ELK CREEK – AUGUSTA FLOOD MITIGATION

LEWIS AND CLARK COUNTY

FEBRUARY 18, 2022

RESPEC

Aerial photo of 2018 flooding at Augusta and Highway 287, courtesy of Montana Department of Transportation.

2018 FLOODING

Photograph courtesy of Carol Fletcher

Photograph courtesy of USGS

2018 FLOODING

Photograph by Mark Taylor via Great Falls Tribune

2018 FLOODING

Photograph by Mark Taylor via Great Falls Tribune

2018 FLOODING

Drone footage by Into the Little Belts

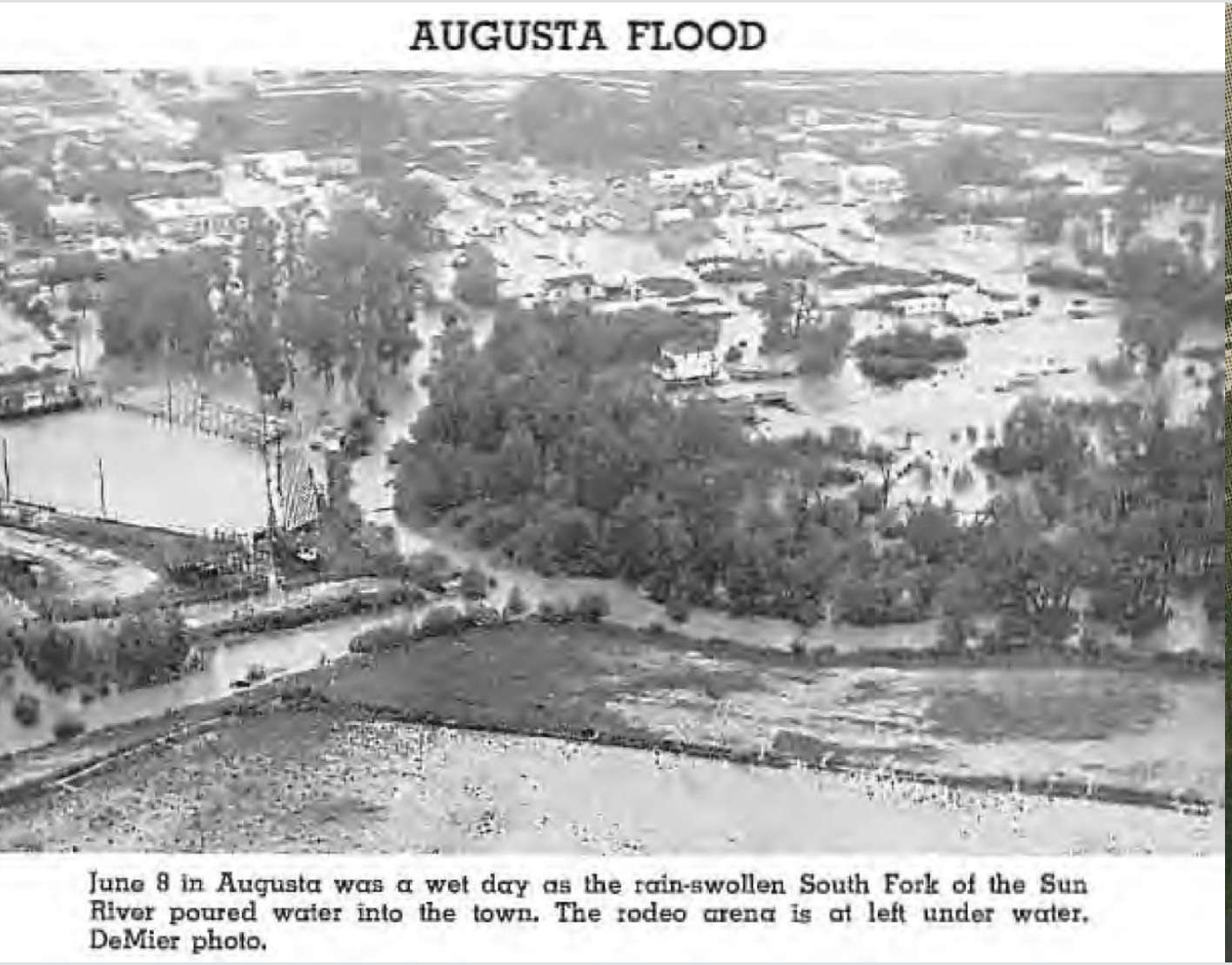
2018 FLOODING MT HIGHWAY 287

Photographs courtesy of the Montana Department of Transportation.

MT HIGHWAY 21 FLOODING

Photographs courtesy of the Montana Department of Transportation.

1964 AERIAL FLOOD PHOTOGRAPHS



AUGUSTA FLOOD

June 8 in Augusta was a wet day as the rain-swollen South Fork of the Sun River poured water into the town. The rodeo arena is at left under water. DeMier photo.

MT-21 aerial photograph of the 1964 flood.

Photographs courtesy of the Great Falls Tribune

1964 FLOOD AT GIBSON RESERVOIR

Photograph by USGS

AUGUSTA FLOOD MITIGATION PROJECT

- DEVELOP FLOOD STUDY
  - Quantify existing conditions, evaluate effectiveness of alternatives
  - Leverage existing data and work to-date
    - Lewis and Clark Conservation District
    - Montana Department of Transportation
- PUBLIC ENGAGEMENT
  - Two Public Meetings to gather local insights and feedback
- DEVELOP FLOOD MITIGATION ENGINEERING RECOMMENDATIONS REPORT
  - Used to leverage grant funding opportunities
  - Used to guide community

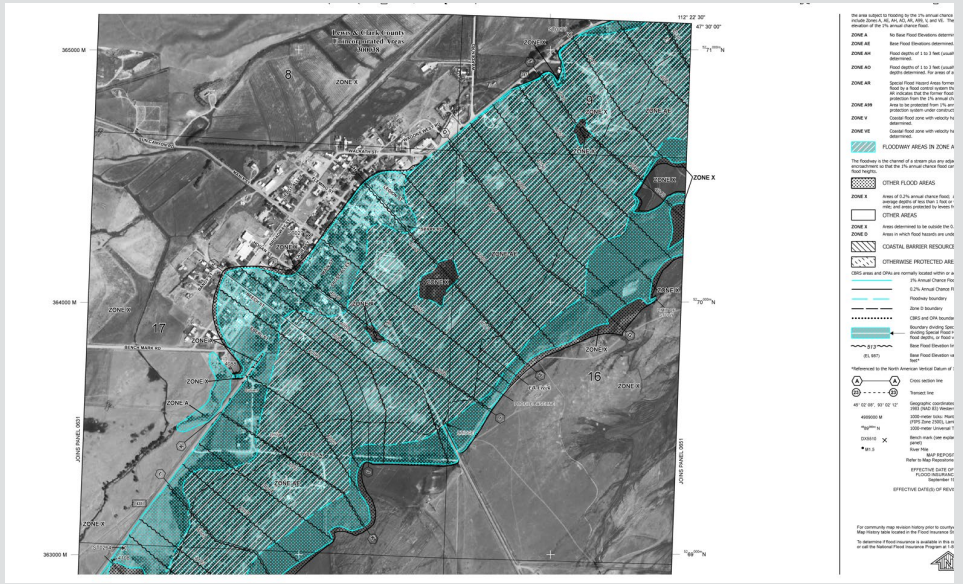
HISTORIC SUMMARY

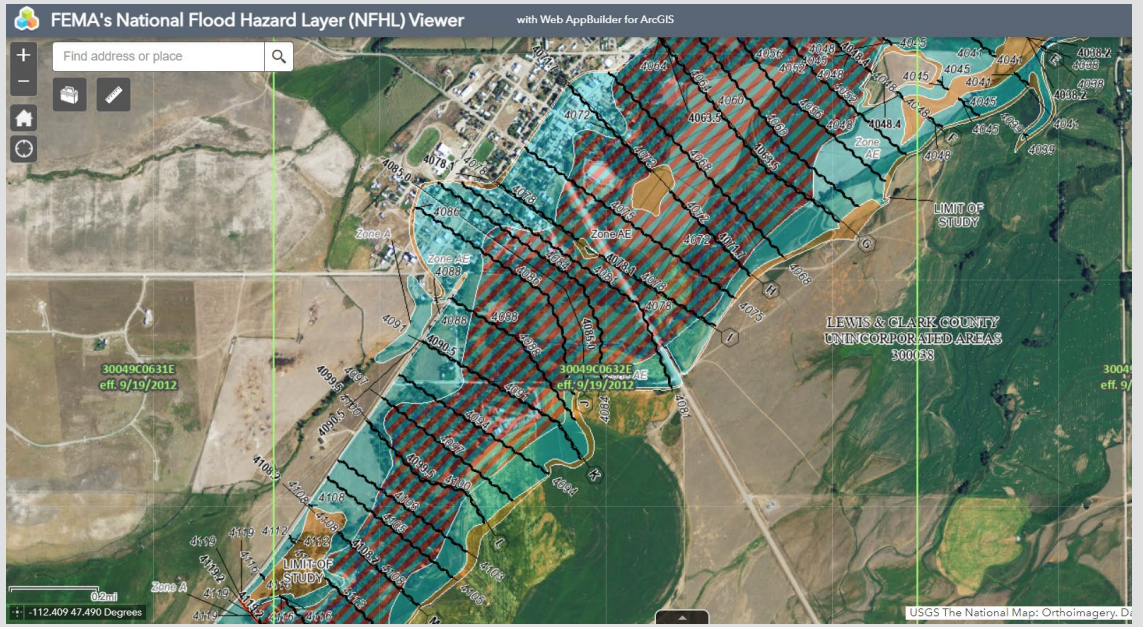
LARGE FLOODS IN:

- 1948
- 1953
- 1964
- 1975
- 2011
- 2018
- 2019

PAST STUDIES:

- 1980 FEMA FIS
- 2019-2020 (CONFLUENCE AND APPLIED GEOMORPHOLOGY)
- 2020 MDT/DOWL HYDROLOGY AT MT-21





HYDROLOGIC ASSESSMENT SUMMARY

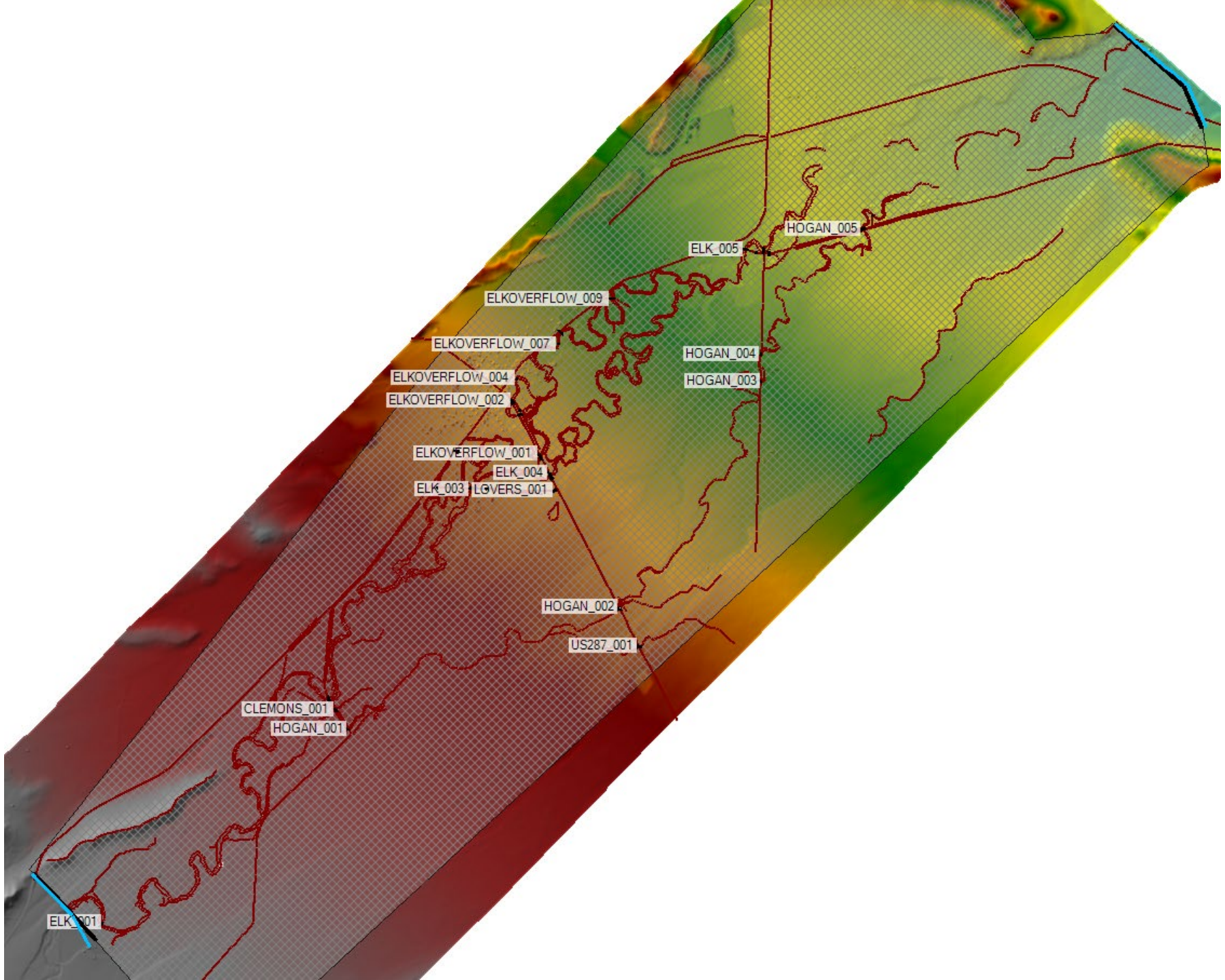
- FLOODING MOST PRONOUNCED AROUND AUGUSTA DUE TO THE FLAT, WIDE FLOODPLAIN
- WATER IS ROUTED BY IRRIGATION DITCHES, BORROW DITCHES, AND STREAM CHANNELS
- ROADS AND LARGE DEBRIS JAMS CREATE BACKWATER
- CHANGING CHANNEL MORPHOLOGY DUE TO SEDIMENT TRANSPORT DURING FLOODS

WHY IS A FLOOD STUDY NECESSARY?

- UNDERSTAND HOW THE NETWORK OF DITCHES AND STREAM CHANNELS ROUTE WATER
- EXTENT OF BACKWATERING FROM ROAD NETWORKS AND CROSSINGS
- ASSESS POTENTIAL MITIGATION SOLUTIONS
- FLOOD STUDY IS NECESSARY FOR FLOODPLAIN PERMITTING
- FEDERAL GRANT ELIGIBILITY
  - Project included in PDM Plan
  - Develop benefit cost analysis (FEMA grants)

HYDRAULICS

- ELK CREEK, ELK CREEK OVERFLOW, HOGAN SLOUGH
  - Utilized measured flows at USGS gage
    - USGS 06084500 Elk Creek at Augusta MT
  - All flooding sources modeled in one 2D area
  - Bridges and Culverts based on RPA survey and field measured elevations
  - Study area:
    - Upstream Extent: 0.5 mi NE of Smith and Elk Creek confluence
    - Downstream Extent: 0.25 mi NE of abandoned railroad berm east of Augusta
  - Simulated the Existing Conditions (EX) – 1964, 1975, 2018 floods


HOGAN_005
ELK_005
ELKOVERFLOW_009
ELKOVERFLOW_007
HOGAN_004
ELKOVERFLOW_004
HOGAN_003
ELKOVERFLOW_002
ELKOVERFLOW_001
ELK_004
ELK_003
LOVERS_001
HOGAN_002
US287_001
CLEMONS_001
HOGAN_001

SIMULATION ANIMATION - EX

FLOODS OF INTEREST:

- 2018 flood event – 6,580 cfs (10-25 year)
- 1975 flood event – 8,500 cfs (25-50 year)
- 1964 flood event – 12,000 cfs (50-100 year)

HYDRAULIC RESULTS SUMMARY

- ELK CREEK MAIN CHANNEL AND FLOODPLAIN
- ELK CREEK OVERFLOW CHANNEL AND FLOODPLAIN
- HOGAN'S SLOUGH CHANNEL AND FLOODPLAIN

	% of Total Flow - 2018		% of Total Flow - 1975		% of Total Flow - 1964	
	US Highway 287	MT Highway 21	US Highway 287	MT Highway 21	US Highway 287	MT Highway 21
Elk Creek Main	37%	86%	35%	81%	33%	75%
Elk Creek Overflow	44%		43%		42%	
Hogan's Slough	19%	14%	22%	19%	25%	25%

FLOOD MITIGATION TOPICS

- COLLECT ADDITIONAL INSIGHT AND FEEDBACK FROM COMMUNITY

- EVALUATE FEASIBILITY AND EFFECTIVENESS OF ALTERNATIVES IN HYDROLOGIC ASSESSMENT:
  - Divert to East Canal and Infiltrate
  - Prevent floodwater capture by 435 ditches at Clemons Rd
  - Highway 287

- DEVELOP A MATRIX OF OPTIONS RANGING IN EASE, COST, AND PERMITTING

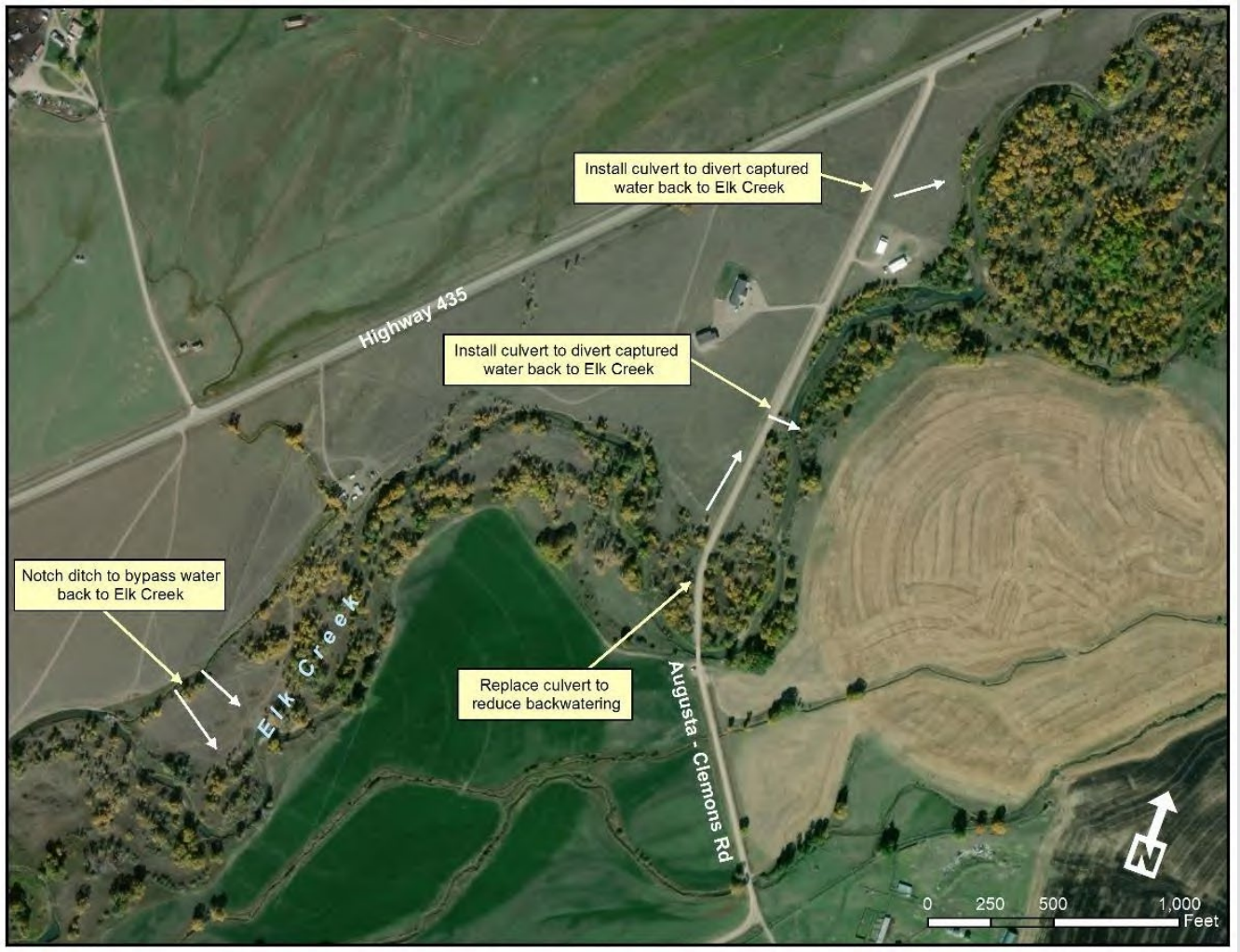
POTENTIAL MITIGATION ALTERNATIVES

- CHANNEL AND FLOODPLAIN DEBRIS REMOVAL, CULVERT MAINTENANCE
- STRUCTURE ASSESSMENT AND UPSIZING
- ROUTE FLOODWATERS AWAY FROM HIGH-RISK AREAS (SUCH AS TOWN)
  - Expand existing infrastructure to route excess flood waters
- REALIGN HIGHWAY 287

CHANNEL, FLOODPLAIN, CULVERT DEBRIS REMOVAL

- GENERALLY LOW COST
- ANNUAL MONITORING, MAINTENANCE
- PERMITTING MAY BE REQUIRED
- COORDINATED EFFORT WITH CD AND FWP FOR ANY CHANNEL ACTIVITY

LIMITING BORROW DITCH ABILITY TO FUNNEL FLOOD WATERS



- EX. : HIGHWAY 435 BORROW DITCHES
- LOWER COST OPTION
- SHORTER TIMEFRAME

Figure from the Post-Flooding Hydrological Assessment by Confluence and Applied Geomorphology (2020).

STRUCTURE ASSESSMENT AND UPSIZING

- US HIGHWAY 287 STRUCTURES
- ELK CREEK OVERFLOW STRUCTURES
- MT 21 STRUCTURES
  - MDT Project Ongoing

ROUTE FLOODWATERS AWAY FROM HIGH-RISK AREAS

- UTILIZE EXISTING INFRASTRUCTURE:
  - Irrigation ditches such as Hogan's Slough
- HIGH COST, LONG-TERM
- IMPACT TO IRRIGATION AND AG OPERATION

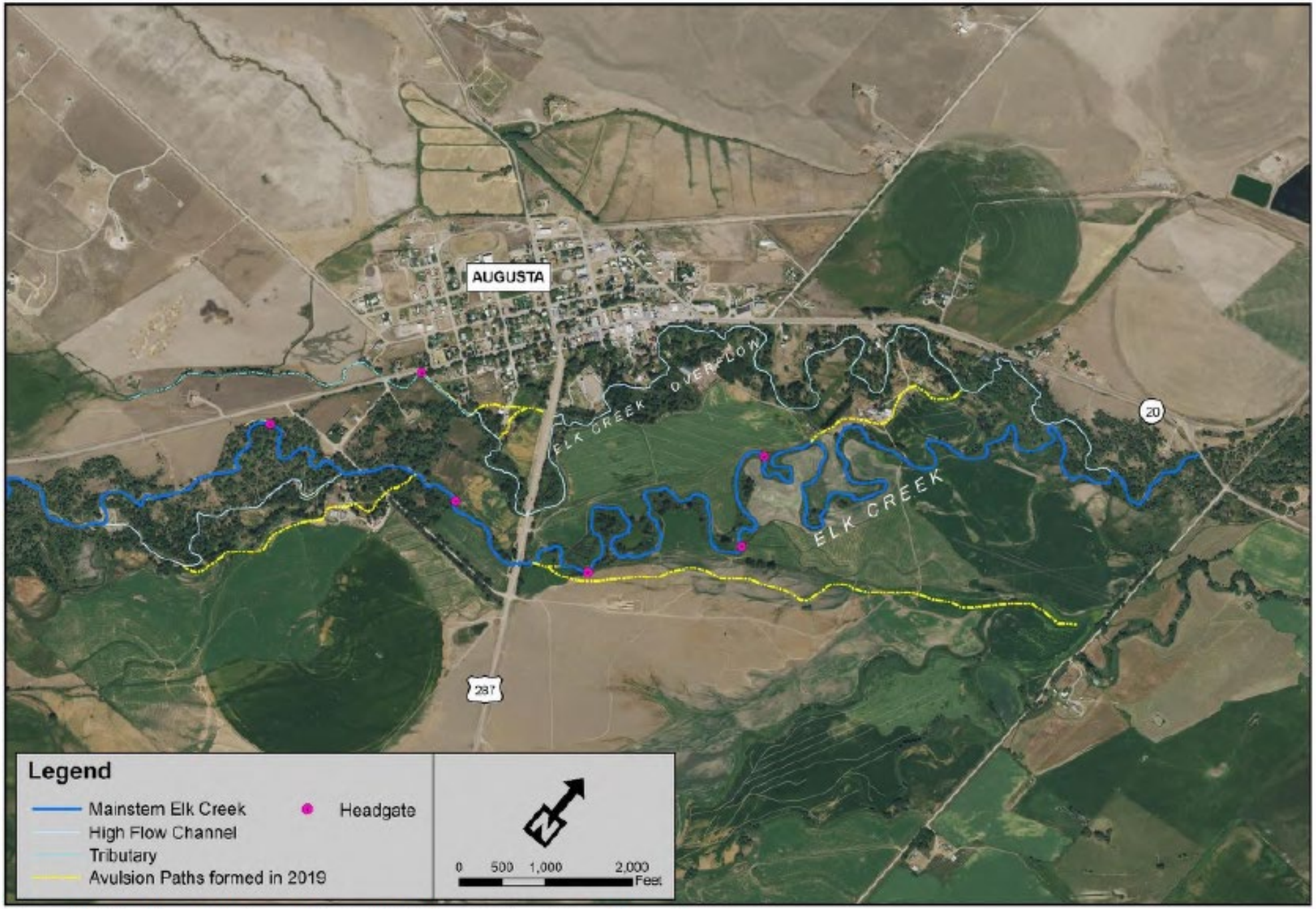


Figure 102. Avulsion paths formed during 2019 flood in the vicinity of Augusta.


Secondary 435 Hwy
Secondary 435 Hwy
Augusta
287
Gilman
21

REALIGN US HIGHWAY 287

- US HIGHWAY 287 IS A LARGE BOTTLENECK
- HIGH COST, LONG TERM
- EVALUATE EFFECTIVENESS IN MODEL
- COLLABORATE WITH MDT

View south across US Highway 287 showing damming of flood waters, flow from right to left.

Figure from the Post-Flooding Hydrological Assessment by Confluence and Applied Geomorphology (2020).

PERMITTING

- 310 PERMIT – LEWIS AND CLARK CONSERVATION DISTRICT
  - Work on bed or bank of perennial stream
- 404 – US ARMY CORPS OF ENGINEERS
  - Placing fill or dredging in Waters of US
- FLOODPLAIN PERMIT
  - Work within the FEMA 100-year floodplain
  - Issued by Lewis and Clark County

ONLINE SURVEY FOR COMMENTS

- HTTPS://WWW.SURVEYMONKEY.COM/R/JMY3GFJ
- COMMENT ON ANY FLOODING RELATED TOPIC
  - Emphasis on observations and mitigation ideas
- OPEN UNTIL 3/18

NEXT STEPS

- COLLECT COMMENTS AND FEEDBACK FROM THIS MEETING
- SIMULATE FEASIBLE ALTERNATIVES TO EVALUATE EFFECTIVENESS (MARCH ‘22)
- HOLD MEETING 2 (APRIL ‘22) TO PRESENT RESULTS AND RECOMMENDATIONS
- COLLECT COMMENTS AND FEEDBACK
- FINAL REPORT – JUNE ‘22

AUGUSTA FLOOD MITIGATION – FEBRUARY 2022 MEETING

QUESTIONS AND DISCUSSION

Photo by Mark Taylor

Photo by Lewis and Clark County