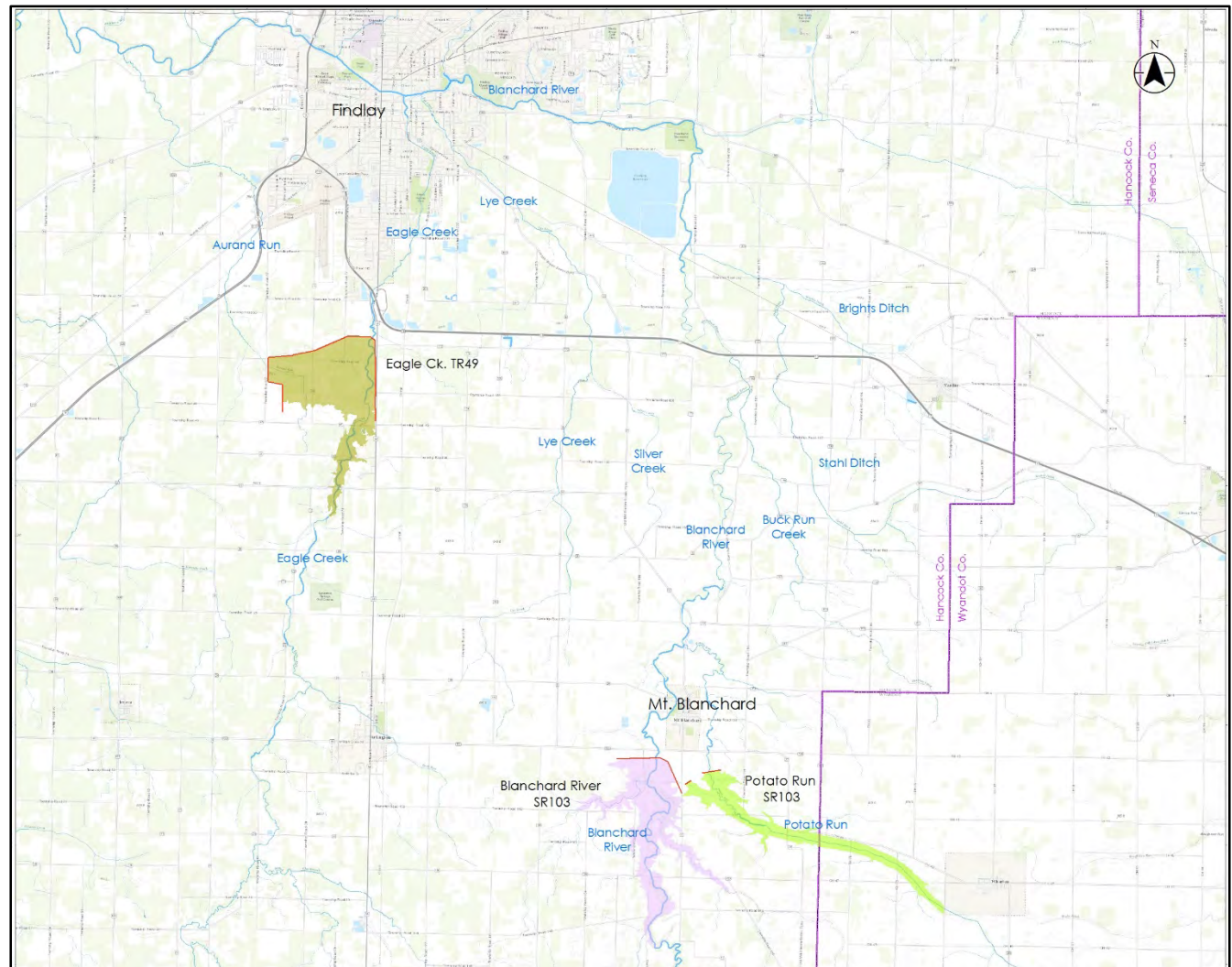




# Percent of Watershed Influenced



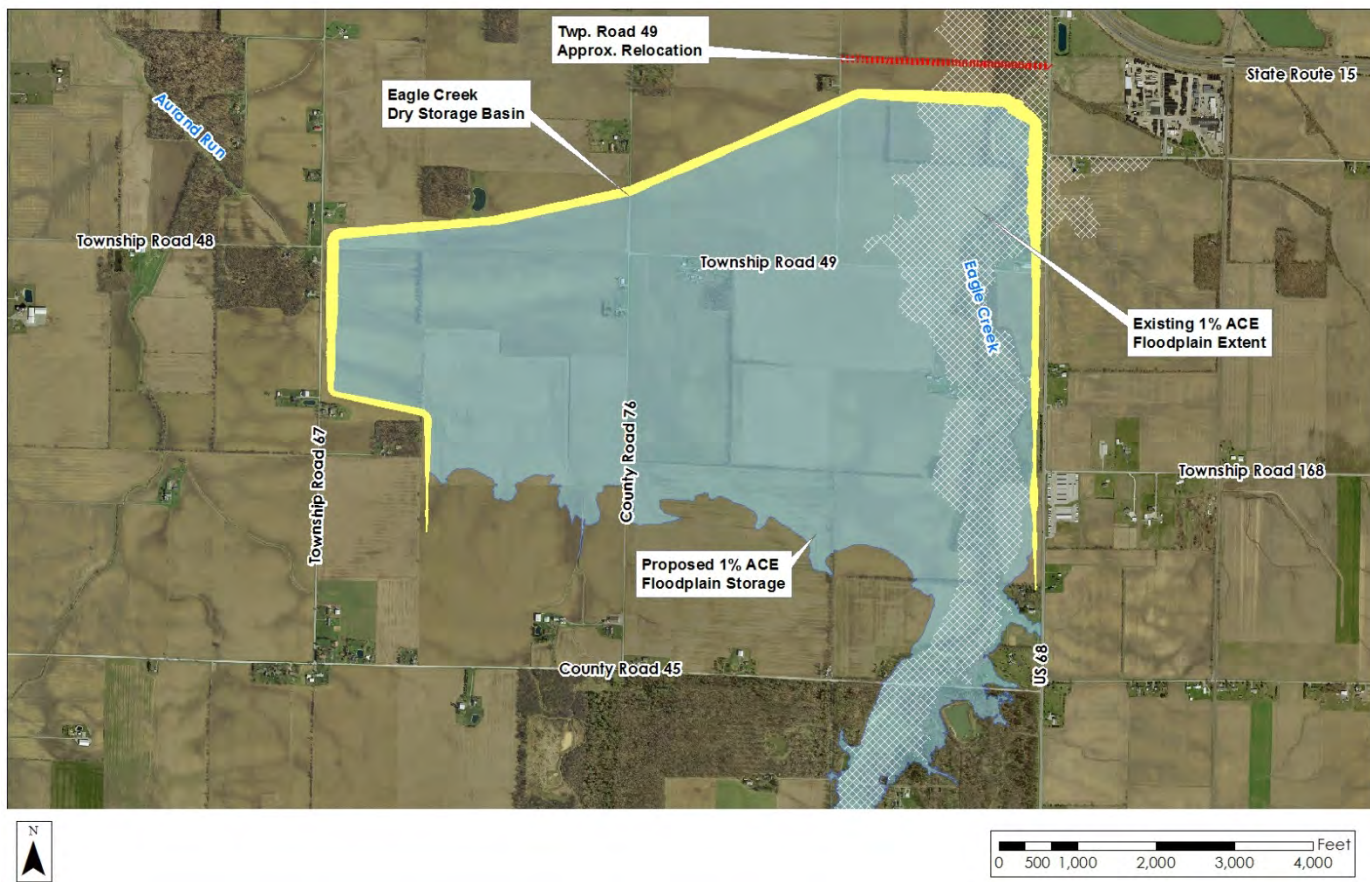
# Storage





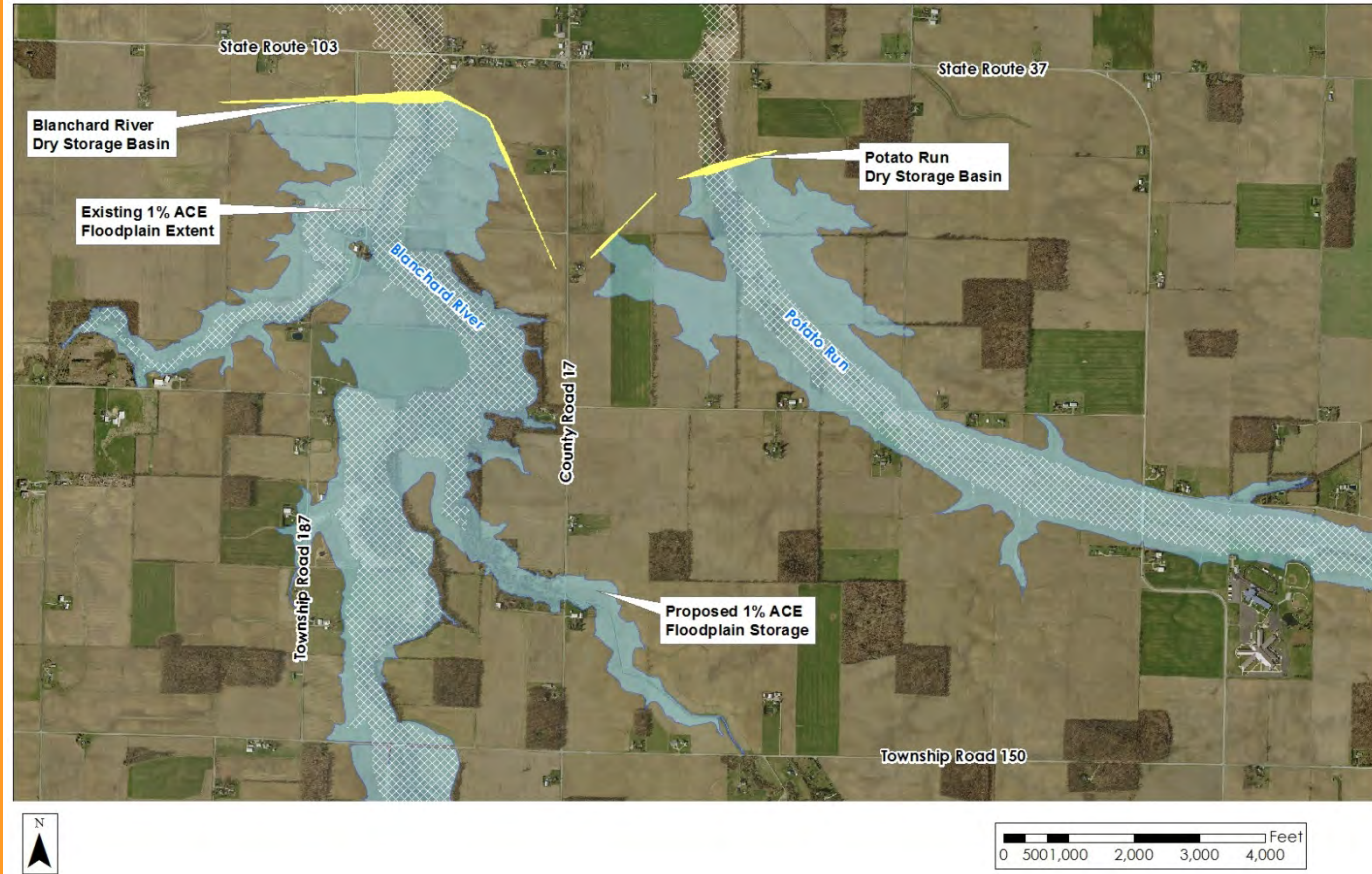
Storage

## Eagle Creek Dry Storage



## Storage

# Blanchard River & Potato Run at Mt. Blanchard

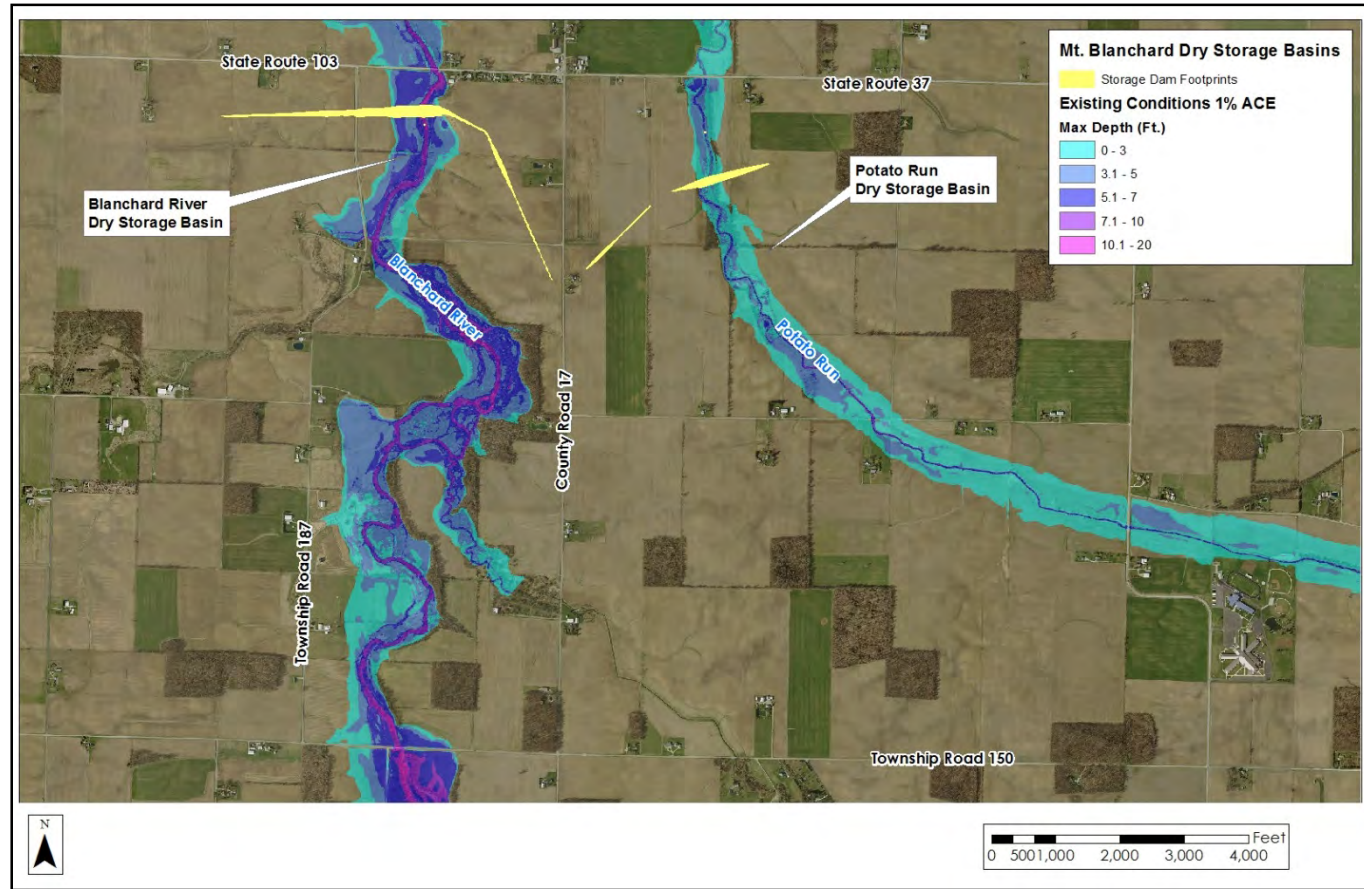




# Blanchard River & Potato Run at Mt. Blanchard

Existing  
Conditions

1% ACE event

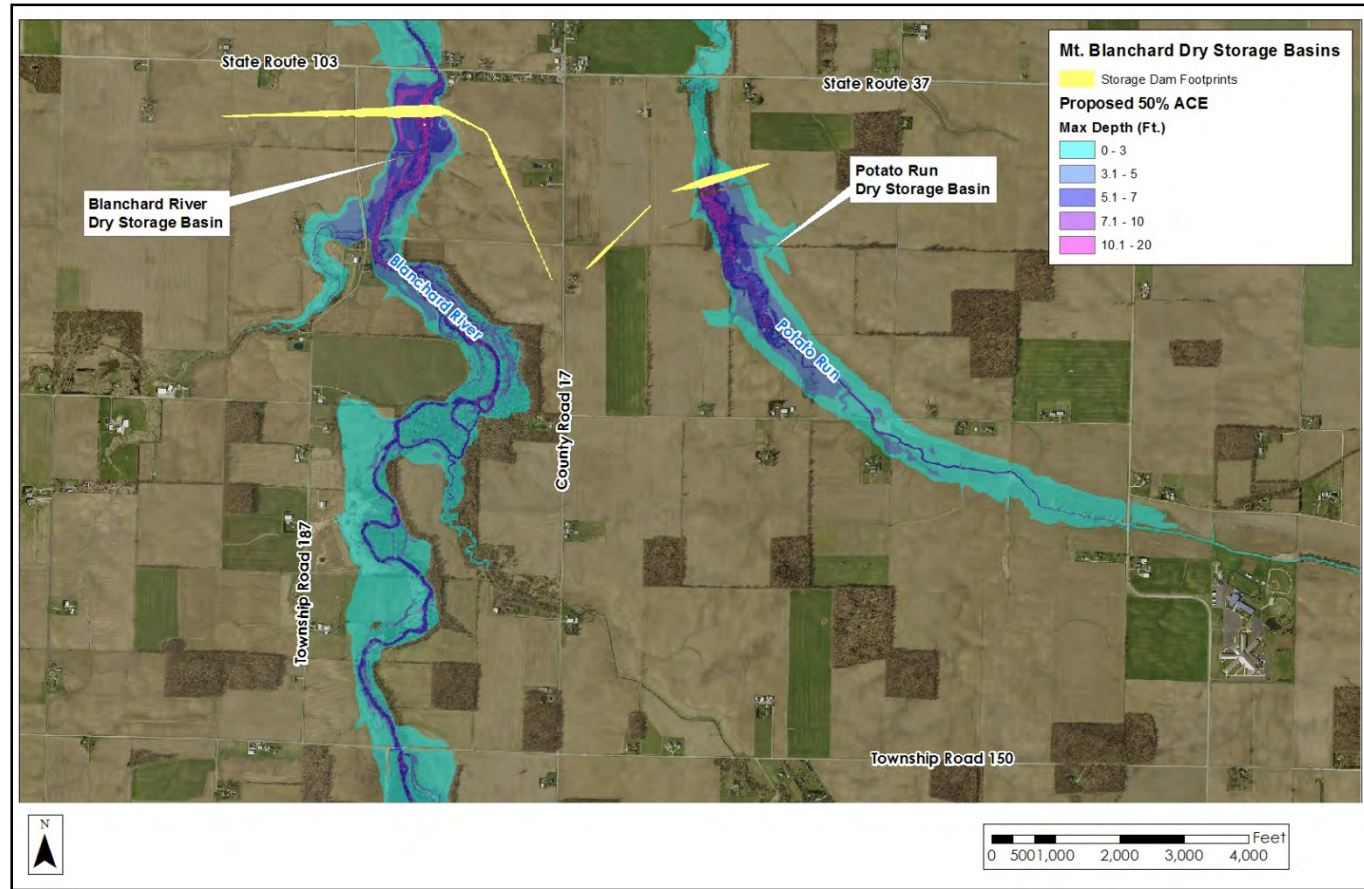




# Blanchard River & Potato Run at Mt. Blanchard

Proposed  
Conditions

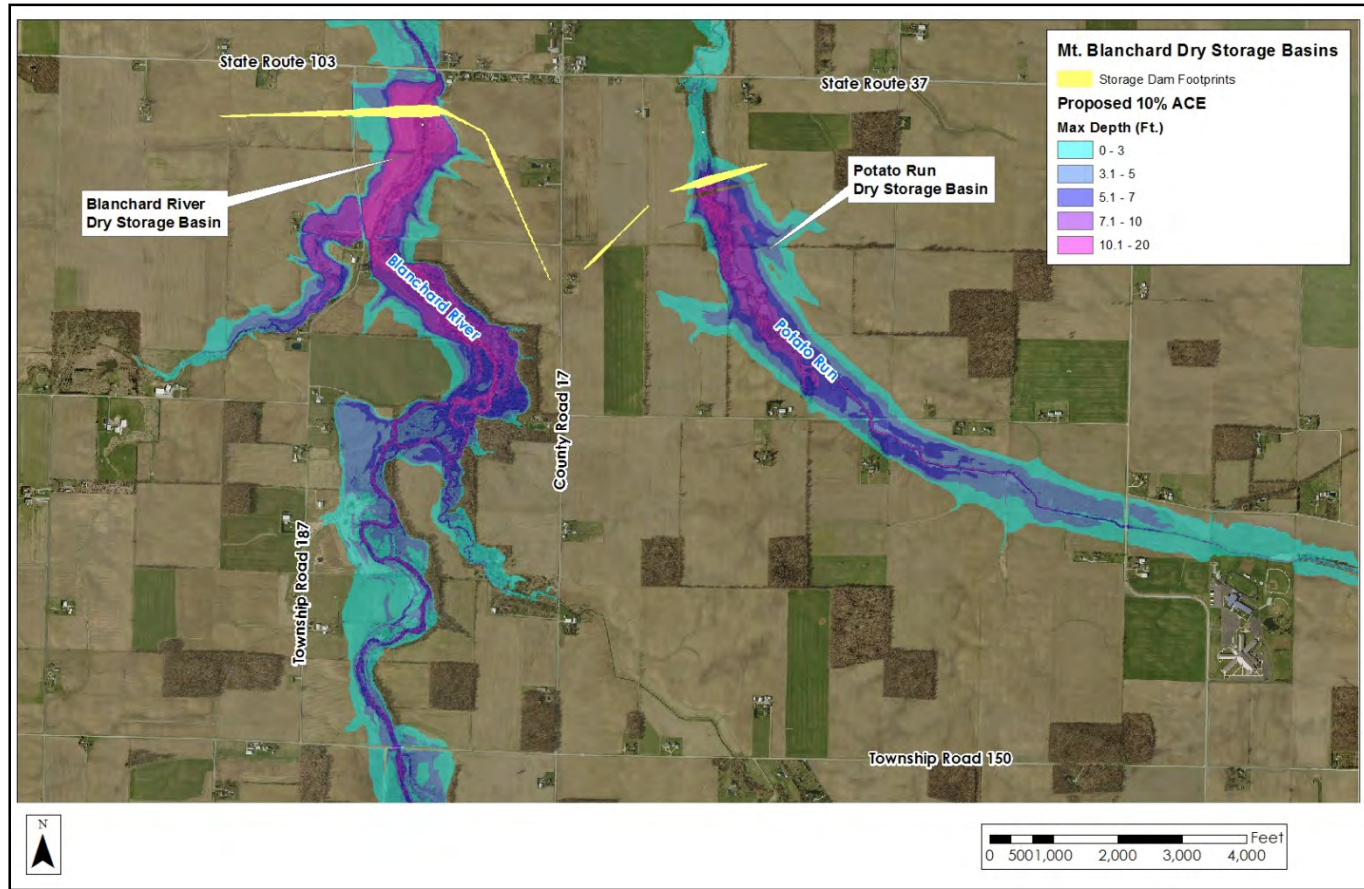
50% ACE event



# Blanchard River & Potato Run at Mt. Blanchard

Proposed  
Conditions

10% ACE event

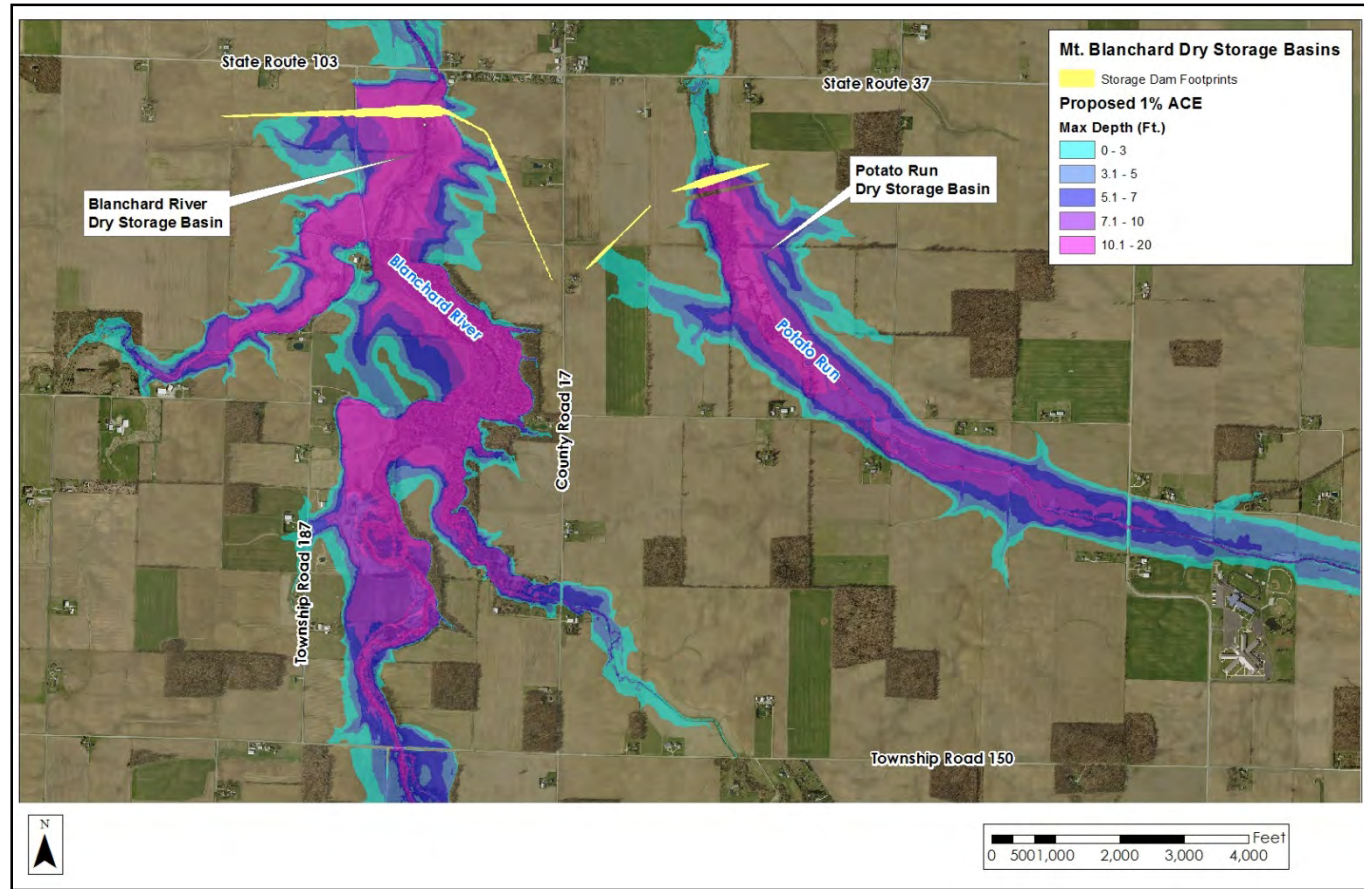


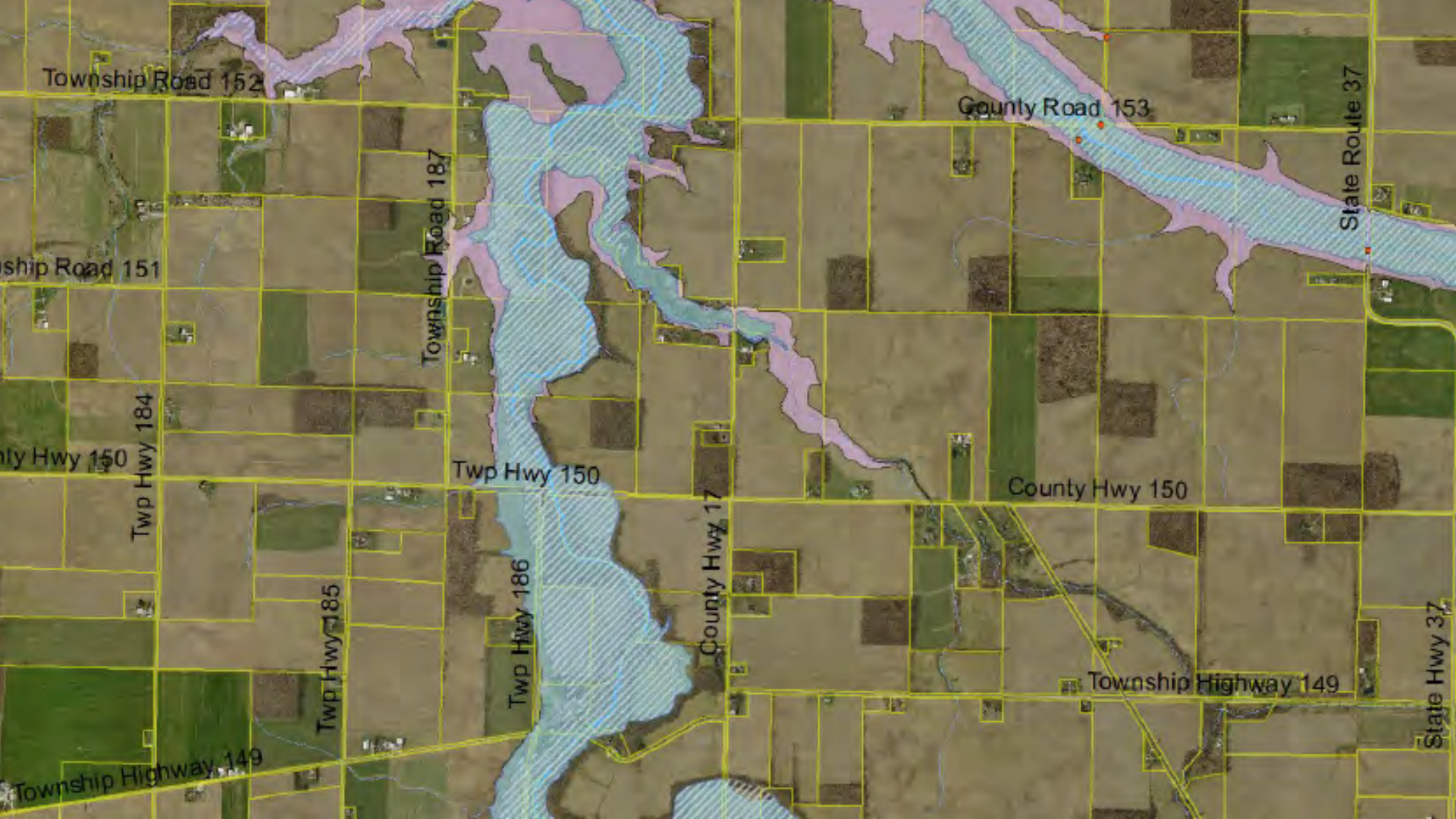


# Blanchard River & Potato Run at Mt. Blanchard

Proposed  
Conditions

1% ACE event





Township Road 152

County Road 153

State Route 37

ship Road 151

Township Road 187

Twp Hwy 184

ly Hwy 150

Twp Hwy 150

County Hwy 17

County Hwy 150

Twp Hwy 185

Twp Hwy 186

Township Highway 149

State Hwy 37

Township Highway 149

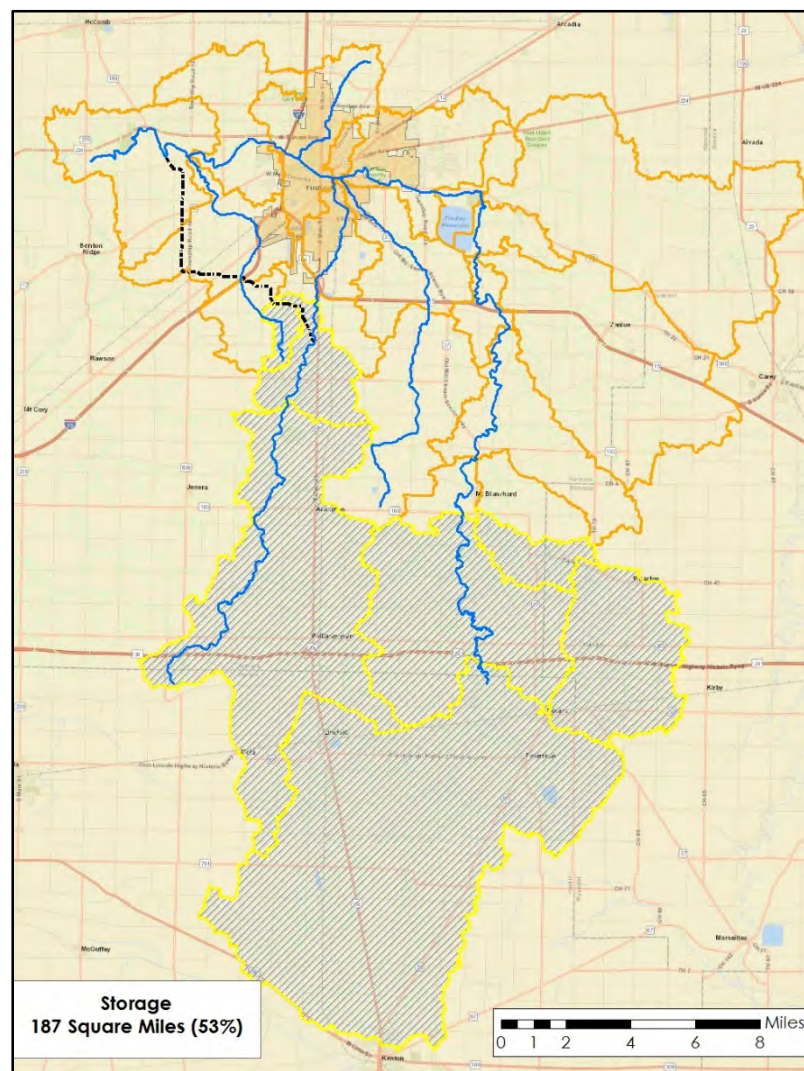


# Riverdale





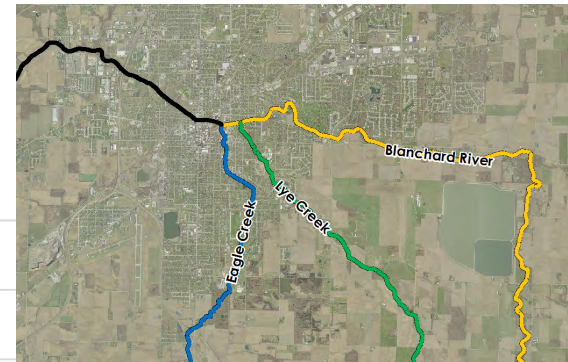
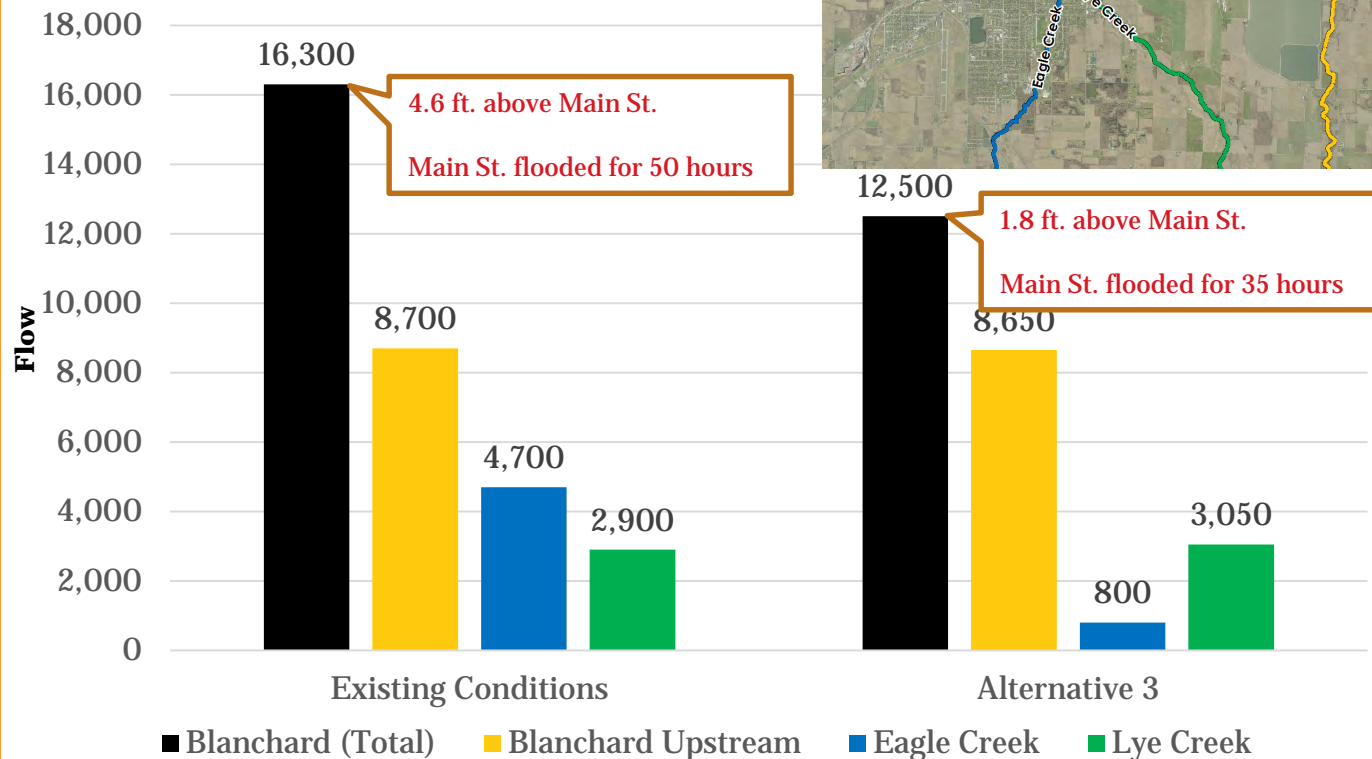
# Percent of Watershed Influenced



1% ACE  
100-Year, 24-Hour  
SCS Type II = 5.26"

Blanchard River  
in Findlay

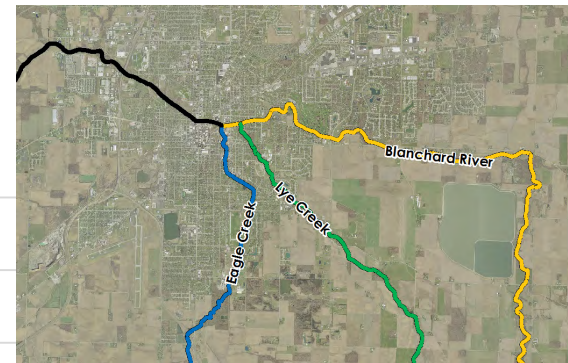
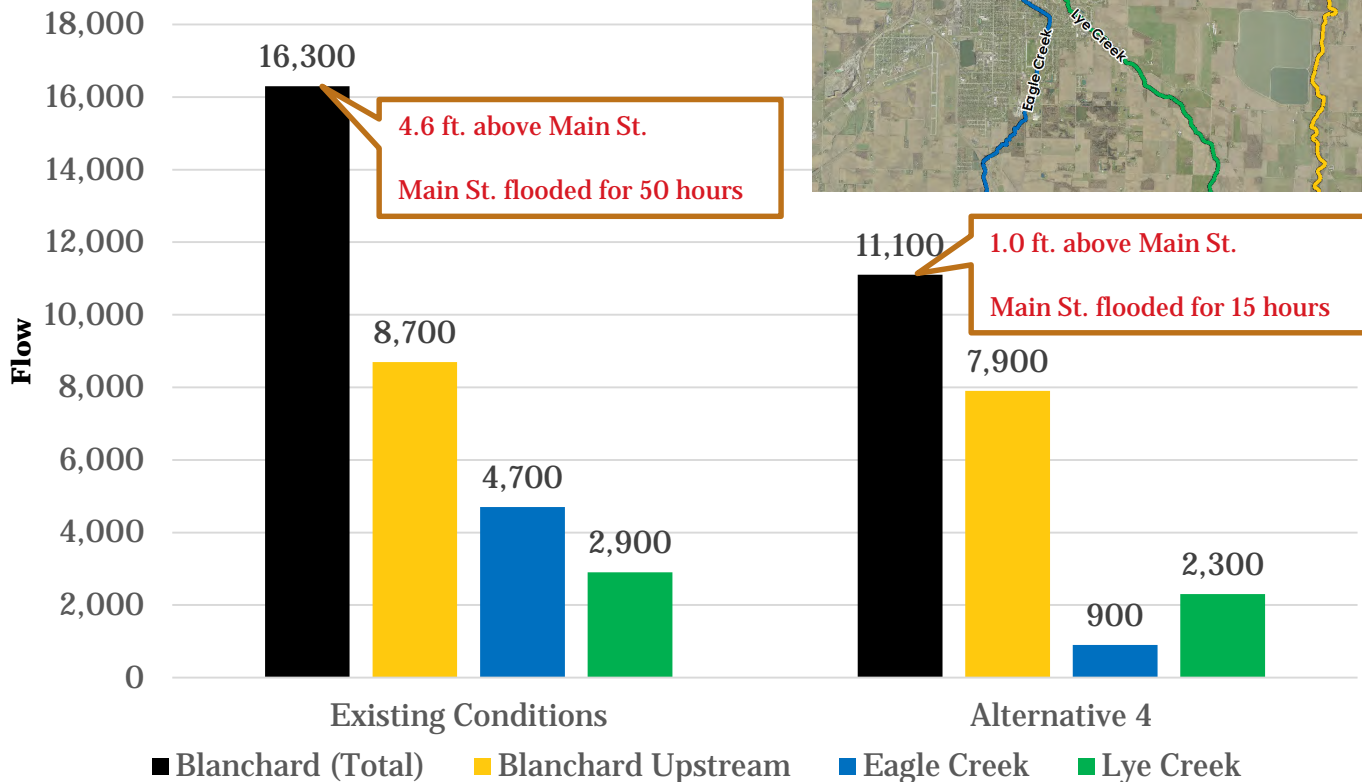
## Eagle Creek Storage



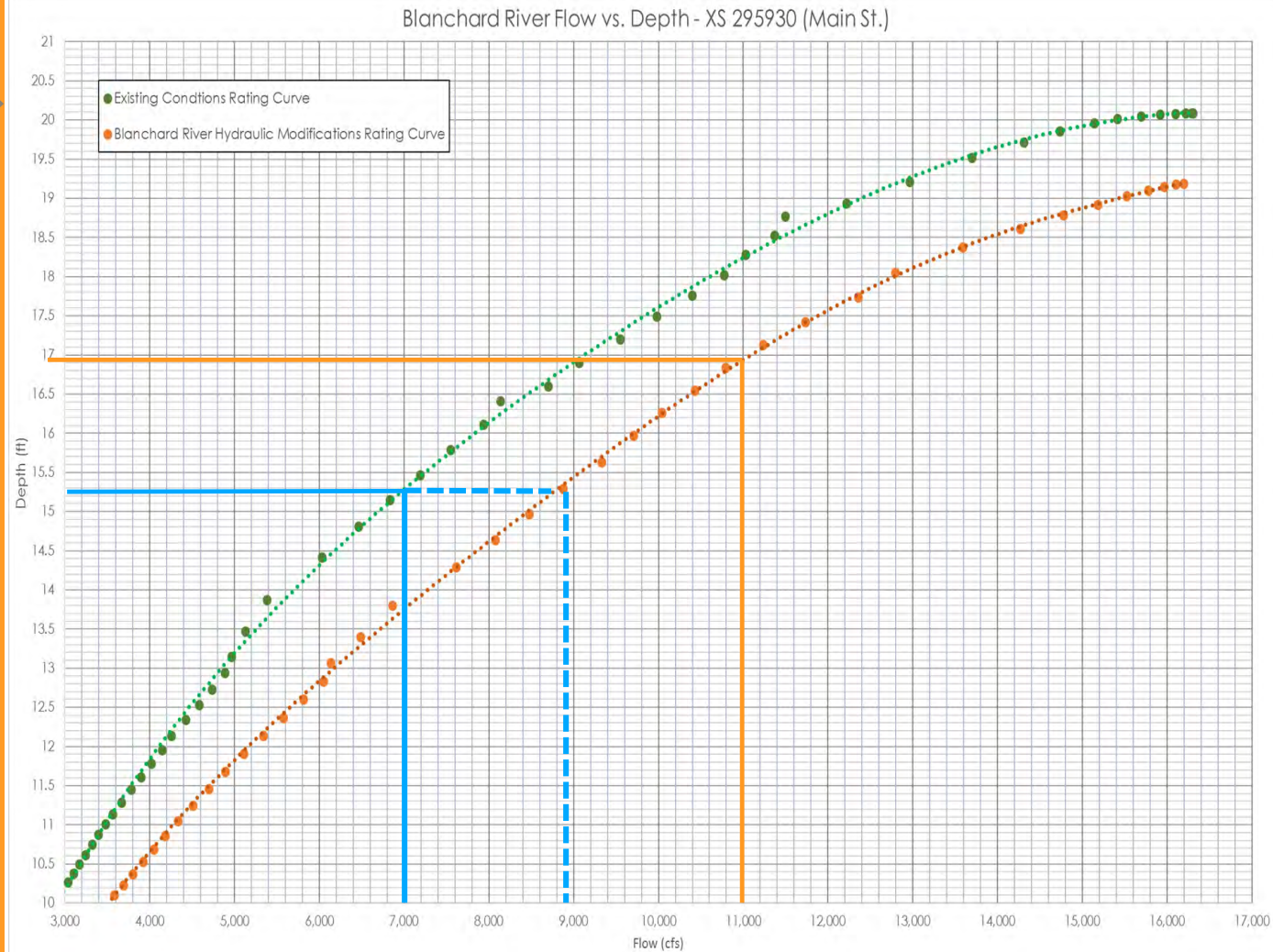
1% ACE  
100-Year, 24-Hour  
SCS Type II = 5.26"

Blanchard River  
in Findlay

## Eagle Creek Storage + Blanchard R. and Potato Run Storage



# New Blanchard River Rating Curve at Main Street





## Opinions of Probable Cost

## Alternative Components

Alternative Option	Base Cost	Cost With Contingency
USACE Plan (25-Year Diversion of Eagle Creek)	<b>\$63,804,000</b>	<b>\$80,902,000</b>
Refined Diversion (100-Year Diversion of Eagle Creek)	\$81,300,000	\$105,690,000
Diversion Channel Extension (Eagle Creek to Blanchard River)	\$67,800,000	\$88,140,000
<b>Total Diversion Channel Extension</b>	<b>\$149,100,000</b>	<b>\$193,830,000</b>
Riffle/Inline Structures Removal	\$780,000	\$1,014,000
Floodplain Bench Widening and Railroad Bridge Modifications	\$14,500,000	\$18,850,000
<b>Total Hydraulic Improvements</b>	<b>\$15,280,000</b>	<b>\$19,864,000</b>
Eagle Creek Dry Storage Basin	\$53,500,000	\$69,550,000
Blanchard River Dry Storage Basin	\$34,400,000	\$44,720,000
Potato Run Dry Storage Basin	\$19,700,000	\$25,610,000
<b>Total Storage</b>	<b>\$107,600,000</b>	<b>\$139,880,000</b>

Opinions of  
Probable Cost

Spatial Spread  
of Projects

Independent  
Projects that  
make up a  
Program

## Alternatives

Alternative	Base Cost	Cost With Contingency
Alternative 0 – Existing Conditions	--	--
Alternative 1 – USACE Plan (25-Year Diversion of Eagle Creek)	\$63,804,000	\$80,902,000
Alternative 2 – Blanchard River Modifications	\$15,280,000	\$19,864,000
Alternative 3 – Alt. 2 + Eagle Creek Dry Storage Basin	\$68,780,000	\$89,414,000
Alternative 4 – Alt. 3 + Blanchard & Potato Dry Storage Basins	\$122,880,000	\$159,744,000

- Alternative 4 is Stantec's Recommended Plan
  - Hydraulic improvements
  - Eagle Creek dry storage basin
  - Blanchard River dry storage basin
  - Potato Run dry storage basin

# Benefits and Impacts Summary

Alternative	Modeled Scenario	Reduction in WSE at Main St (Feet)	Max Water Depth on Main St (Feet)	Duration Water is 6" Above Main St (Hours)	Total Acres Directly Impacted by Project Construction	Home Buyouts	New Bridges or Cul-De-Sacs	Acres Impacted Outside of Ex. Regulatory Floodplain	Acres Removed from Floodplain	Agricultural Acres Removed from Floodplain	Parcels Directly Impacted by Project Construction	Parcels Removed from Floodplain
0	Existing Conditions	n/a	4.6	50	--	--	--	--	--	--	--	--
1	USACE Plan (25-Yr Diversion)	0.9	3.6	45	960	1	13	960	1,690	1,140	75	1,670
2	Blanchard R. Modifications	0.9	3.7	40	2	0	0	2	280	40	5	760
3	Blanchard R. + Eagle Cr. Storage	2.8	1.8	35	1,140	14	1	863	2,780	1,180	55	2,460
4	Blanchard R. + Eagle Cr. Storage + Blanchard & Potato Storage	3.6	1	15	2,430	19	2	1,514	5,060	2,850	135	2,850

Benefit / Impact Summary HEC-RAS Results (SCS Type II – NOAA Atlas 14 100-Year, 24-Hour event (5.26 inches) equally distributed across watershed)

# Hancock County Flood Risk Reduction Program: Benefit Cost Analysis

(STANTEC Project # 174316204)

Prepared for:



Submitted by:



## Point of Contact:

Michael F. Lawrence, JFA President

4915 Saint Elmo Avenue, Suite 205

Bethesda, Maryland 20814

Phone: (301) 961-8835 Fax: (301) 469-3001

[lawrence@jfaucett.com](mailto:lawrence@jfaucett.com)

March 2017

## Opinion of Probable Construction Cost

Alternative Option	Base Cost	Cost With 30% Contingency
Riffle/Inline Structures Removal	\$780,000	\$1,014,000
Floodplain Bench Widening and Railroad Bridge Modifications	\$14,500,000	\$18,850,000
<b>Total Hydraulic Improvements</b>	<b>\$15,280,000</b>	<b>\$19,864,000</b>
Eagle Creek Dry Storage Basin	\$53,500,000	\$69,550,000
Blanchard River Dry Storage Basin	\$34,400,000	\$44,720,000
Potato Run Dry Storage Basin	\$19,700,000	\$25,610,000
<b>Total Storage</b>	<b>\$107,600,000</b>	<b>\$139,880,000</b>

## Operations and Maintenance Cost:

- Hydraulic Improvements - \$17,700 annually
  - Mowing, debris removal
- Dry Storage Basins - \$155,000 annually
  - Annual inspections, EAP updates, mowing, embankment repair, debris removal



# Benefit-Cost Analysis

- Structures & Content
- Motor VehiclesProg
- Transportation

## Program Schedule

- Environmental / Landuse

- RED Benefits/Damages Avoided:
  - Business Losses
    - Income, Clean-up, Emergency Plan
  - Environmental / Landuse

# Hydraulic Improvements

## Costs / Benefits - NPV

(Thousands of 2017 Dollars)

Category	Cost	Benefit	Benefit-Cost Ratio
Program Costs	\$20,233		
Structures (Residential)		\$33,896	
Structures (Business)		\$24,901	
Motor Vehicles		\$2,523	
Transportation		\$5,969	
Emergency Response		\$4,050	
NFIP Administrative Cost	5,969	\$5,698	
Business Losses (Income)		\$2,067	
Business Losses (Cleanup)		\$2,673	
Business Losses Emergency Plan		\$797	
Agricultural		\$163	
Environmental		\$11,229	
Total	\$20,233	\$93,966	4.64

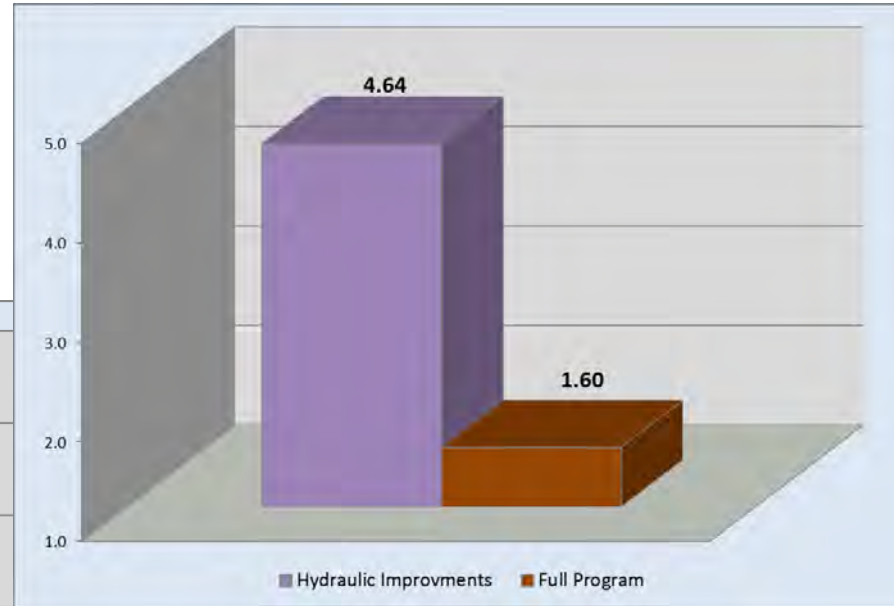
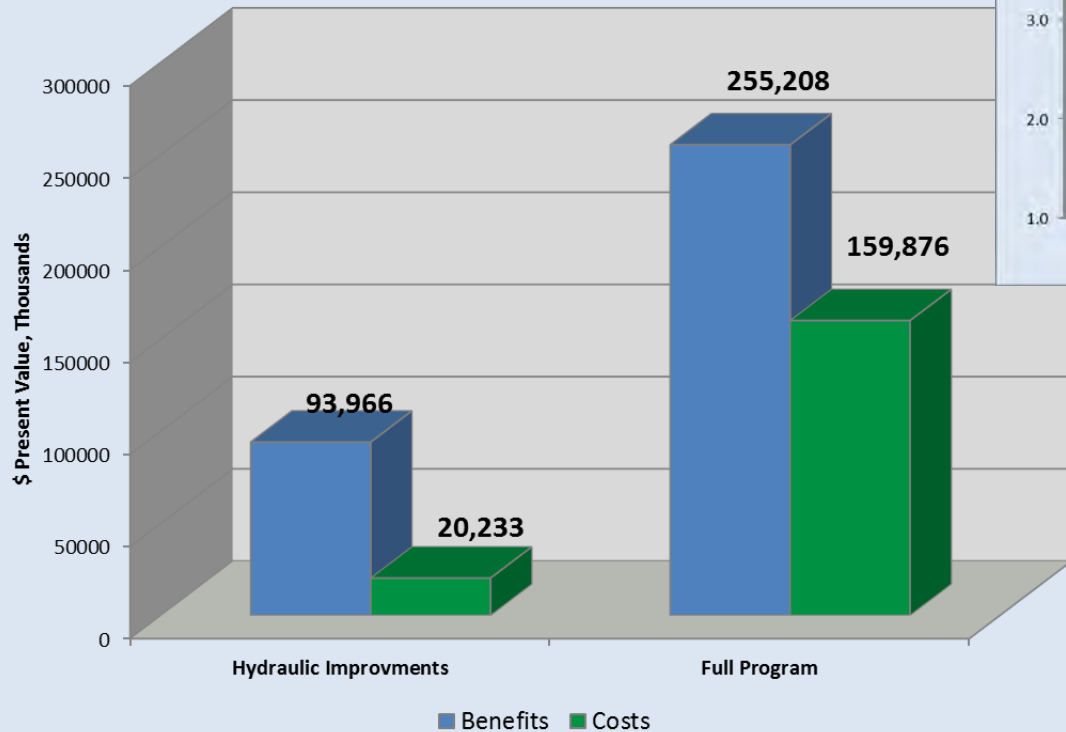
# Full Program

## Costs / Benefits - NPV (Thousands of 2017 Dollars)

Category	Cost	Benefit	Benefit-Cost Ratio
Program Costs	\$159,876		
Structures (Residential)		\$107,450	
Structures (Business)		\$42,867	
Motor Vehicles		\$5,388	
Transportation		\$8,992	
Emergency Response		\$6,419	
NFIP Administrative Cost		\$18,311	
Business Losses (Income)		\$3,276	
Business Losses (Cleanup)		\$3,153	
Business Losses Emergency Plan		\$1,277	
Agricultural		\$368	
Environmental		\$57,707	
Total	\$159,876	\$255,208	1.60



# Benefit-Cost Analysis



Benefit-Cost Ratio

Benefits / Costs - NPV  
(Thousands of 2017 Dollars)

Economics

Public Policy

Planning

**Jack  
Faucett  
Associates**





1% ACE Flood

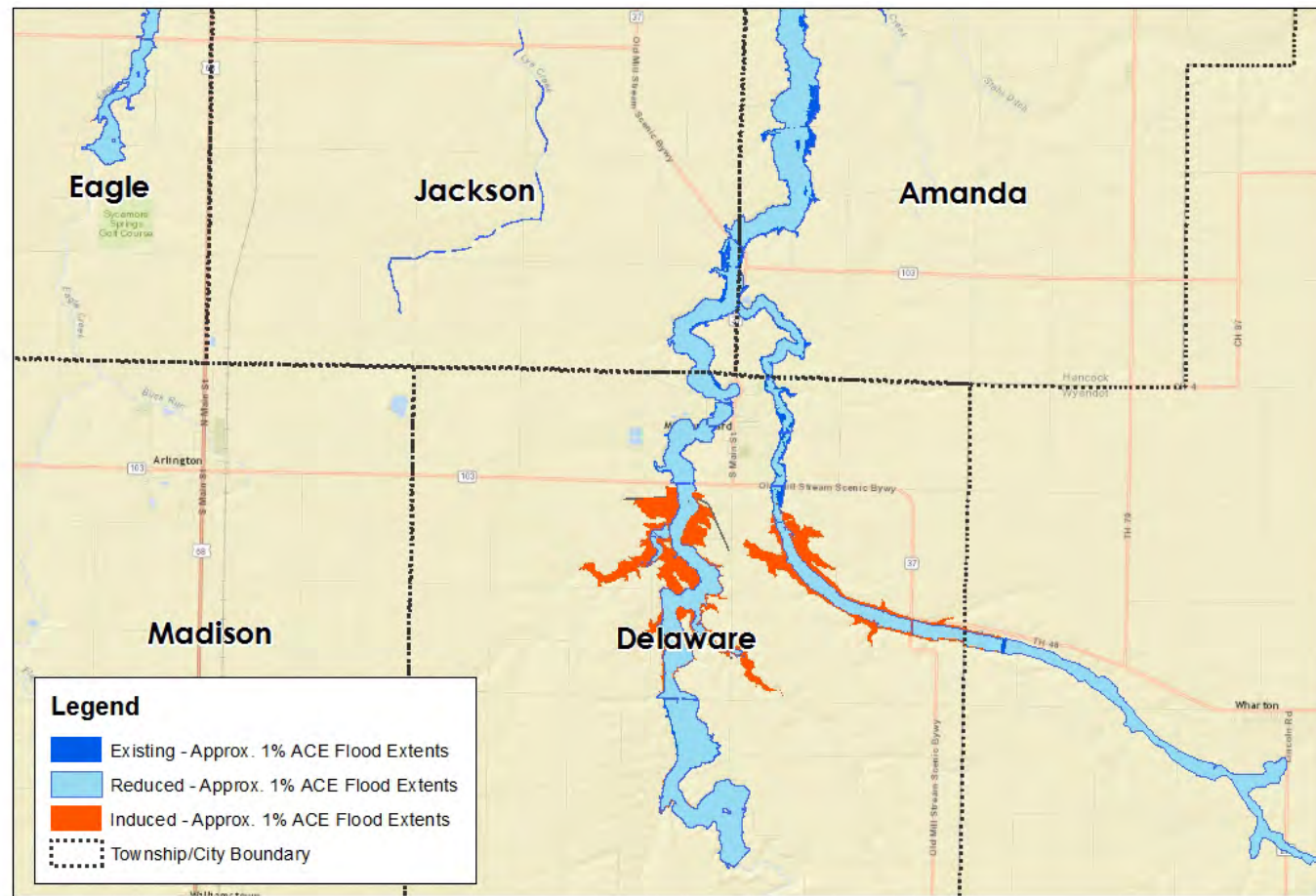
Mt. Blanchard  
Storage

+

Eagle Creek  
Storage

+

Hydraulic  
Improvements





# 1% ACE Flood

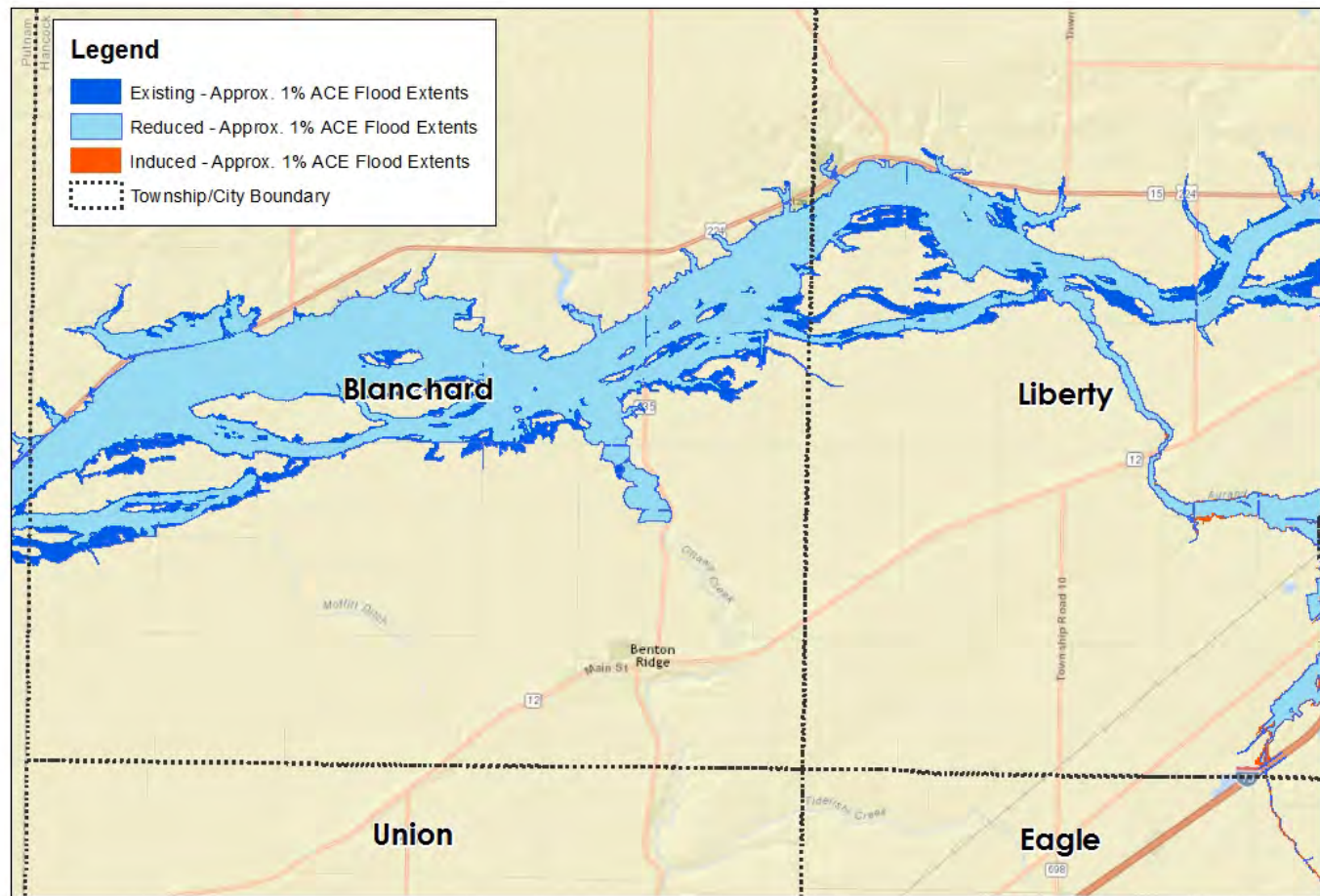
Mt. Blanchard  
Storage

+

Eagle Creek  
Storage

+

Hydraulic  
Improvements



## Path Forward

- Community Review and Consider Options
  - Open Houses at City and Township Level
- MWCD Board & Conservancy Court May 2017
  - Will take Proof of Concept under Advisement
- MWCD Update Official Plan
  - Court will review Stantec report to determine the additional information needed to amend the District's official plan

## Questions

[www.HancockCountyFlooding.com](http://www.HancockCountyFlooding.com)

### Hancock County Flood Risk Reduction Program Report

Steve Wilson - [scwilson@co.hancock.oh.us](mailto:scwilson@co.hancock.oh.us)

Project Manager

Maumee Watershed Conservancy District

1900 Lima Ave.

Findlay, OH 45840

Phone: 419-424-5050