Mayo Mill Dam and Appurtenant Facilities Feasibility & Alternatives Study

for the Town of Dover-Foxcroft

Presentation Overview:

- Technical Studies Status
- Project Basemap
- River Flows
  - Watershed
  - Flow Volumes
  - Features That Influence River Levels
  - Flooding History
  - FEMA Maps
  - River Hydraulics Today

Funding for the report is provided by NOAA Fisheries through the Infrastructure and Investment Jobs Act.

Project Schedule for 2023

Technical Work

- March
  - ✓ basemap of existing conditions
- April
  - ✓ preliminary hydraulic modeling of existing conditions

Project Schedule for 2023

Technical Work

- March
  - ✓ basemap of existing conditions
- April
  - ✓ preliminary hydraulic modeling of existing conditions
- June
  - draft existing conditions report
  - draft preliminary screening matrix table of potential options
- June to August
  - supplemental fieldwork
- September
  - final existing conditions report

Project Schedule for 2023

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- March
  - ✓ basemap of existing conditions
- April
  - ✓ preliminary hydraulic modeling of existing conditions
- June
  - draft existing conditions report
  - draft preliminary screening matrix table of potential options
- June to August
  - supplemental fieldwork
- September
  - final existing conditions report
- October
  - draft feasibility and alternatives report
- December
  - final feasibility and alternatives report

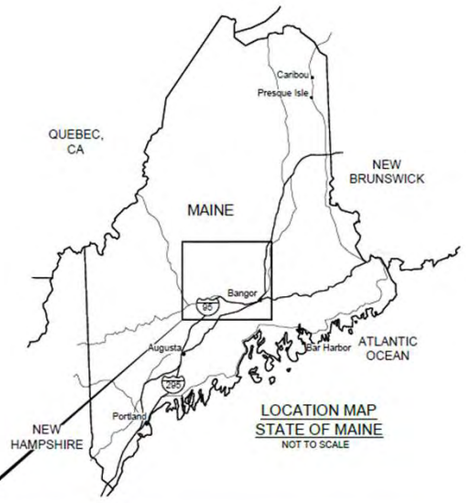
Basemap

MAYO MILL DAM REVITALIZATION

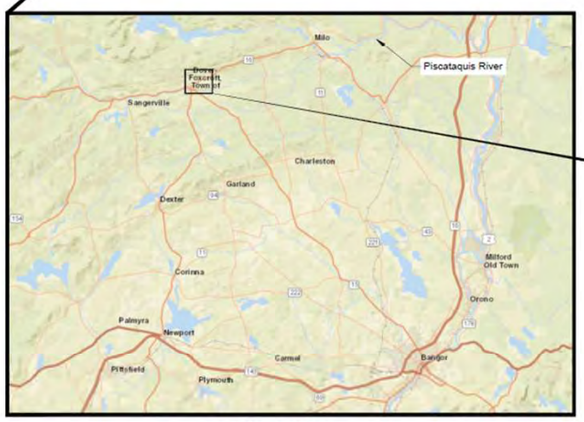
PISCATAQUIS RIVER, DOVER-FOXCROFT, ME

PROJECT BASEMAP

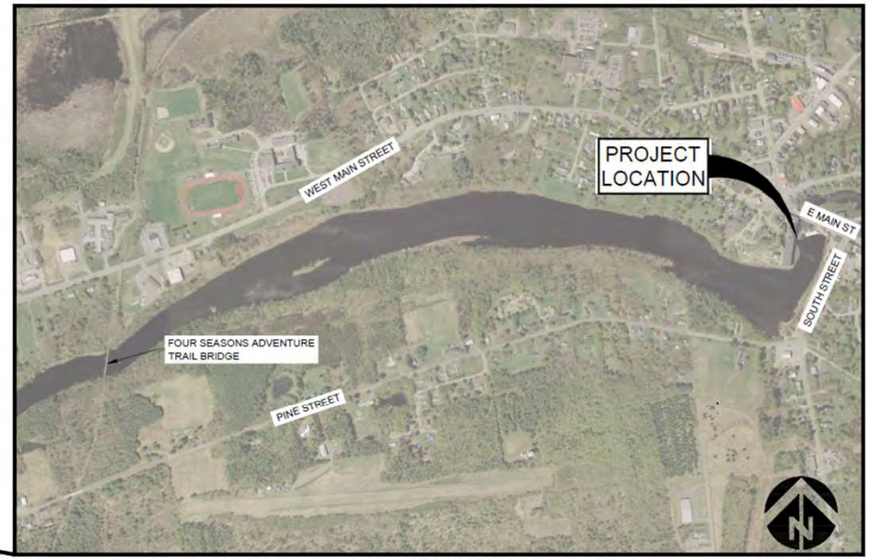
April 2023



LOCATION MAP
STATE OF MAINE
NOT TO SCALE



VICINITY MAP
1" = 30,000'



SITE MAP
1" = 500'

SHEET INDEX

COORDINATES:
LATITUDE N45° 11' 14"
LONGITUDE W69° 13' 54"
DOVER-FOXCROFT, PISCATAQUIS COUNTY, MAINE

WATERBODY: PISCATAQUIS RIVER
TRIBUTARY OF: PENOBSCOT RIVER

NO.	BY	DATE	REVISION DESCRIPTION

KD	MYS	MB
DRAWN	DESIGNED	CHECKED
-----	04-05-23	22-05-26
APPROVED	DATE	PROJECT

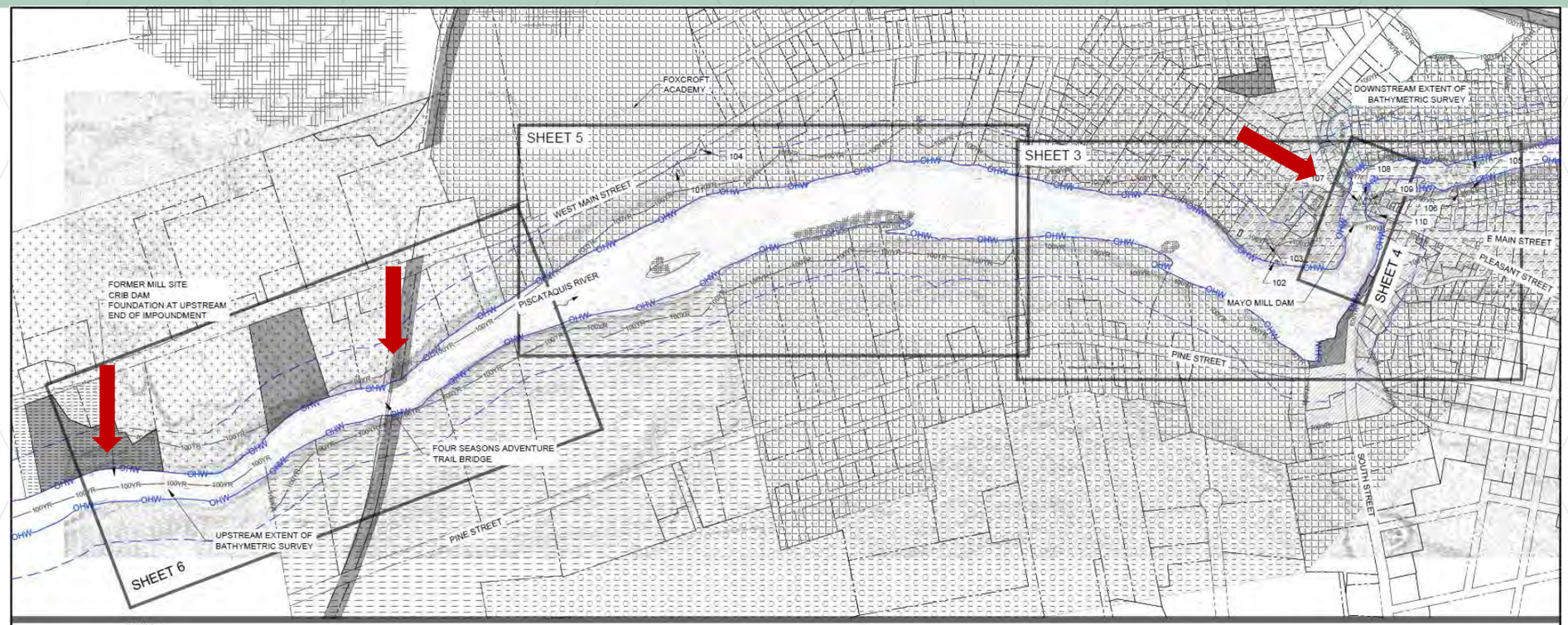
TOWN OF DOVER-FOXCROFT
MAY MILL DAM REVITALIZATION
DOVER-FOXCROFT, ME

inter-fluve
265 Main Street, Suite 2 B
PO Box 236
Damariscotta, ME 04543
207.315.7014
www.interfluve.com

COVER SHEET, LOCATION MAP AND SHEET INDEX

SHEET
1 OF 7

Basemap



NOTES:

1. HORIZONTAL COORDINATES ARE REFERENCED TO MAINE STATE PLANE, EAST ZONE, NAD 83, US SURVEY FEET. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88), UNITS OF FEET.
2. BATHYMETRIC SURVEY BY INTER-FLUVE NOVEMBER 2022. BATHYMETRIC CONTOURS SHOULD BE CONSIDERED APPROXIMATE.
3. SELECTED TOPOGRAPHIC SURVEY OF NEAR SHORE DAM AREA AND SELECTED FEATURES BY INTER-FLUVE IN NOVEMBER 2022. TOPOGRAPHY AND FEATURE SURVEY IN DAM, SPILLWAY AND SURROUNDING AREA SUPPLEMENTED BY SURVEY AND STRUCTURE FROM MOTION PHOTOGRAMETRY COURTESY OF WEBBER SURVEYING, COLLECTED SEPTEMBER, 2019. TOPOGRAPHIC SURVEY OF MONUMENT SQUARE AND MOOSEHEAD LANE AREAS SUPPLEMENTED BY SURVEY COURTESY OF PLYMOUTH ENGINEERING, COLLECTED BY PERRY LAND SURVEYING IN DECEMBER 2021 AND JUNE 2022.
4. LIDAR DATA OBTAINED FROM USGS VIA MAINE GIS, COLLECTED IN 2015. PROVIDES SUPPLEMENTAL TOPOGRAPHY OUTSIDE THE LIMITS OF THE TOPOGRAPHIC AND BATHYMETRIC SURVEY.
5. FERC PROJECT BOUNDARY PER NATEL 2020. PARCEL LINES, LAND USE BOUNDARIES AND HISTORIC DISTRICT BASED ON PUBLIC SOURCE GIS DATA COURTESY OF LATLONG LOGIC. SEWER AND WATER SUPPLY ALIGNMENTS AND FEATURES COURTESY OF DIRIGO ENGINEERING. ALL OTHER BOUNDARIES AND FEATURES BASED ON STATE OF MAINE GIS MAINE DATABASE OR RELEVANT RESOURCE AGENCY ONLINE SOURCES.
6. PISCATAQUIS RIVER IS FEDERALLY DESIGNATED CRITICAL HABITAT FOR ENDANGERED ATLANTIC SALMON

LEGEND

- EXISTING 1 FT. CONTOUR
- EXISTING 5 FT. CONTOUR
- PARCELS
- RIVER/STREAM
- LAND USE-VILLAGE
- LAND USE-DOWNTOWN
- LAND USE-LIGHT INDUSTRIAL
- LAND USE-RURAL RESIDENTIAL
- LAND USE-COMMERCIAL
- HISTORIC DISTRICT
- OHW — DRAFT ORDINARY HIGH WATER
- 100YR — FEMA ZONE AE
- NATIONAL WETLANDS INVENTORY
- CONSERVED LANDS
- 250 FOOT RIPARIAN BUFFER

0 600 1200

SCALE IN FEET

(AS SHOWN ON 22" X 34" SHEET)

SURVEY CONTROL:

CONTROL	DESCRIPTION	EASTING (FT)	NORTHING (FT)	ELEVATION (FT)
101	CAPPED REBAR	791823.55	554175.59	377.9
102	CAPPED REBAR	795536.9	553615.85	348.436'
103	MANHOLE	795482.17	553722	350.63
104	CAPPED REBAR	791970.67	554305.62	377.02
105	CAPPED REBAR	796741.38	554069.68	371.48
106	NAIL	796652.11	554044.96	368.81
107	NAIL	796051.9	553962.65	356.39
108	NAIL	796087.52	554000.81	355.81
109	NAIL	795915.59	554077.58	356.39

NO.	BY	DATE	REVISION DESCRIPTION

KD DRAWN — APPROVED | MYS DESIGNED | 04-05-23 DATE | MB CHECKED | 22-05-26 PROJECT

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inter-fluve

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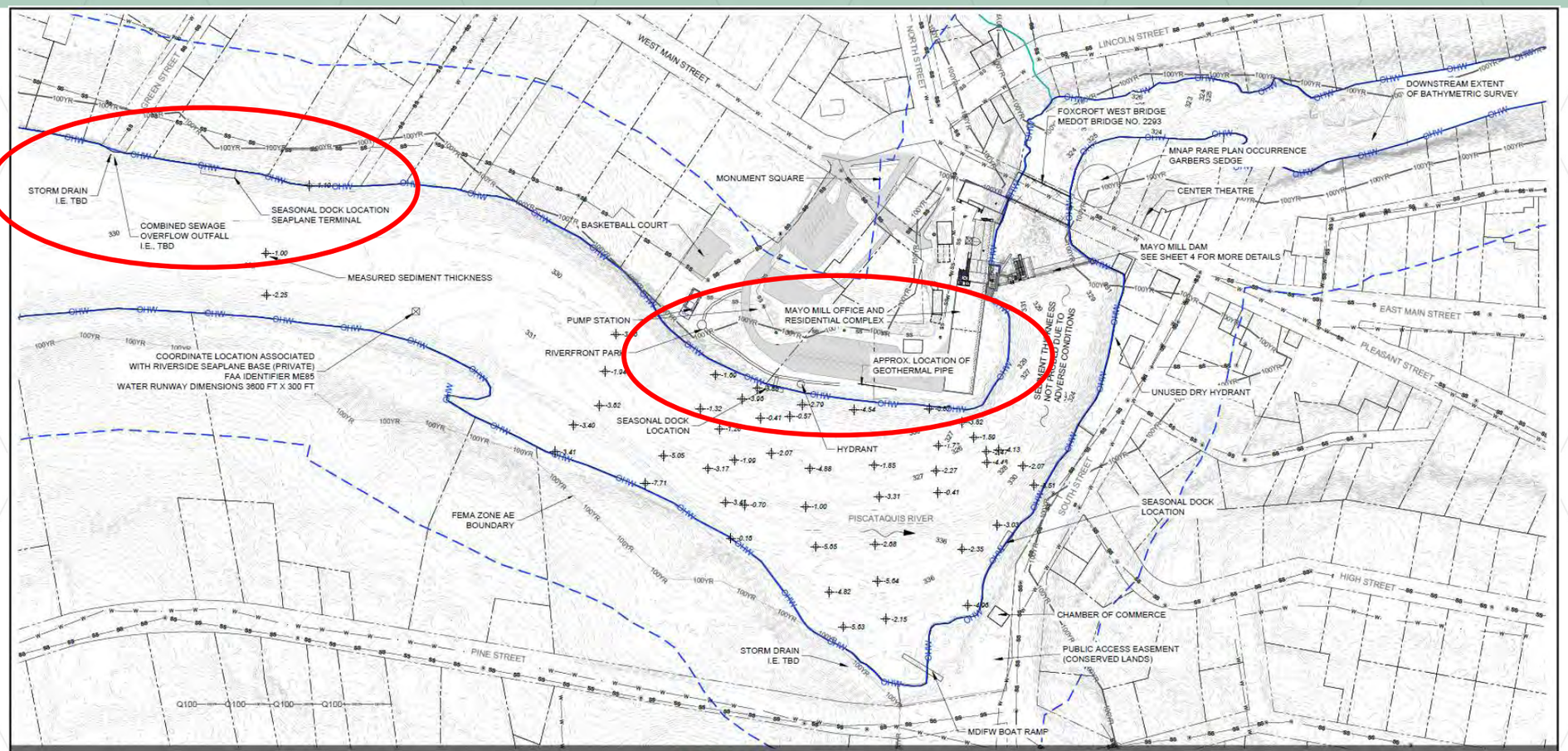
PLAN OVERVIEW & SURVEY CONTROL

SHEET 2 OF 7

Basemap



NOTES:

1. NATIONAL WETLANDS INVENTORY DATA OBTAINED FROM US FISH AND WILDLIFE SERVICE. SOURCE DATA RESOLUTION IS LOW AND LOCATIONS ARE APPROXIMATE.
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N

0 200 400

SCALE IN
FEET
(AS SHOWN ON 22" X 34" SHEET)

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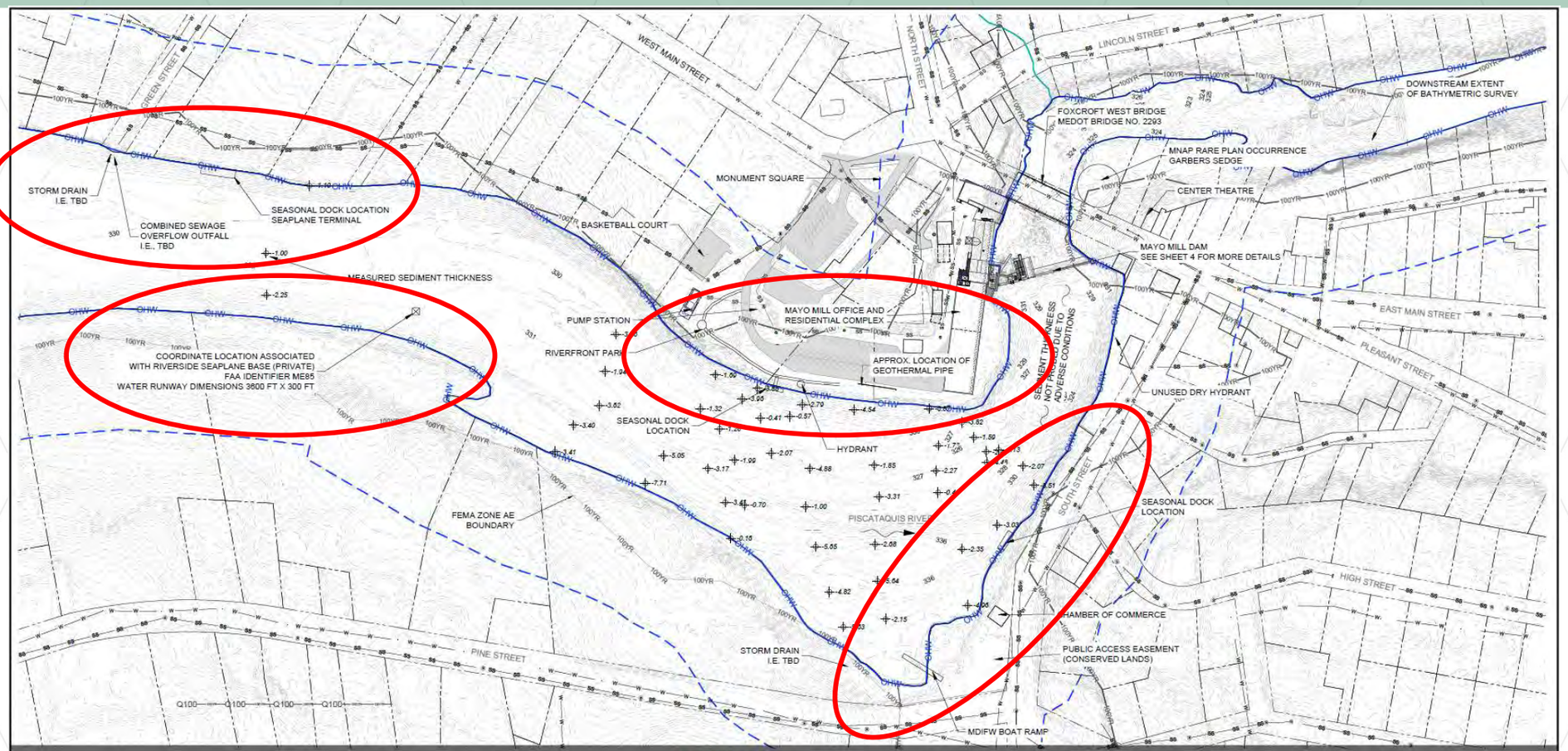
EXISTING CONDITIONS (1 OF 4)

SHEET
3 OF 7

Basemap



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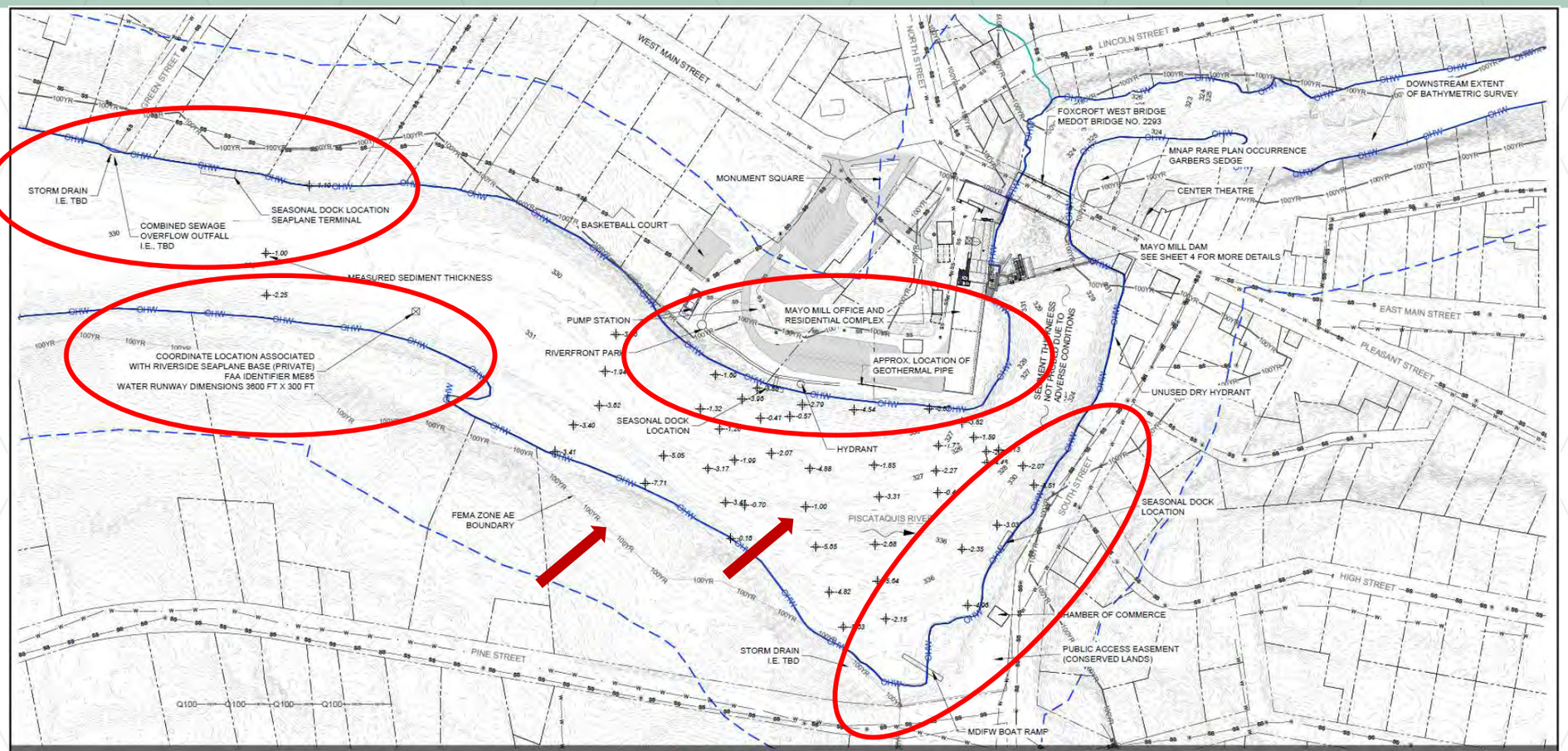

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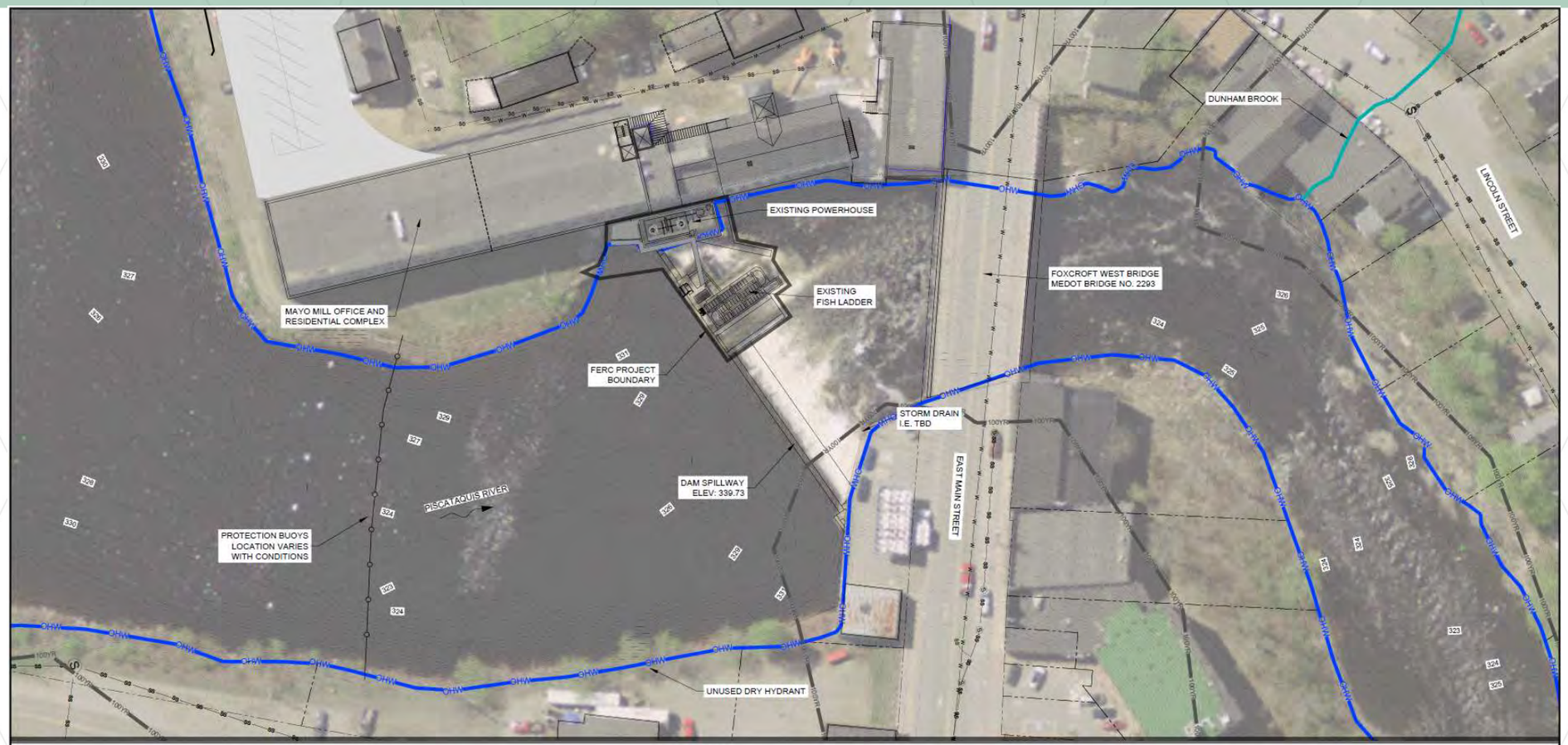
EXISTING CONDITIONS (1 OF 4)

SHEET 3 OF 7

Basemap



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- FERC PROJECT BOUNDARY
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0 60 120

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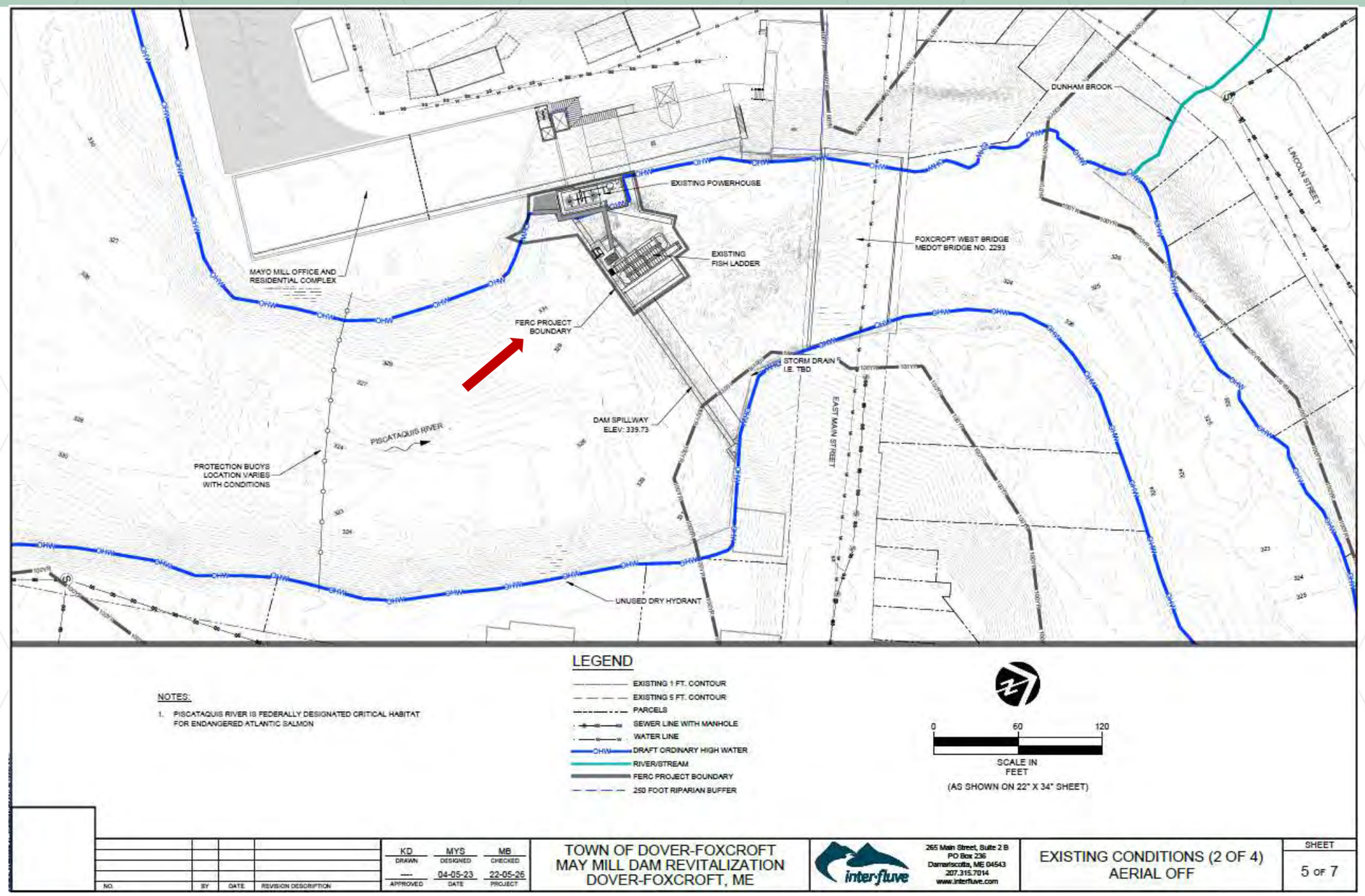
EXISTING CONDITIONS (2 OF 4)
AERIAL ON

SHEET
4 OF 7

Basemap


DUNHAM BROOK
LINCOLN STREET
EXISTING POWERHOUSE
EXISTING FISH LADDER
FOXCROFT WEST BRIDGE MEDOT BRIDGE NO. 2293
MAYO MILL OFFICE AND RESIDENTIAL COMPLEX
FERC PROJECT BOUNDARY
STORM DRAIN I.E. TBD
EAST MAIN STREET
DAM SPILLWAY ELEV: 339.73
PISCATAQUIS RIVER
PROTECTION BUOYS LOCATION VARIES WITH CONDITIONS
UNUSED DRY HYDRANT
NOTES:
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LEGEND
EXISTING 1 FT. CONTOUR
EXISTING 5 FT. CONTOUR
PARCELS
SEWER LINE WITH MANHOLE
WATER LINE
DRAFT ORDINARY HIGH WATER
RIVER/STREAM
FERC PROJECT BOUNDARY
250 FOOT RIPARIAN BUFFER
0
60
120
SCALE IN FEET
(AS SHOWN ON 22" X 34" SHEET)
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PROJECT
TOWN OF DOVER-FOXCROFT
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DOVER-FOXCROFT, ME
interfluve
265 Main Street, Suite 2 B
PO Box 236
Damariscotta, ME 04543
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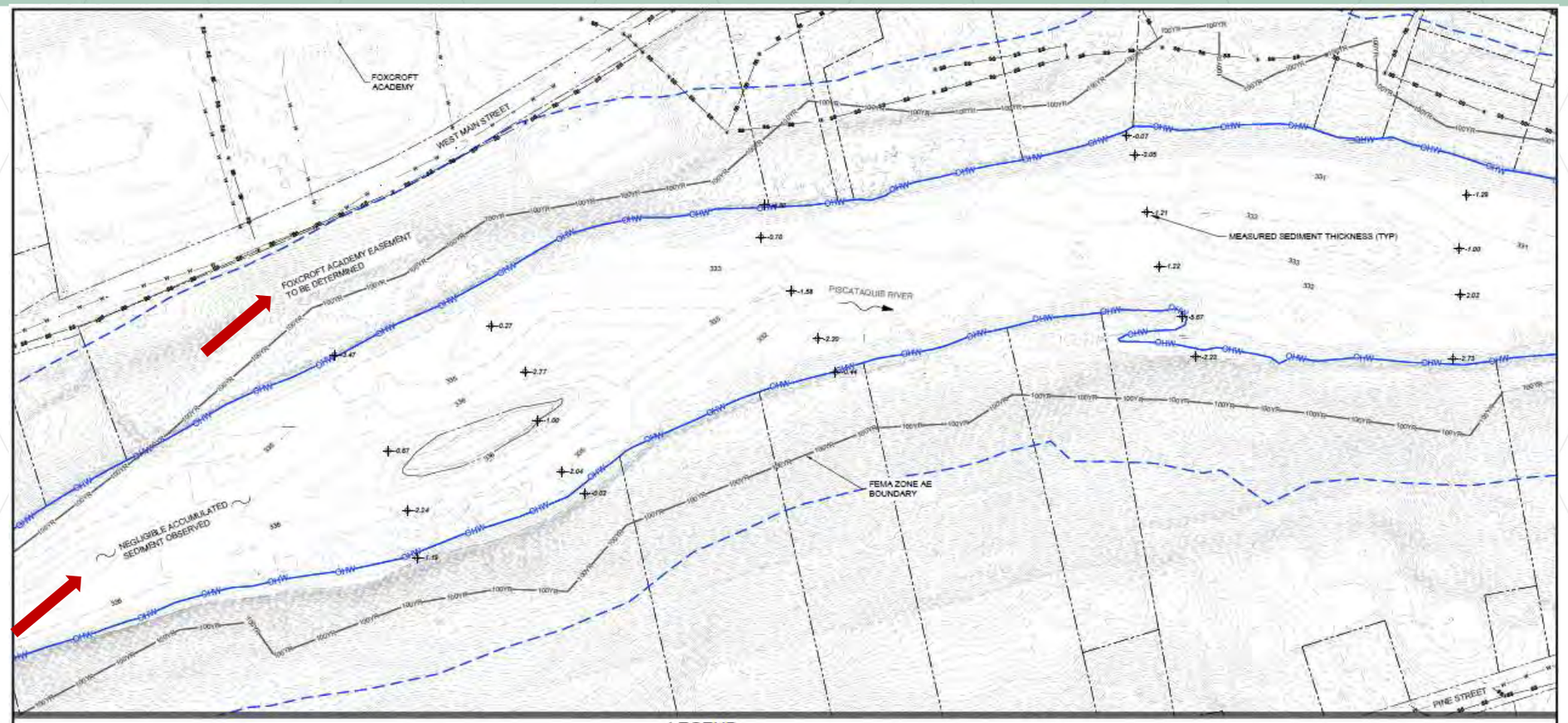
www.interfluve.com
EXISTING CONDITIONS (2 OF 4)
AERIAL OFF
SHEET
5 OF 7

Basemap



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0 200 400

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KD (DRAWN) — MYS (DESIGNED) — MB (CHECKED)
— (APPROVED) — 04-05-23 (DATE) — 22-05-26 (PROJECT)

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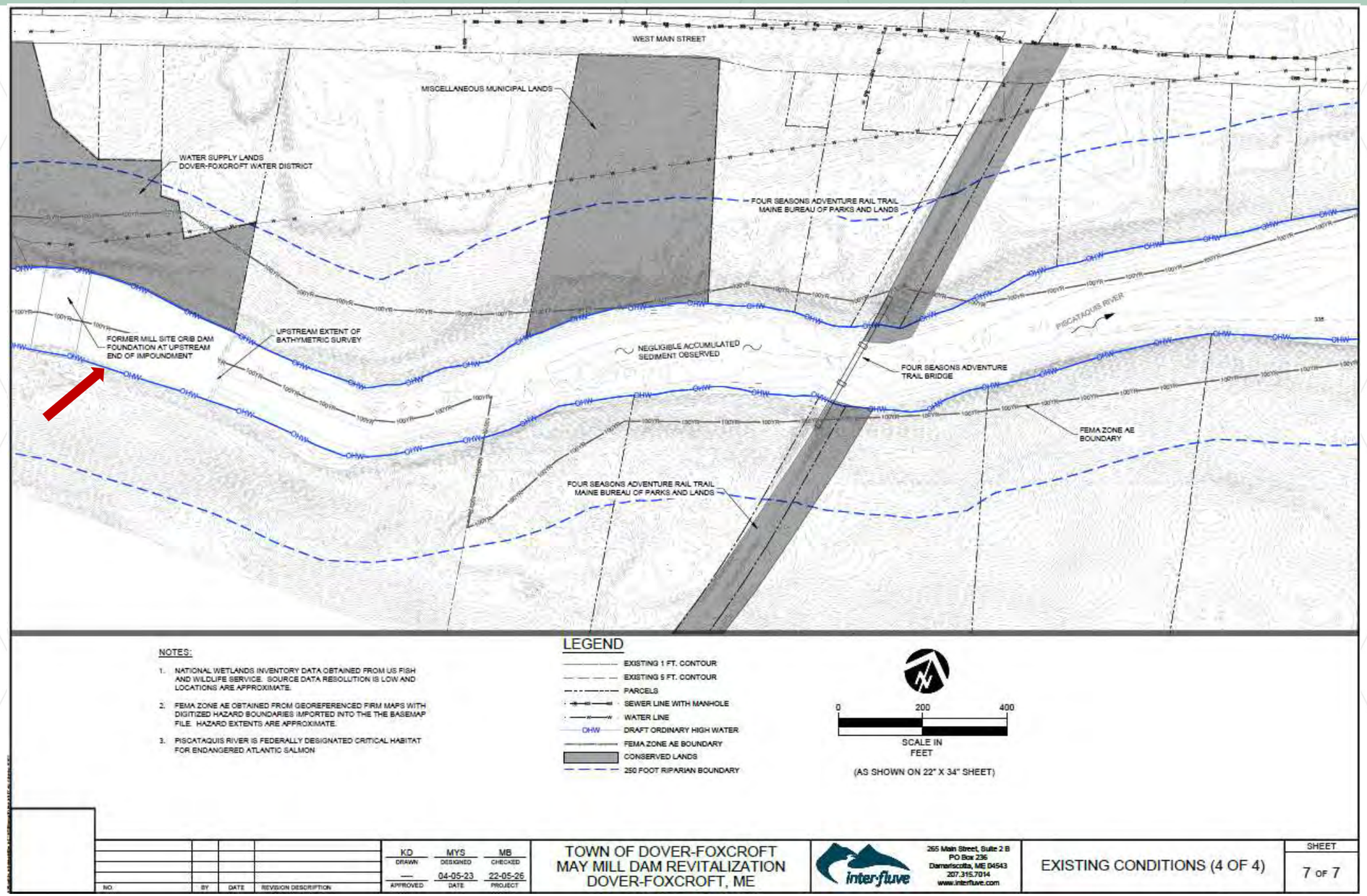
EXISTING CONDITIONS (3 OF 4)

SHEET 6 OF 7

Basemap


WEST MAIN STREET
MISCELLANEOUS MUNICIPAL LANDS
WATER SUPPLY LANDS
DOVER-FOXCROFT WATER DISTRICT
FOUR SEASONS ADVENTURE RAIL TRAIL
MAINE BUREAU OF PARKS AND LANDS
FORMER MILL SITE CRIB DAM
FOUNDATION AT UPSTREAM
END OF IMPOUNDMENT
UPSTREAM EXTENT OF
BATHYMETRIC SURVEY
NEGLIGIBLE ACCUMULATED
SEDIMENT OBSERVED
PISCATAQUIS RIVER
FOUR SEASONS ADVENTURE
TRAIL BRIDGE
FEMA ZONE AE
BOUNDARY
FOUR SEASONS ADVENTURE RAIL TRAIL
MAINE BUREAU OF PARKS AND LANDS
OHW
100YR
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CONSERVED LANDS
250 FOOT RIPARIAN BOUNDARY
0
200
400
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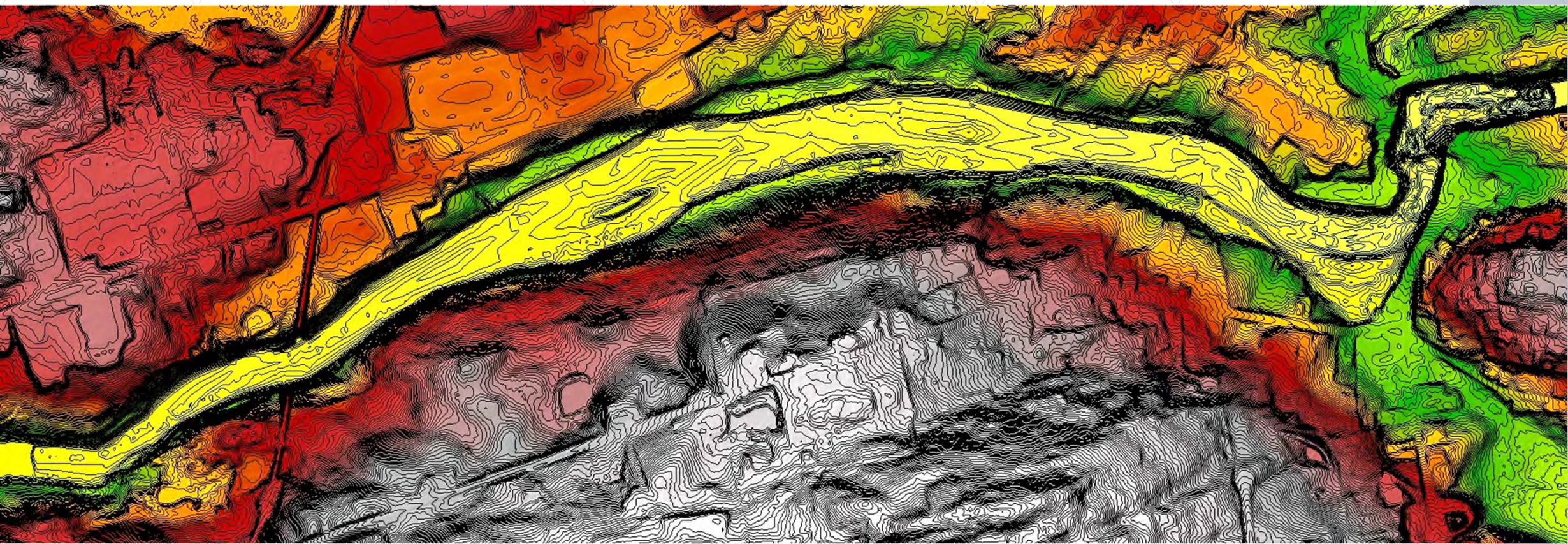
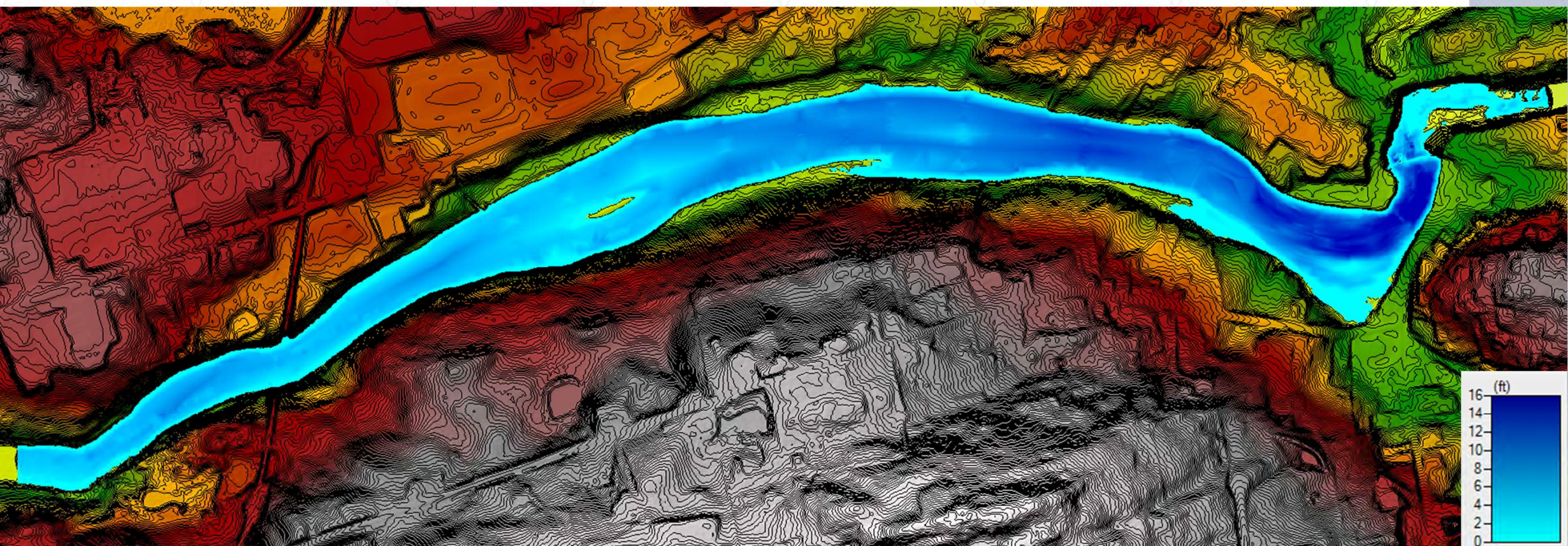
EXISTING CONDITIONS (4 OF 4)
SHEET
7 OF 7

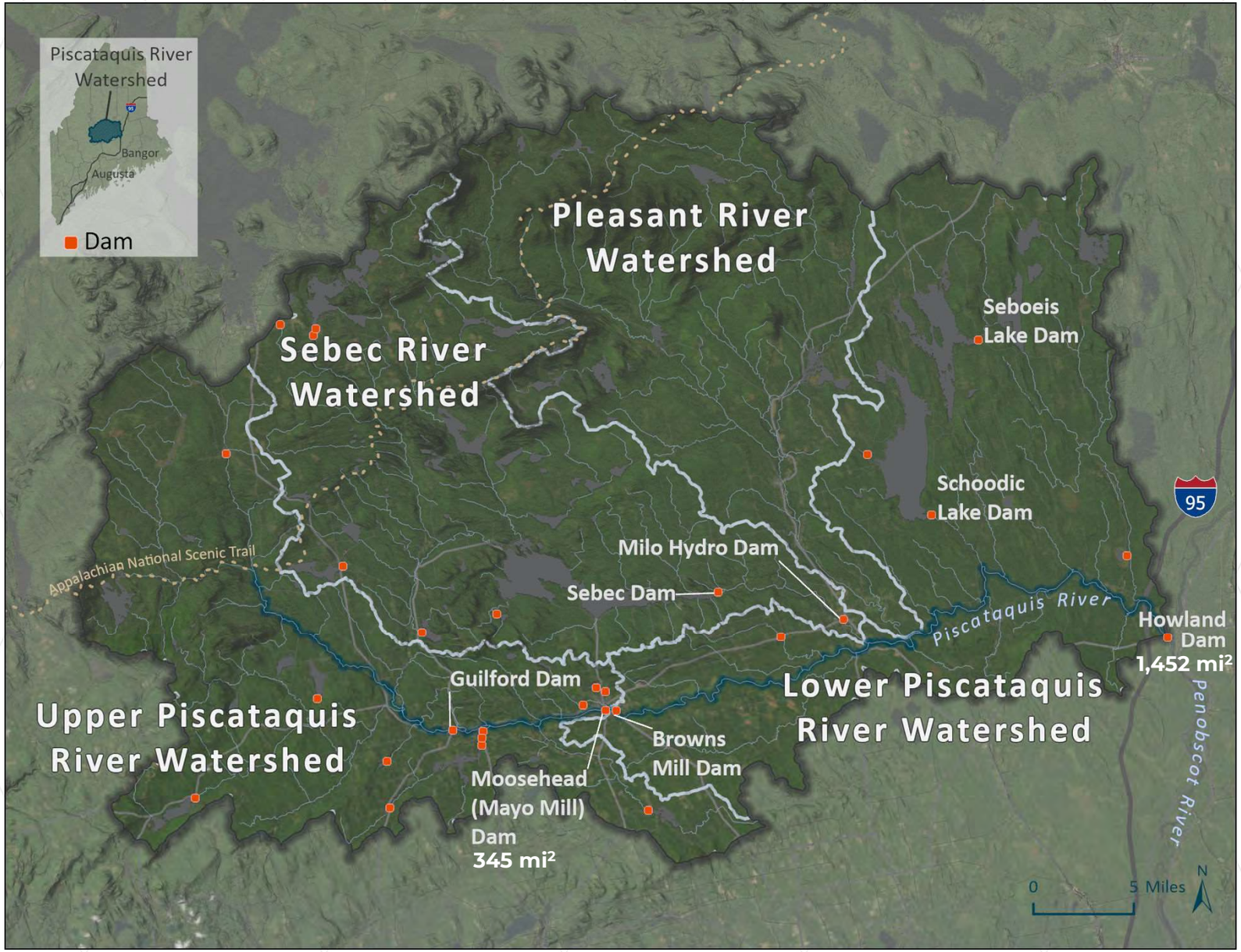
Basemap – Elevation Relief



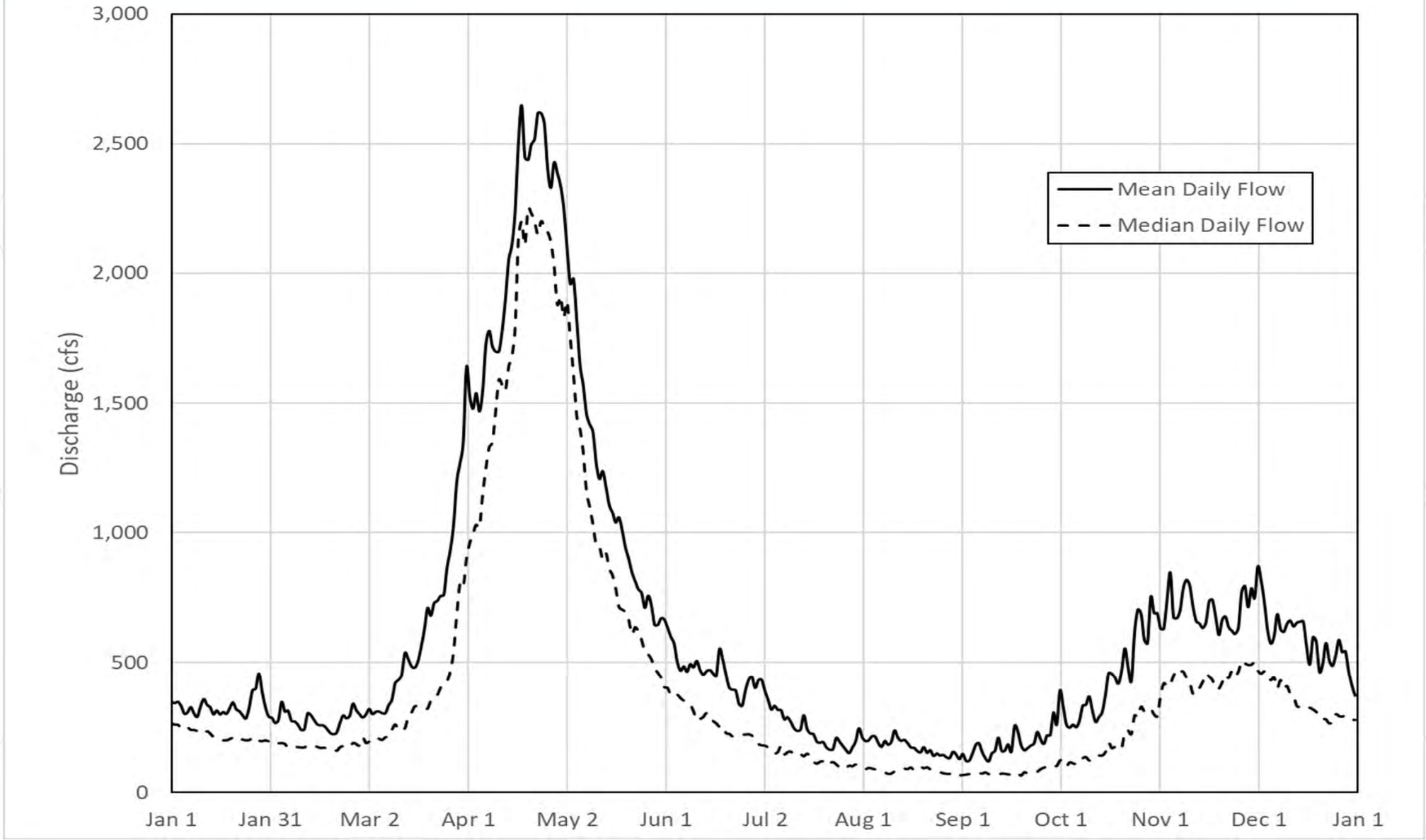
Basemap – Water Depth



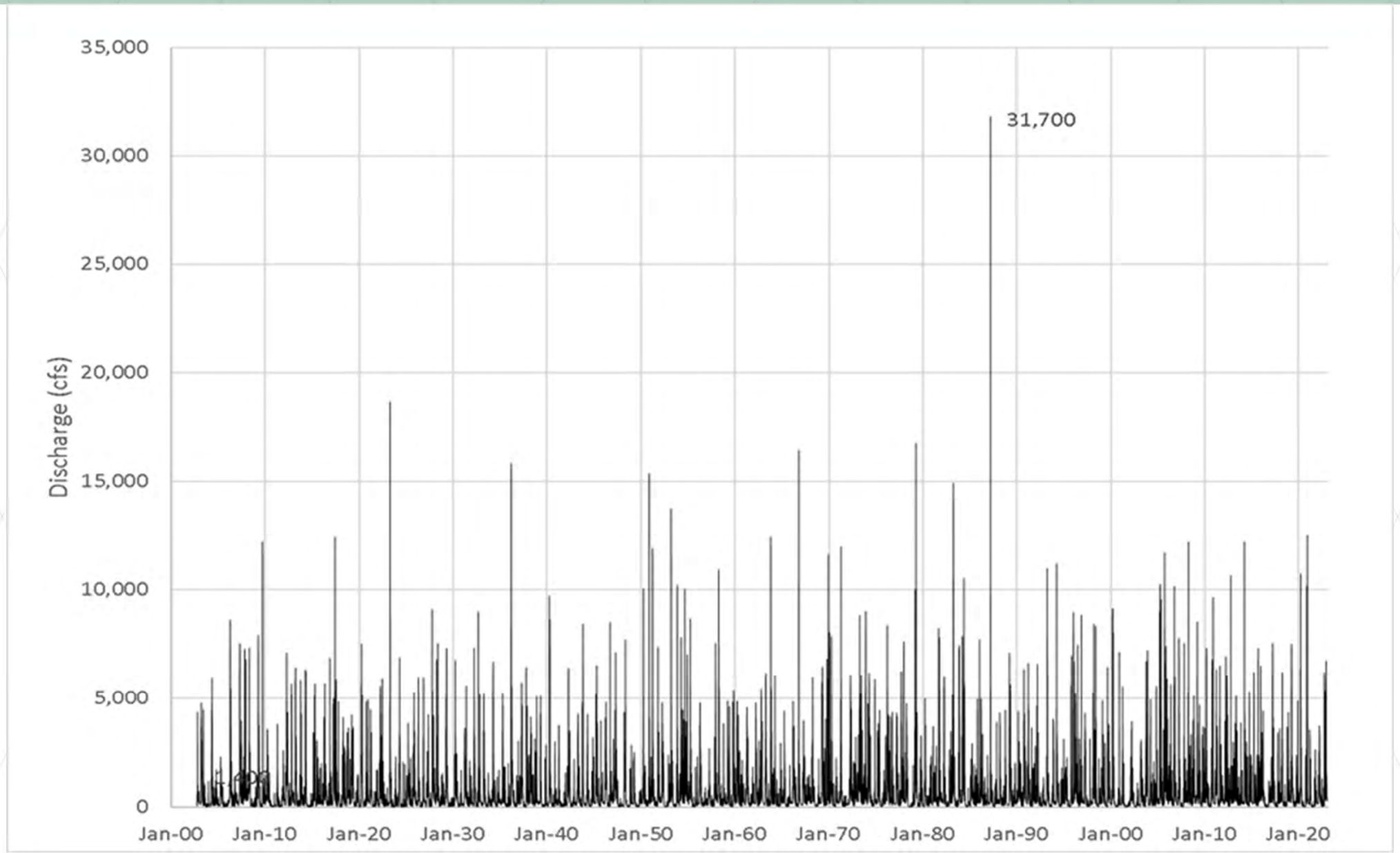
River Flow - Watershed



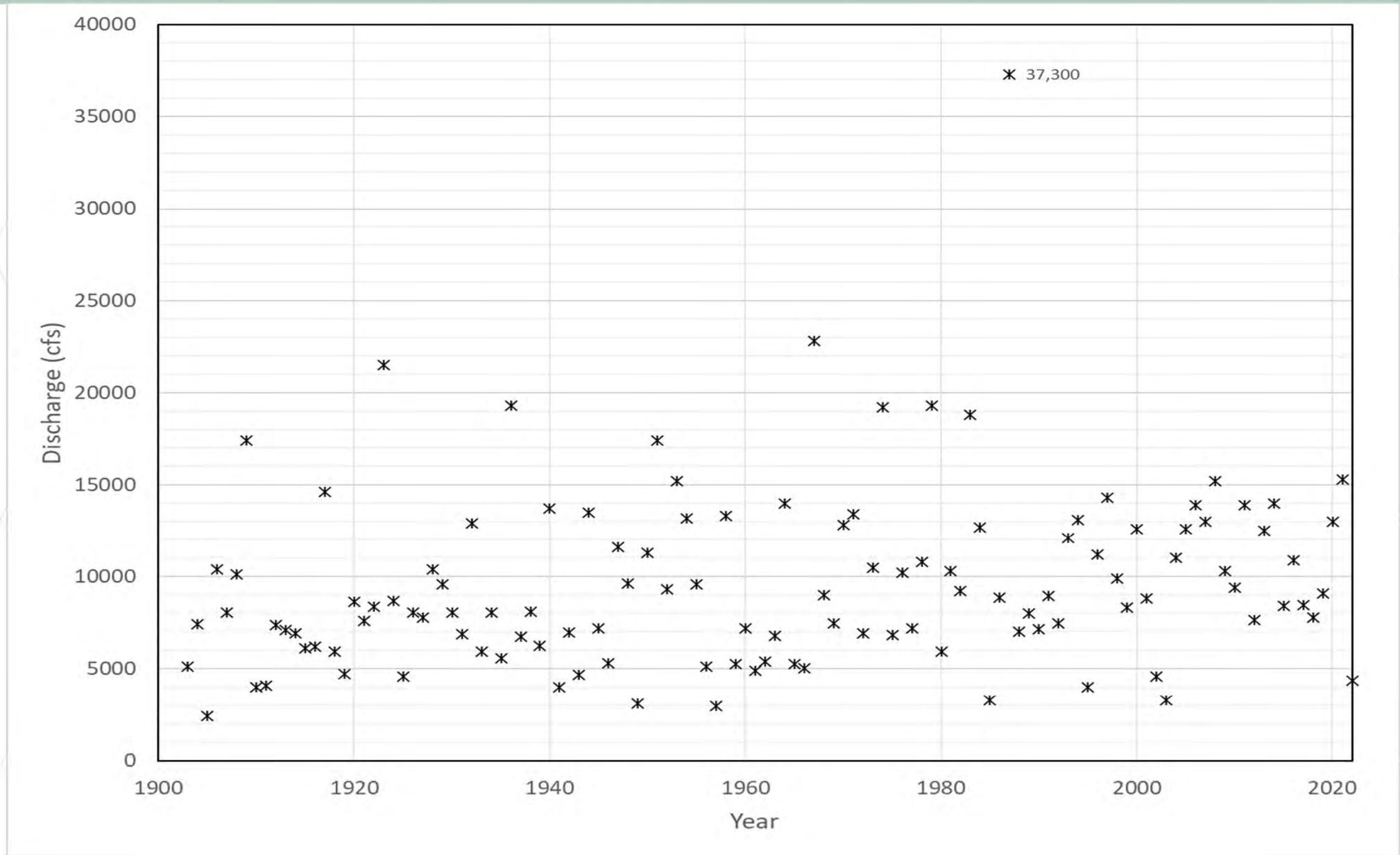
River Flow – 1903 to 2023 Seasonal



River Flow – 1903 to 2023 Daily



River Flow – Annual Peak Flows



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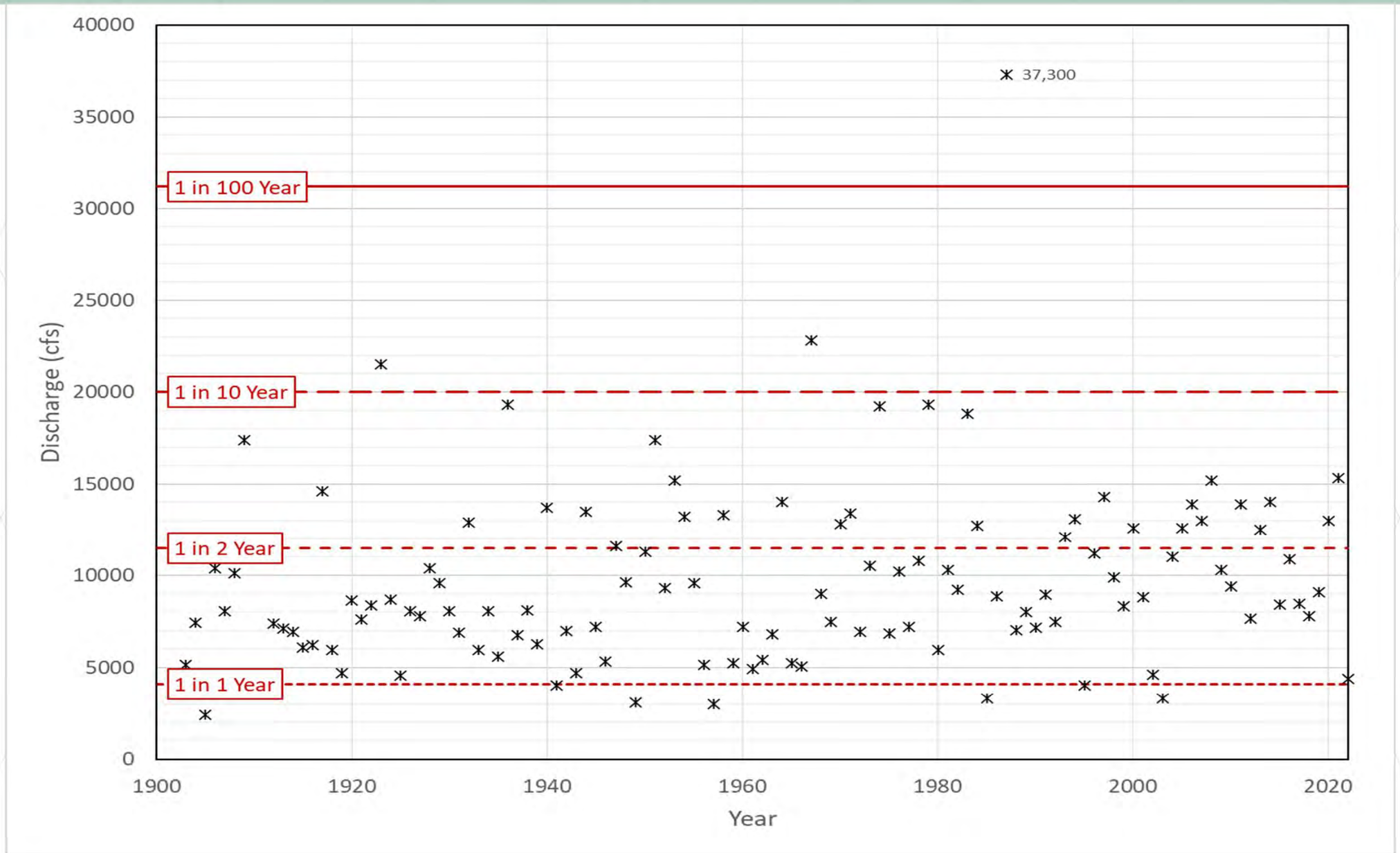
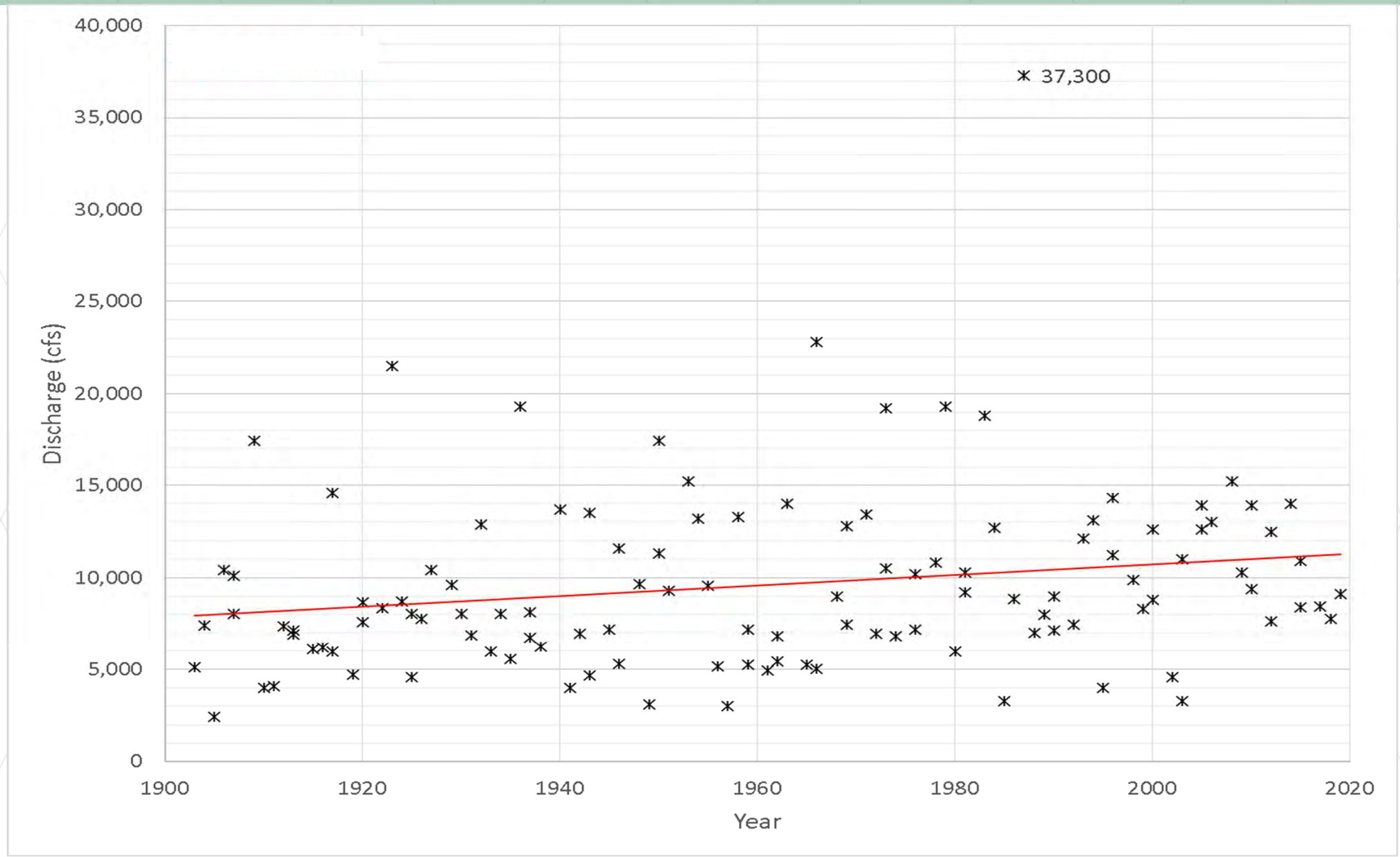


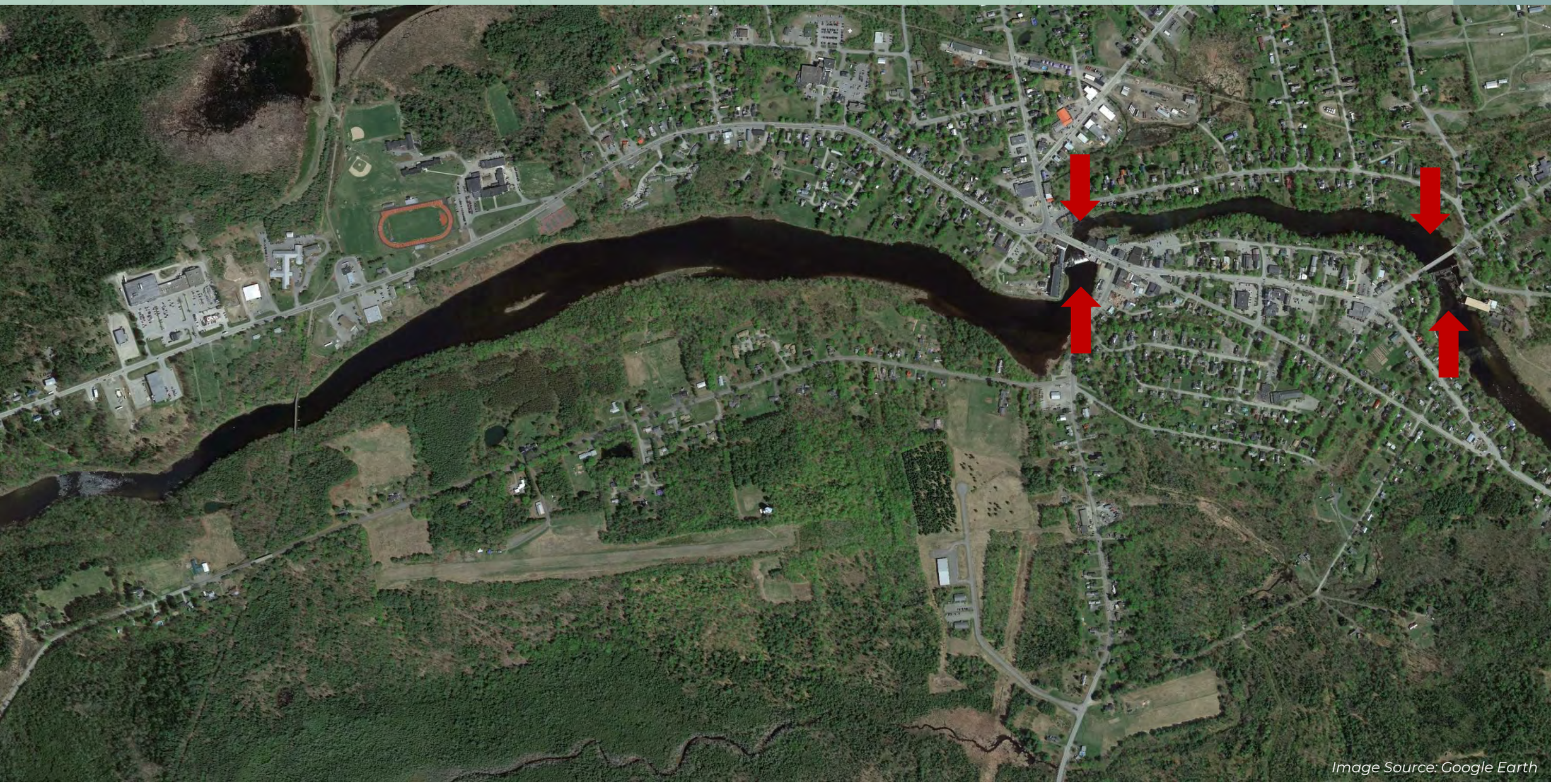
River Flow – Trend in Peak Flows



River Flow – Features That Influence River Levels

Image Source: Google Earth

River Flow – Features That Influence River Levels



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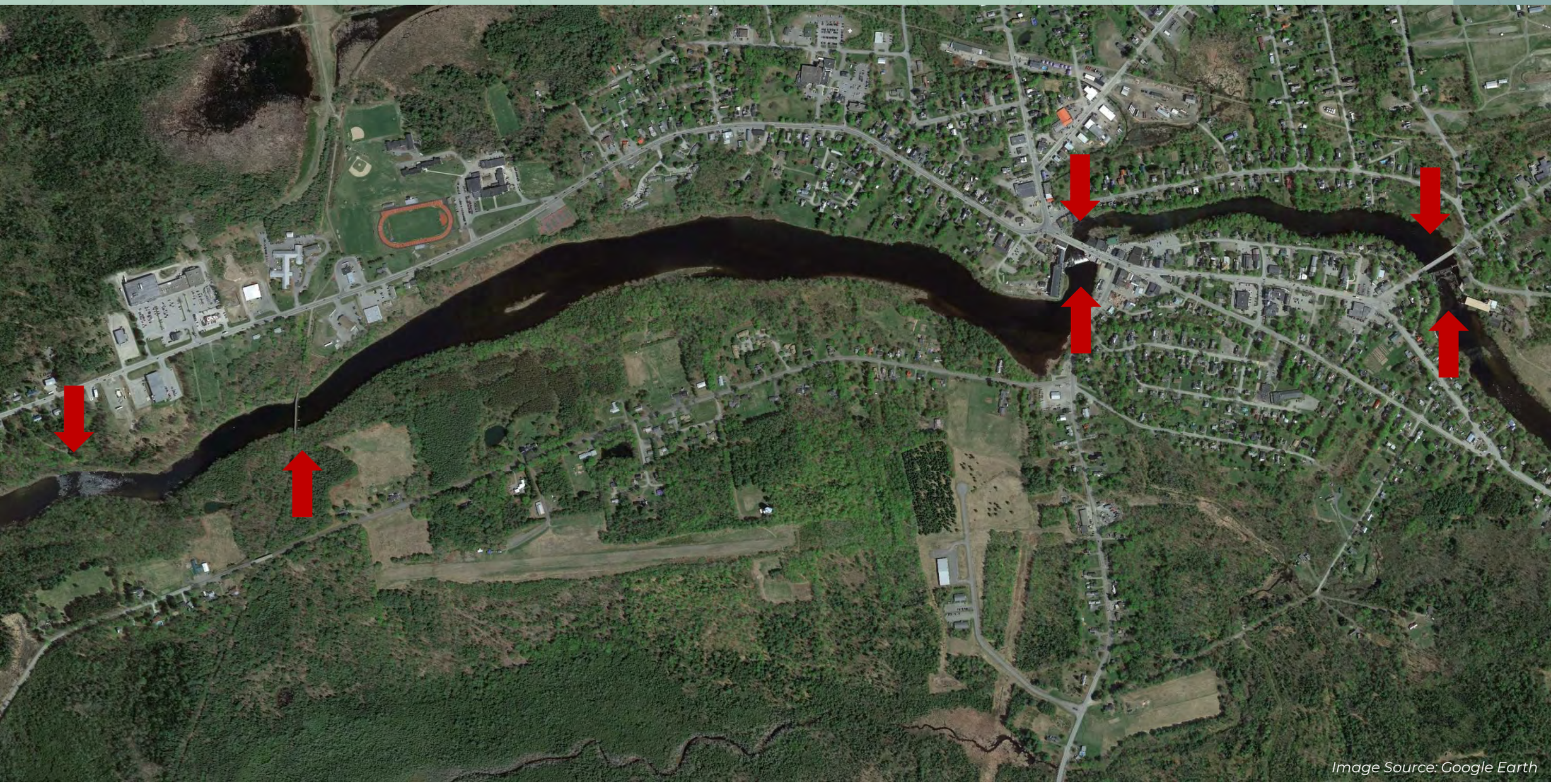

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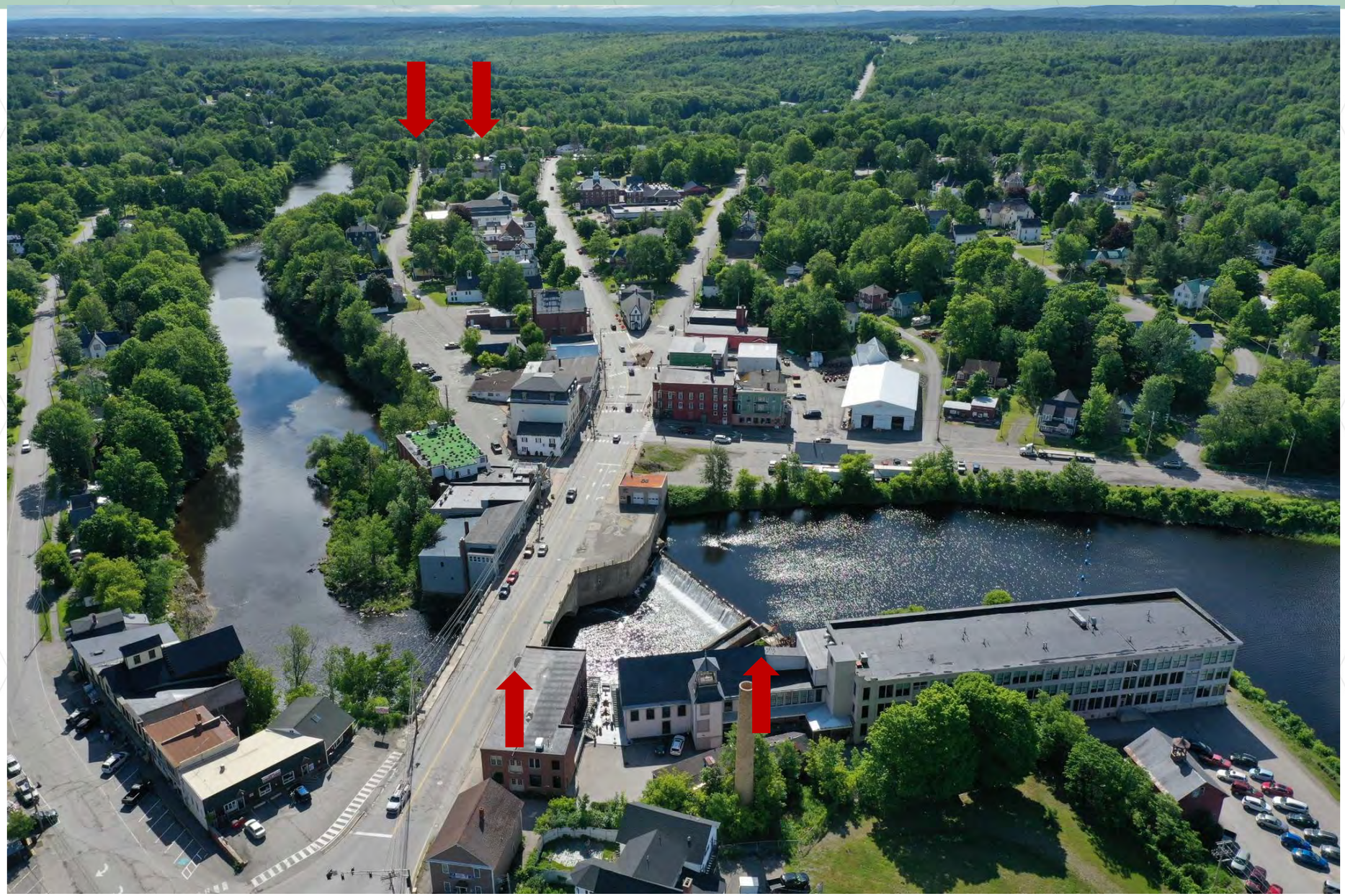

River Flow – Features That Influence River Levels

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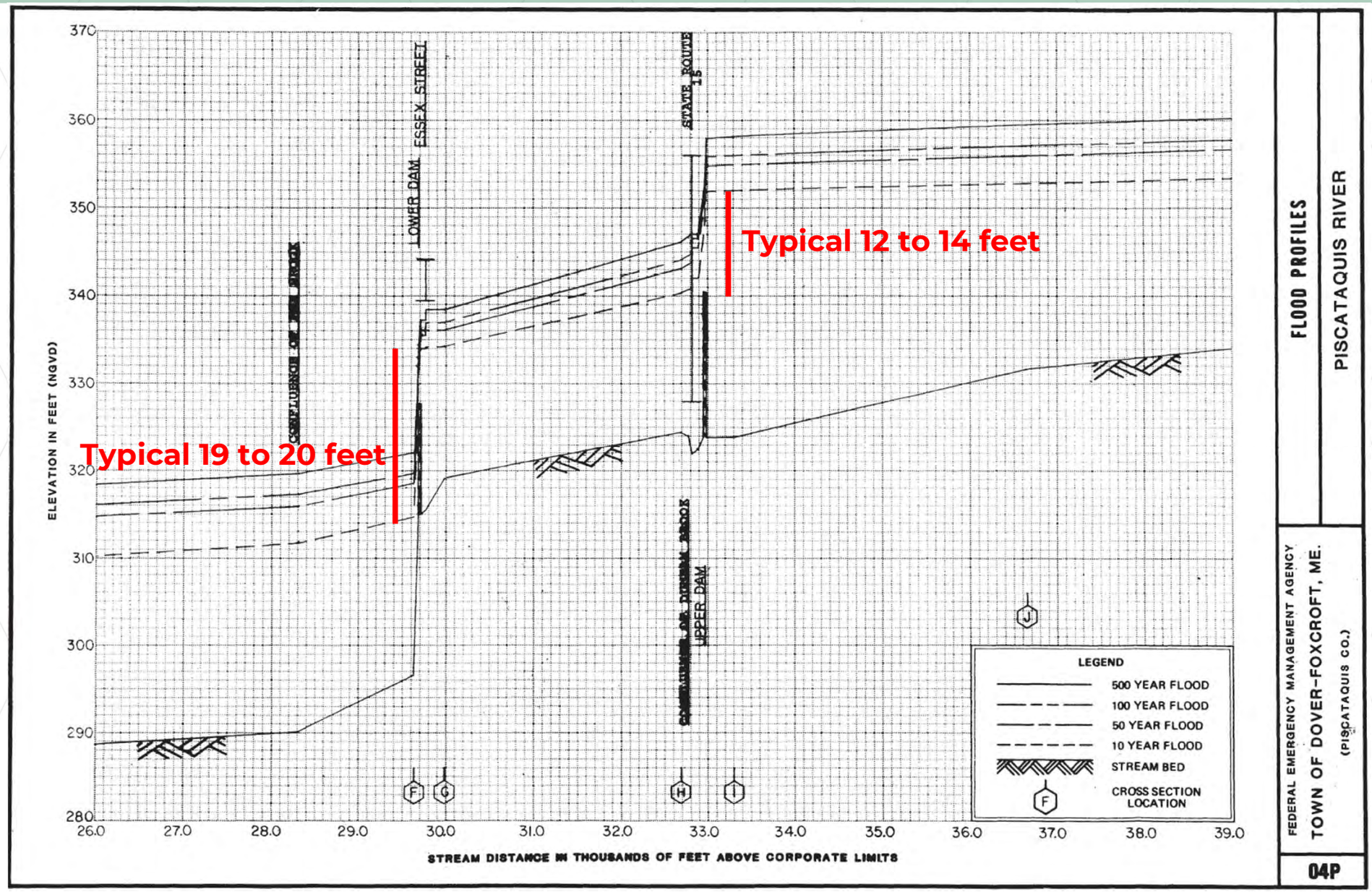


River Flow – Flooding

What is a flood?

River Flow – Flooding

- If **your house** fills with water, it's probably a bad thing.
- If you're an **Egyptian dependent on agriculture** in the Nile Delta, it's probably a good thing.
- You could say that a flood occurs when an area that people expect to be dry – that people count on to be dry—becomes wet.
- If you ask your **mom or dad or neighbor**, they'd probably say that a flood is when water causes some inconvenience. The road washed out, the basement is flooded, the septic system is soggy. The propane tank floated away.
- If you ask your **DPW**, they'd probably say that a flood is when a road becomes impassable, or a pump station is submerged, or a water treatment facility backs up, or a watermain breaks.
- If you ask an **engineer**, they might say that it's when you've got water where you don't want it.
- If you ask a **fluvial geomorphologist**, they might say it's the event builds the river.
- **Insurance Adjuster**?
- **FEMA**?

FLOOD: FEMA definition (44 CFR 59.1):

A general and temporary condition of partial or complete inundation of 2 or more acres of normally dry land area or of 2 or more properties (at least 1 of which is the policyholder's property) from:

1. *Overflow of inland or tidal waters; or*
2. *Unusual and rapid accumulation or runoff of surface waters from any source; or*
3. *Mudslides (i.e., mudflows) which are proximately caused by flooding and are akin to a river of liquid and flowing mud on the surfaces of normally dry land areas, as when earth is carried by a current of water and deposited along the path of the current.; or*
4. *Collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above.*

A flood inundates a floodplain. Most floods fall into three major categories: riverine flooding, coastal flooding, and shallow flooding. Alluvial fan flooding is another type of flooding more common in the mountainous western states.

River Flow – Flooding

Why is flooding bad?

Flooding can be bad for several reasons:

1. Property damage: Flooding can cause extensive damage to buildings, roads, bridges, and other infrastructure. It can also damage personal property like furniture, electronics, and vehicles.
2. Loss of life: Flooding can cause loss of life due to drowning, electrocution, or other accidents.
3. Health hazards: Floodwaters can be contaminated with sewage, chemicals, and other hazardous materials, posing a health risk to humans and animals.
4. Disruption of services: Flooding can disrupt essential services like power, water, and communications, making it difficult for emergency services to respond to the disaster.
5. Economic impact: Flooding can have a significant economic impact on the affected area, causing businesses to shut down, job losses, and a decrease in property values.
6. Environmental damage: Floodwaters can cause erosion, damage to habitats, and harm to wildlife.

For these reasons, flooding is generally considered a natural disaster and is a cause for concern for individuals, communities, and governments. It is important to take steps to prepare for and mitigate the effects of flooding to minimize its impact.

Why is flooding good?

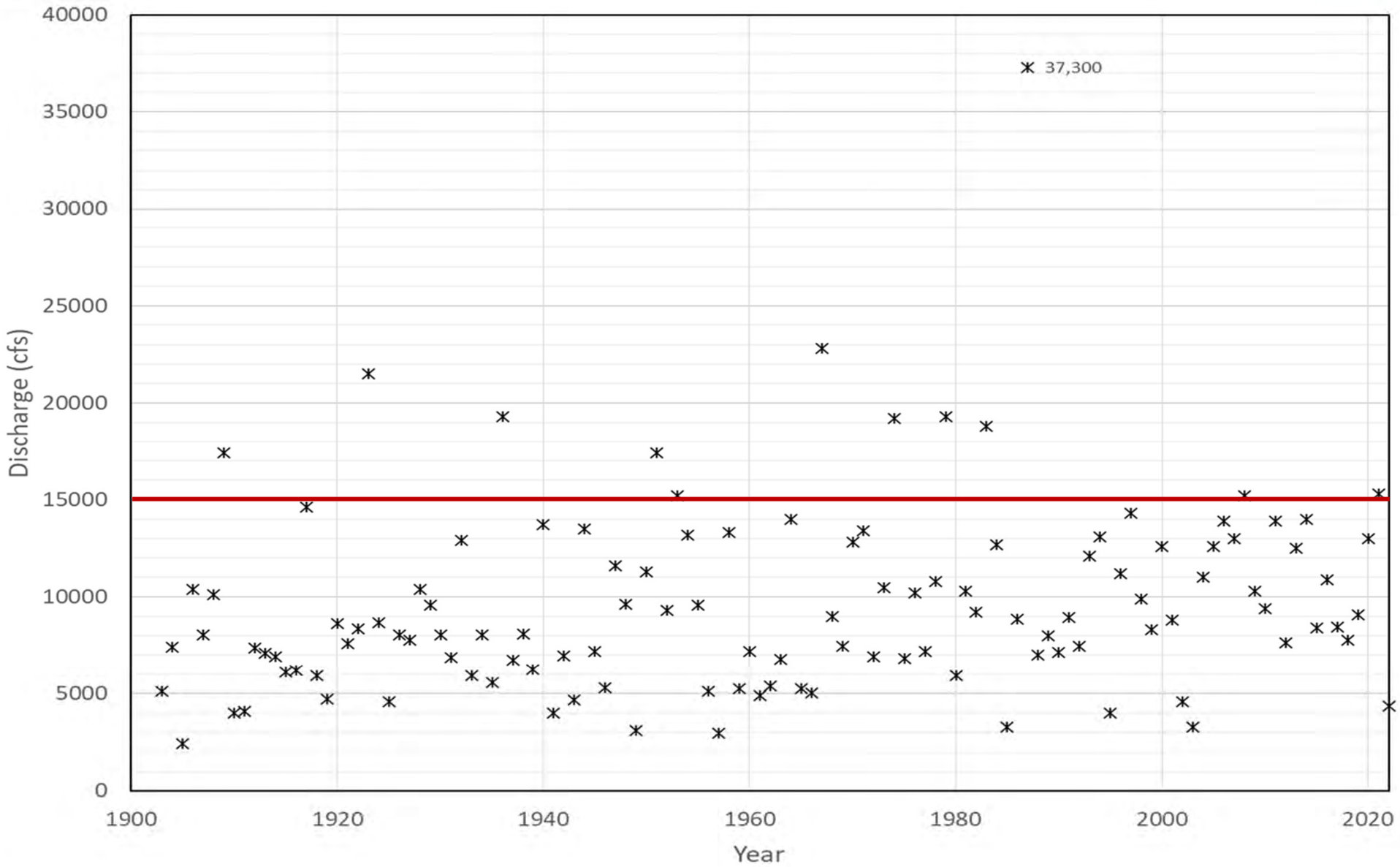
While flooding is often associated with negative consequences, there are some instances where it can have positive effects. Here are a few examples:

1. Replenishment of groundwater: Flooding can help to replenish underground aquifers that supply groundwater. This can be particularly important in arid regions where water is scarce.
2. Fertilization of soil: Flooding can deposit nutrient-rich sediment on soil, which can help to fertilize crops and promote plant growth.
3. Support for ecosystems: Flooding can create or support wetland habitats, which are important for many species of plants and animals. Wetlands can also help to filter pollutants and provide natural flood control.
4. Transportation and irrigation: In some cases, flooding can provide water for transportation and irrigation systems, which can be critical for communities and agriculture.
5. Recreation: Some people enjoy recreational activities like boating and fishing on flooded rivers and lakes.

It's worth noting that while flooding can have positive effects, it's important to balance these benefits against the potential negative consequences. In many cases, flooding can still pose significant risks to human safety, property, and infrastructure. Therefore, it's essential to manage flood risk carefully and take steps to mitigate its impact.

River Flow – Flooding History

Date	Flood Peak (cfs)
4/1/1987	37,300
11/4/1966	22,800
4/29/1923	21,500
3/20/1936	19,300
4/28/1979	19,300
12/22/1973	19,200
4/18/1983	18,800
9/29/1909	17,400
11/27/1950	17,400
12/26/2020	15,300
3/28/1953	15,200
4/30/2008	15,200

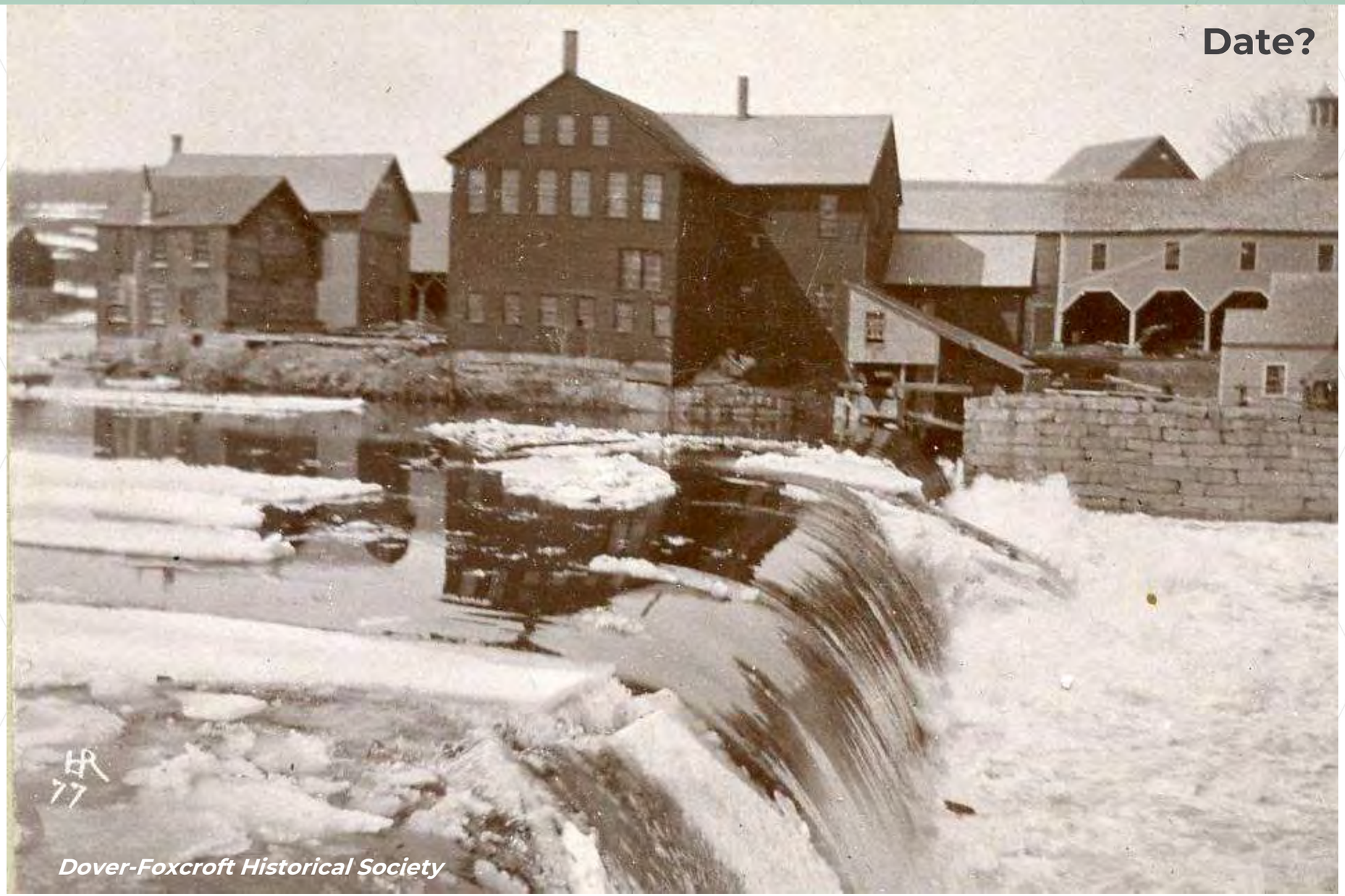


River Flow – Flooding History

Dover-Foxcroft Historical Society

River Flow – Flooding History

River Flow – Flooding History



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1909 – Between 5 and 10 year event

Dover-Foxcroft Historical Society

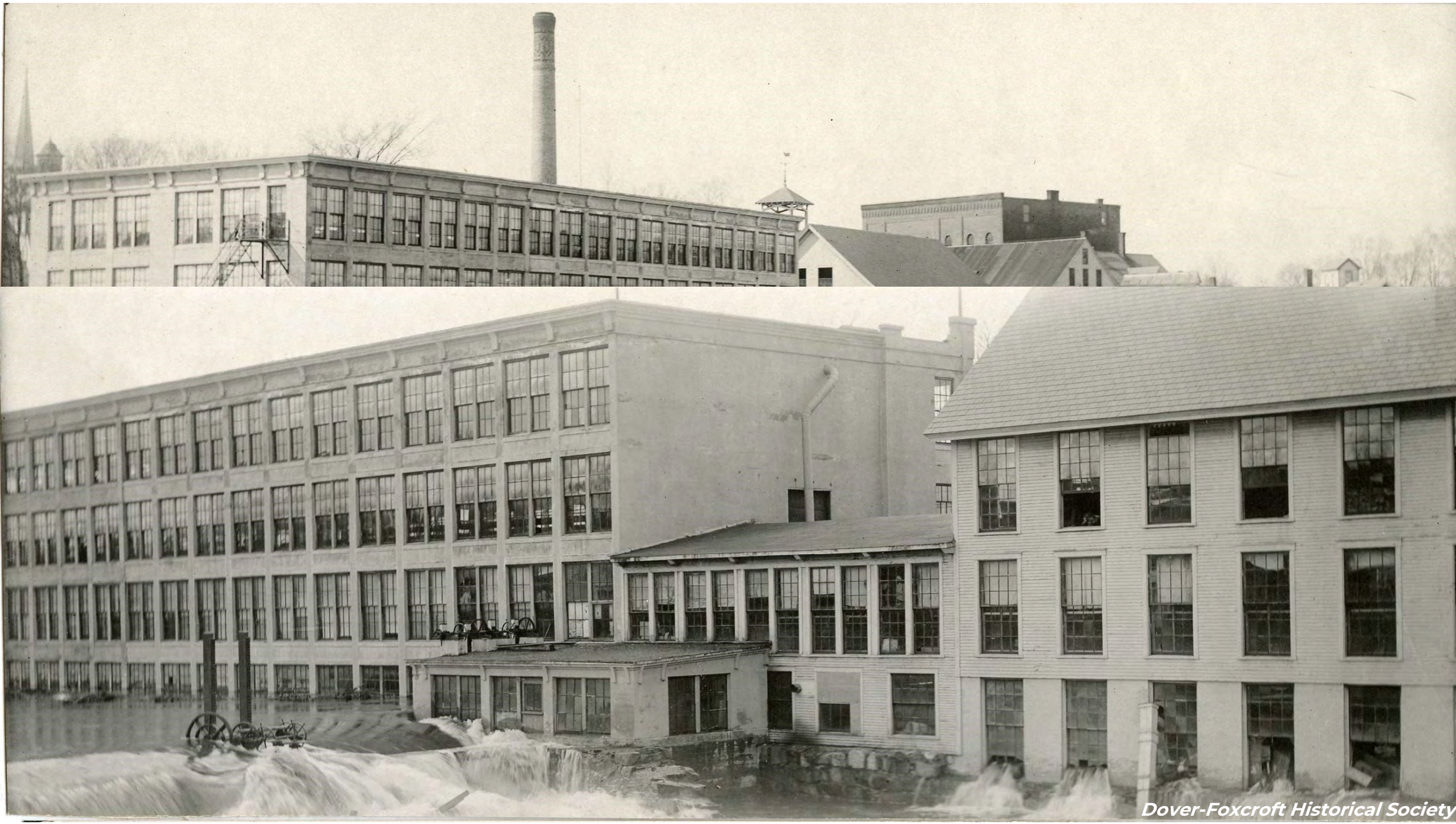
River Flow – Flooding History

Date?

Dover-Foxcroft Historical Society

Date?

Dover-Foxcroft Historical Society



River Flow – Flooding History

JUL 1 6 1994

Flood of April 1987 in Maine

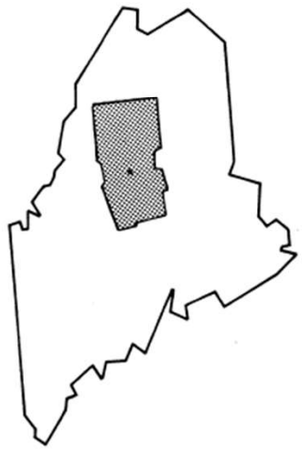
United States Geological Survey Water-Supply Paper 2424

Prepared in cooperation with the Maine Department of Transportation

U.S. DEPARTMENT OF THE INTERIOR · MARCH 3, 1849

FLOOD INSURANCE STUDY

TOWN OF DOVER-FOXCROFT, MAINE
PISCATAQUIS COUNTY



REVISED:
APRIL 2, 1993

Federal Emergency Management Agency

COMMUNITY NUMBER · 230116

River Flow – Flooding History

United States Department of Agriculture

Soil Conservation Service

UPPER PISCATAQUIS RIVER WATERSHED

INTERIM REPORT

Feasibility of Flood Reduction Measures

FIGURE 2

UPPER PISCATAQUIS RIVER WATERSHED

POTENTIAL PROJECT MEASURES

DOVER FOXCROFT AREA

DOVER FOXCROFT, MAINE

USDA Soil Conservation Service

December 1990

River Flow – Flooding History

United States Department of Agriculture

Soil Conservation Service

UPPER PISCATAQUIS RIVER WATERSHED

INTERIM REPORT

Feasibility of Flood Reduction Measures

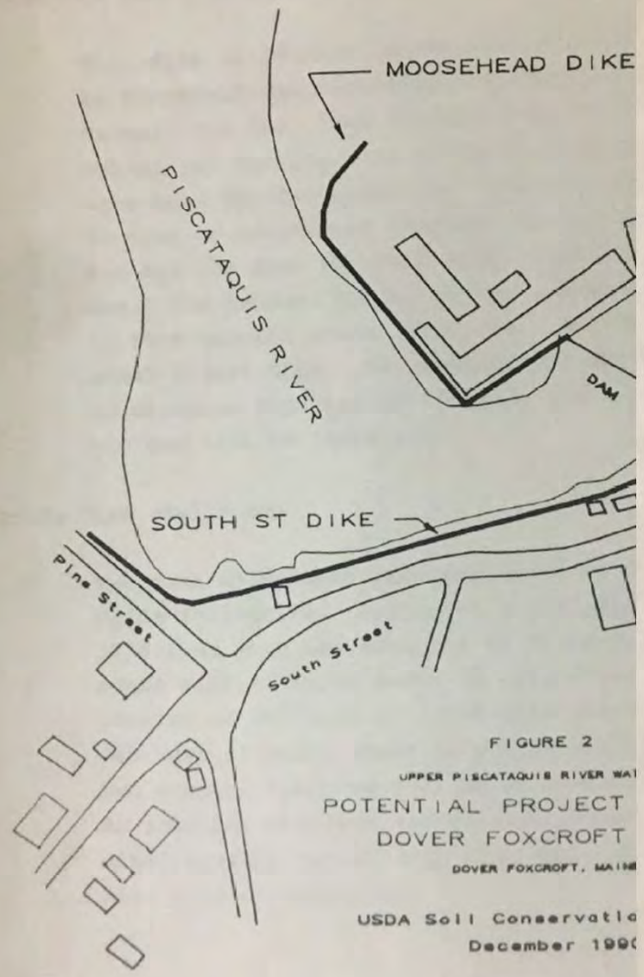


FIGURE 2

UPPER PISCATAQUIS RIVER WA

POTENTIAL PROJECT

DOVER FOXCROFT

DOVER FOXCROFT, MAINE

USDA Soil Conservatio

December 199

The Piscataquis Observer

Federal government awards funding for flood warning system

1996 Info

by Emily Adams

DOVER-FOXCROFT - A flood warning system along the upper Piscataquis River that would cost $150,000 to install is closer to reality now that $112,000, or 75 percent, of the project has been awarded by the federal government.

Piscataquis County Commissioners must decide whether it is worth the required local share of 25 percent, $29,000.

That's not counting the annual maintenance costs that could be at least $20,000 a year unless federal agencies chip in.

"That may be too rich for our blood," said commissioner Eben DeWitt.

The whole reason for the system would be to gain six to nine hours advance warning before a flood.

A public hearing to hash out the pros and cons will be scheduled perhaps in late May.

The news comes nine years after the flood of 1987 that prompted a response and three years after the a plan was drafted in 1993. Funding requests in 1994 and 1995 were denied.

Ironically, now that the feds are ready, the county is not.

Commissioners deliberately did not set aside the money in advance and the news comes too late to include the local share in the 1996 budget.

"There's no question about it, we aren't ready to go," said DeWitt in a meeting his colleagues had with officials involved in the project on Tuesday, April 2, at the county courthouse.

That means the money will be redistributed to other projects.

Due to a technicality in federal regulations, the county has to commit to raising the local share and the federal money must be obligated by the end of June in order to keep it.

The other alternatives to raising the local share to beat this deadline, though considered long shots, would be if it were somehow raised privately or with in-kind services.

Otherwise, the county will gamble that the federal government will is a set of detection and communication devices to relay information about rising water levels.

Two stream gauges like the one encased in a cement structure at Low's Bridge in Guilford would be constructed at the headwaters of the Kingsbury Stream and another in Blanchard. They would be equipped with radio or telephone to transmit river level and rainfall data. Another five rain gauges would have communication links, too. There would also be two stations where a person would measure the snow pack.

There would be a computer likely kept at the Piscataquis Sheriff's Office and a second one at the National Weather Service in Gray, where the information would be compiled. From here, it would be relayed to a river forecast office in Massachusetts that returns information to officials in Gray who would announce flood warnings, if necessary.

The stream gauges like at Low's Bridge now cost nearly $10,000 a year to maintain, double the cost of just a few years ago.

With two such gauges, that would be nearly $20,000.

All of that cost would be borne by the county unless the U.S. Geological Survey and National Weather Service share the burden.

When the plan was drafted in 1993, it was estimated that the county's share of annual maintenance would be $8,700, if the USGS and NWS did pay the rest.

Most of the cost is attributed to stream gauge visits once every six weeks, communication system costs, and analysis of the data.

The problem in 1987, Champeon explained, was that officials did not know how bad conditions were upstream until it was too late due to a lot of rain, snowmelt, and warm temperatures.

Of course, flood warnings can only do so much to limit damage.

A key component of the flood plan drafted in 1993 was to construct dikes around the area's two more vulnerable industries, Pride Manufacturing and Moosehead Manufacturing's Dover-Foxcroft

April 14, 2020

13,000 CFS

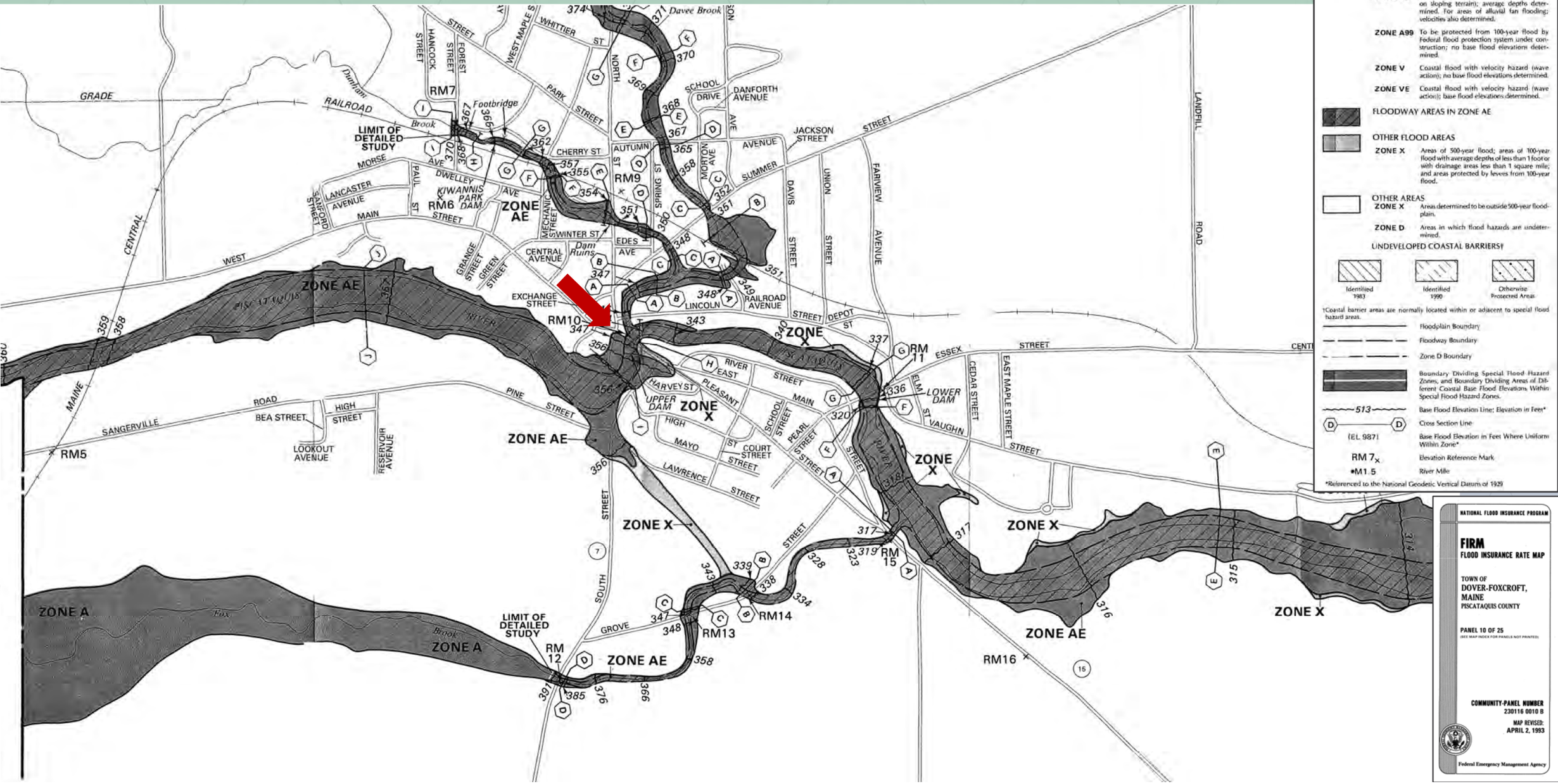

April 14, 2020
13,000 CFS
Piscataquis County EMA
Piscataquis County EMA

December 1, 2020

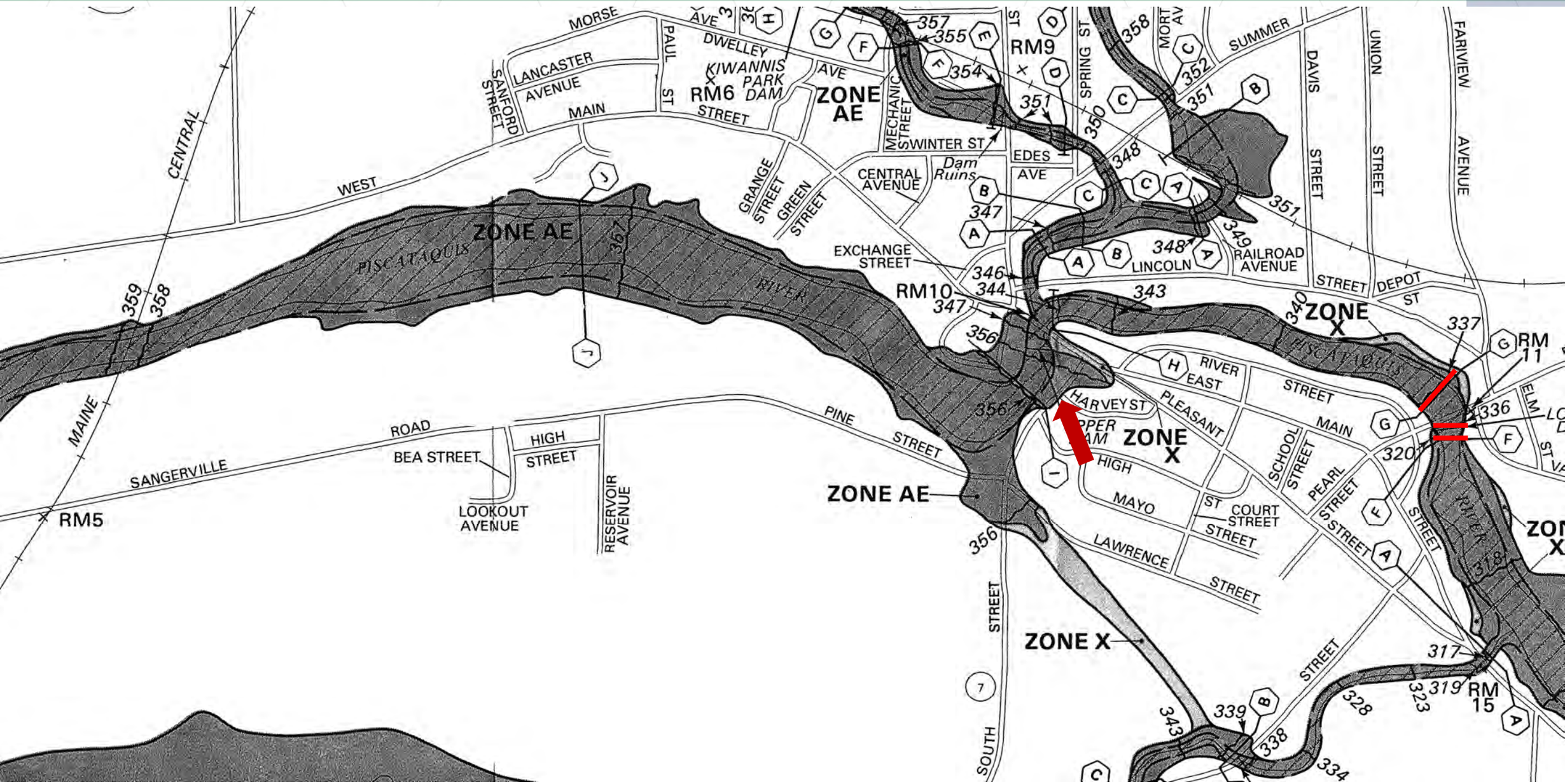
13,000 CFS

Piscataquis Observer

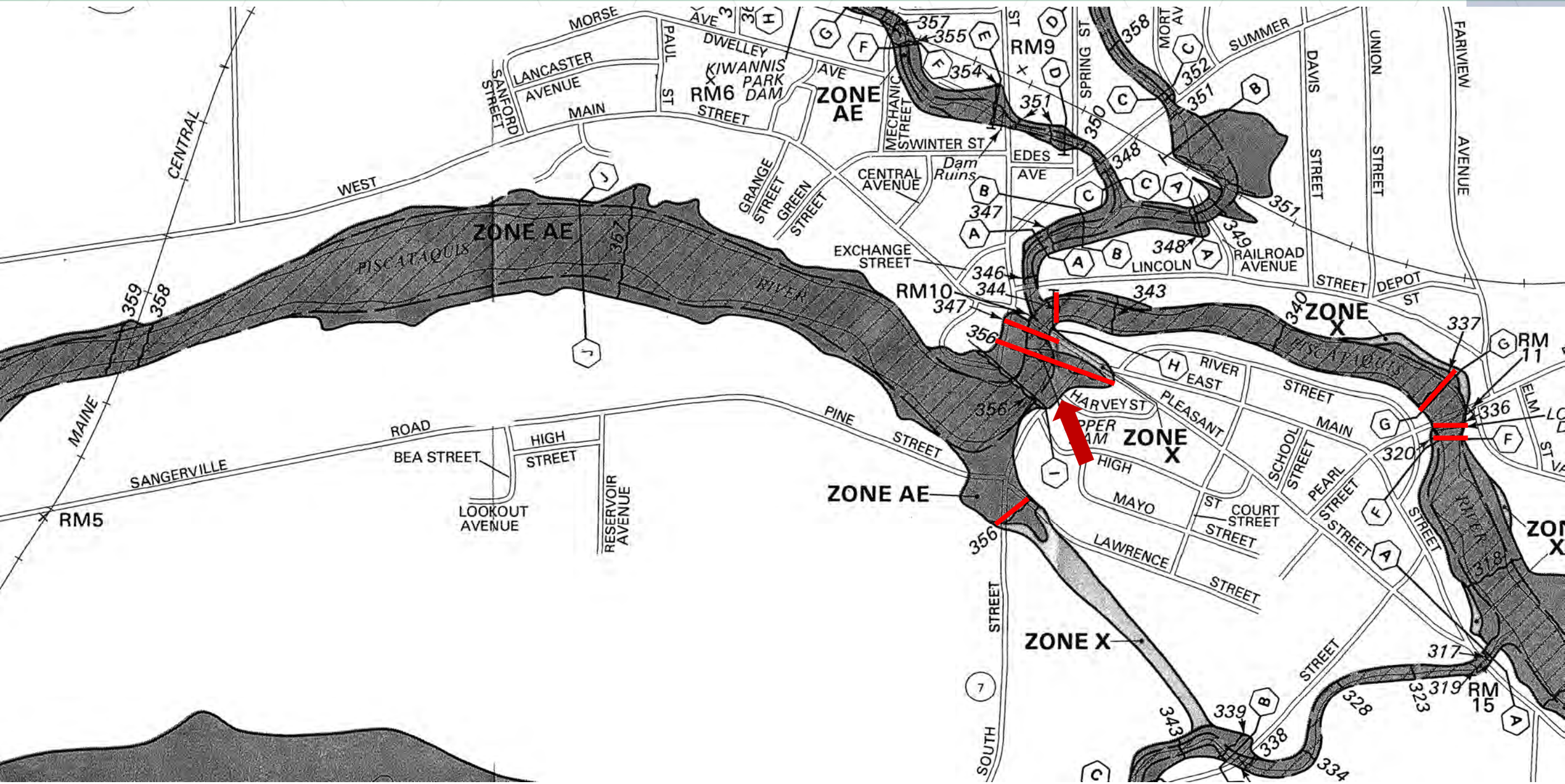
River Flow – FEMA



River Flow – FEMA



River Flow – FEMA



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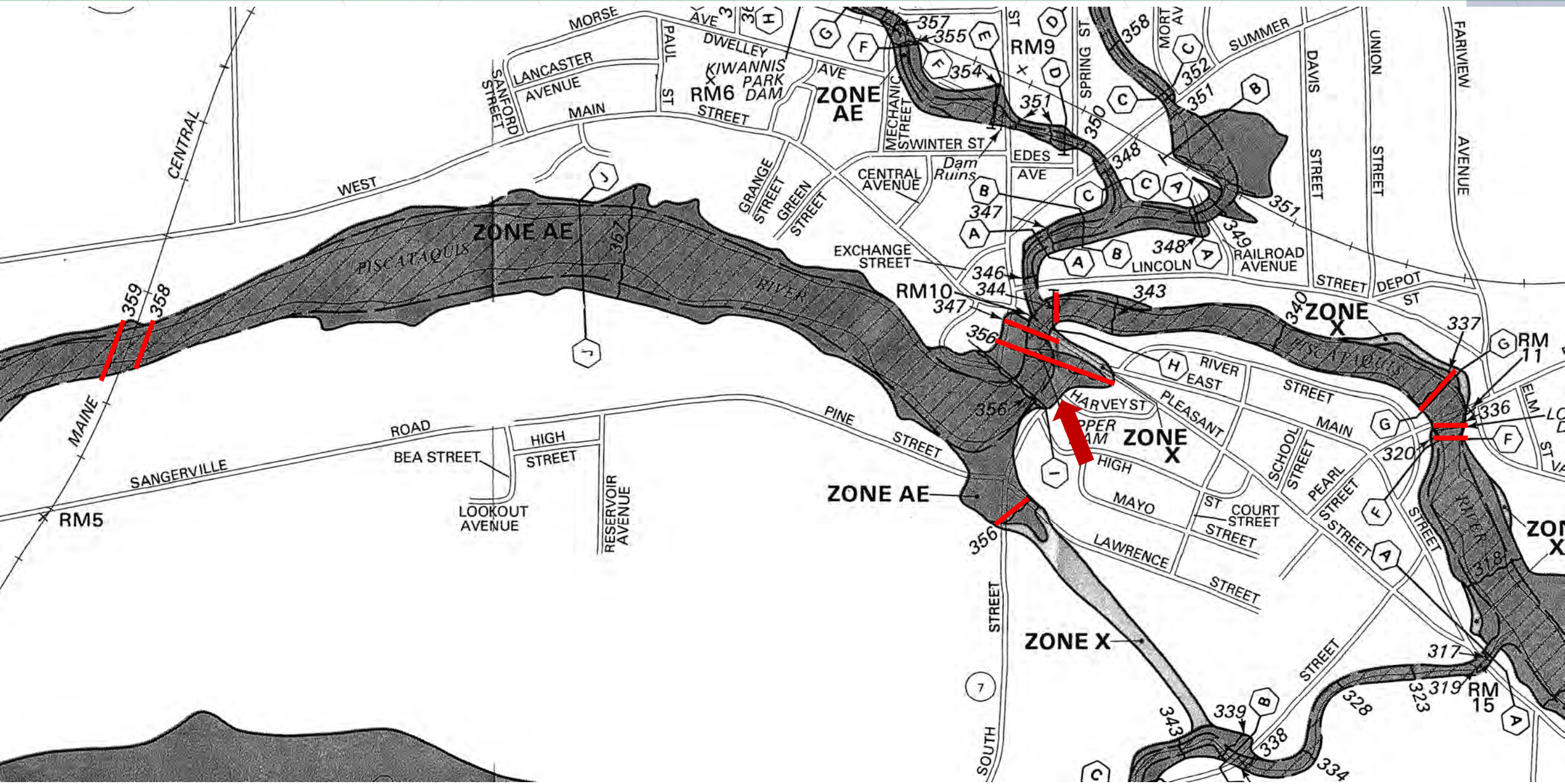
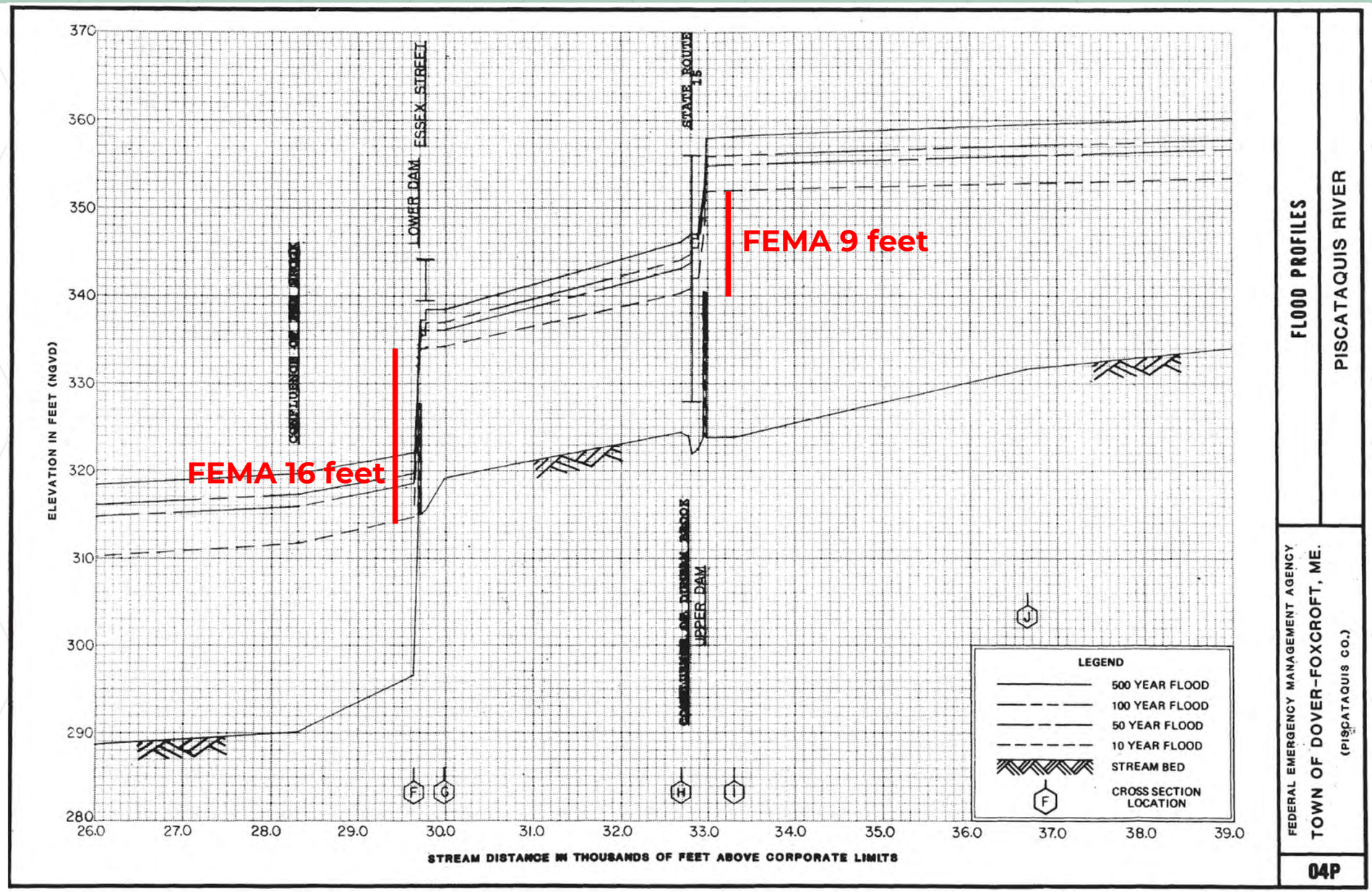
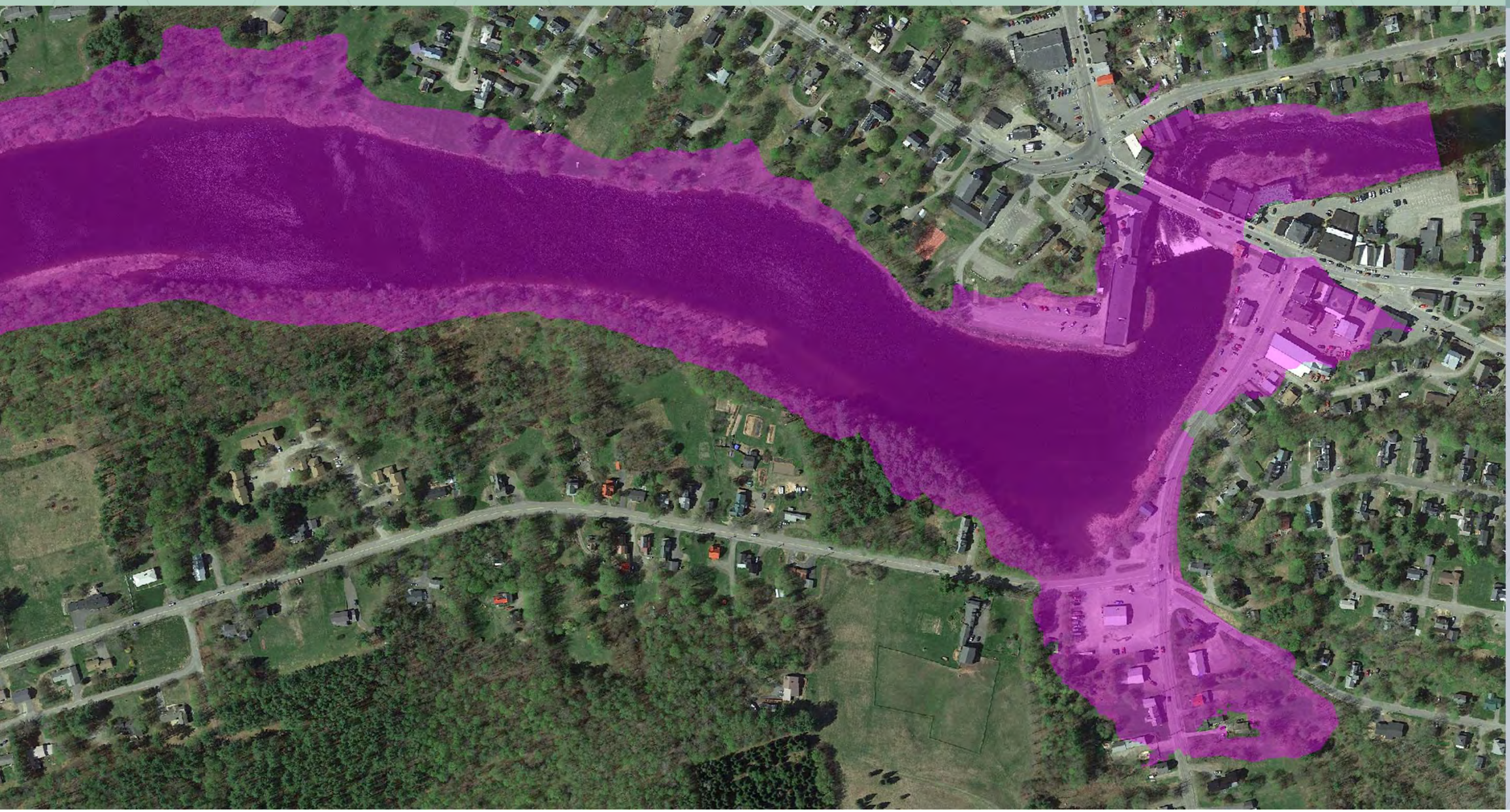


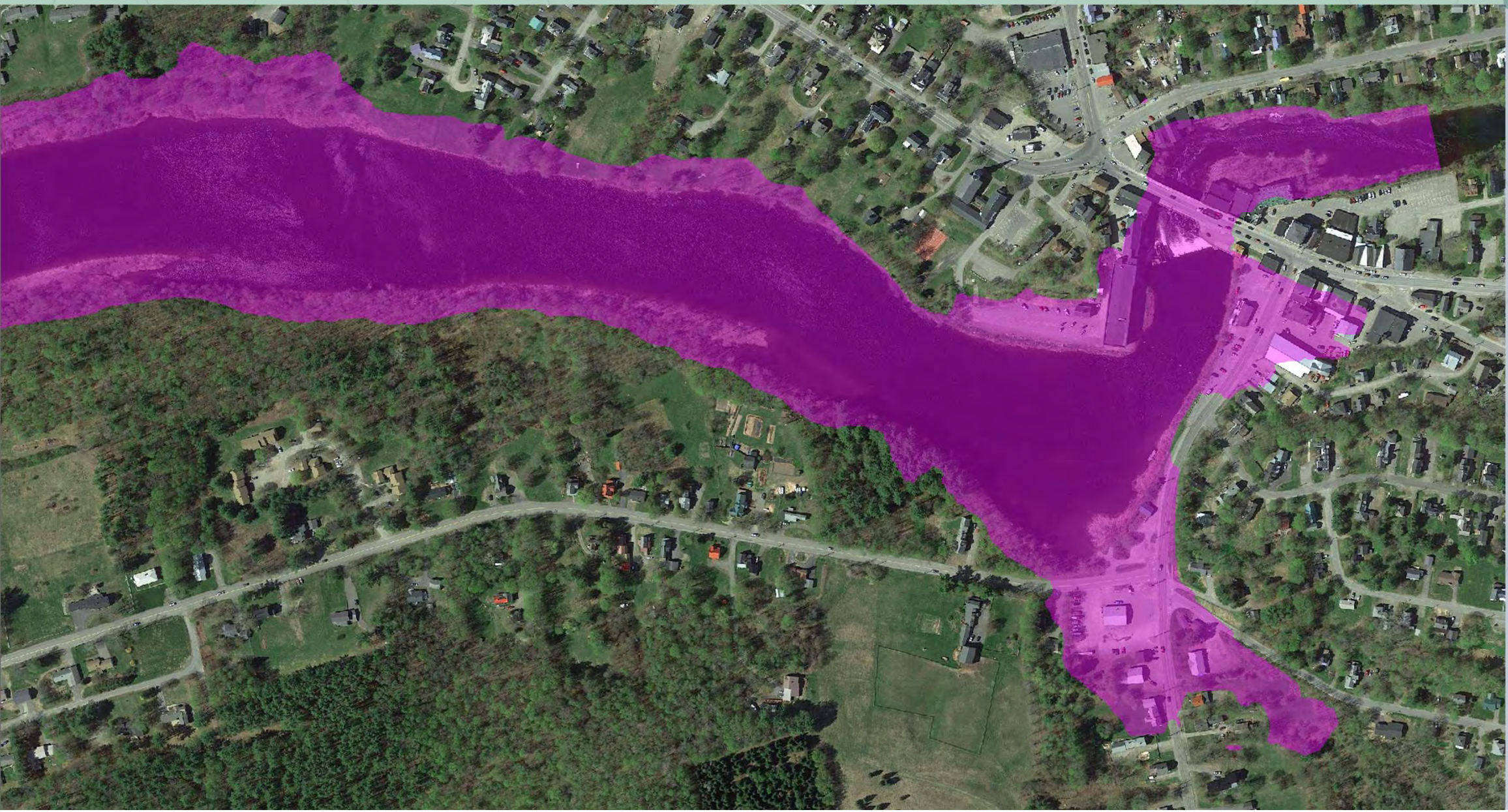
River Flow – FEMA



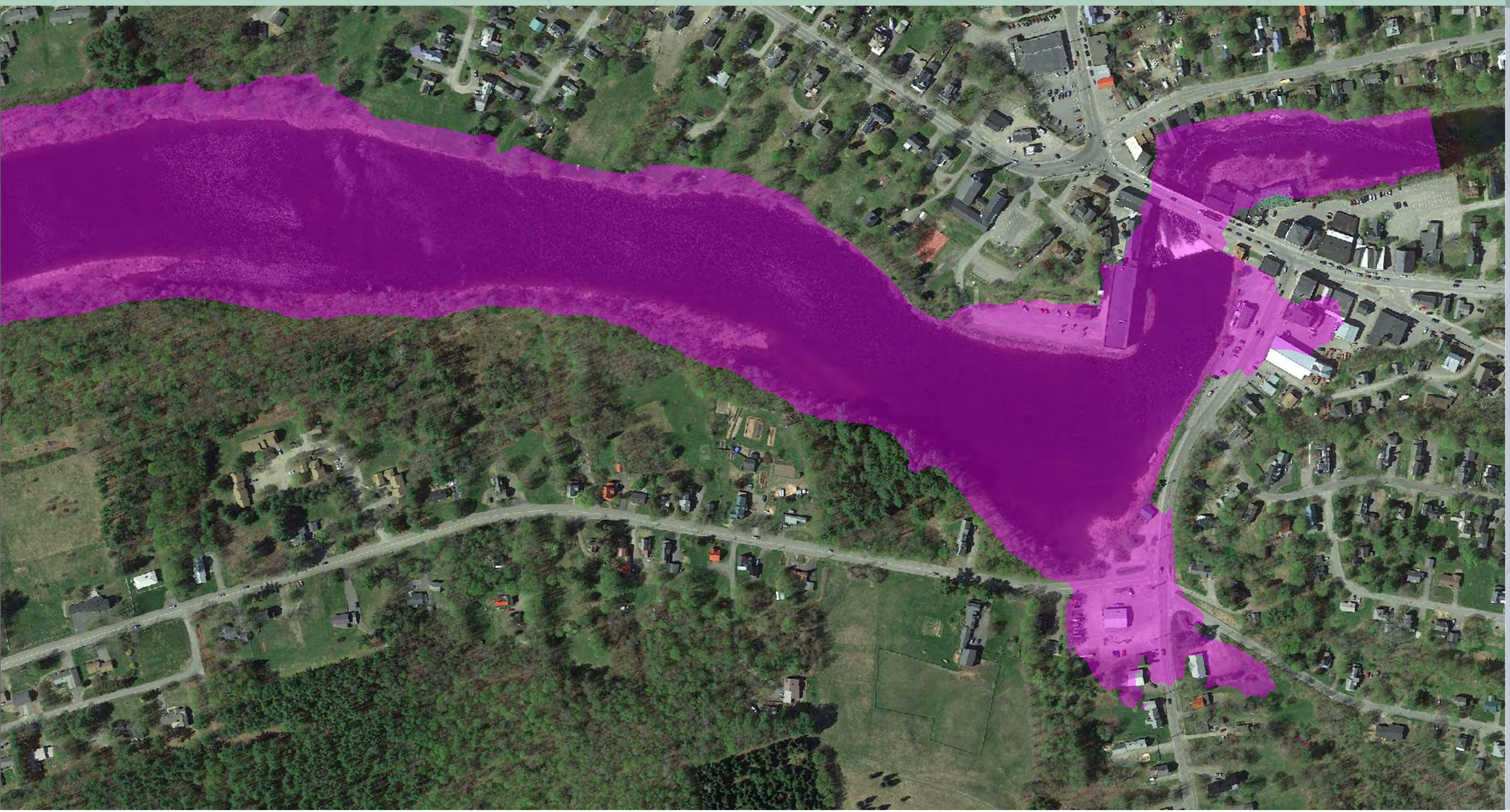
River Flow – 1987 Inundation



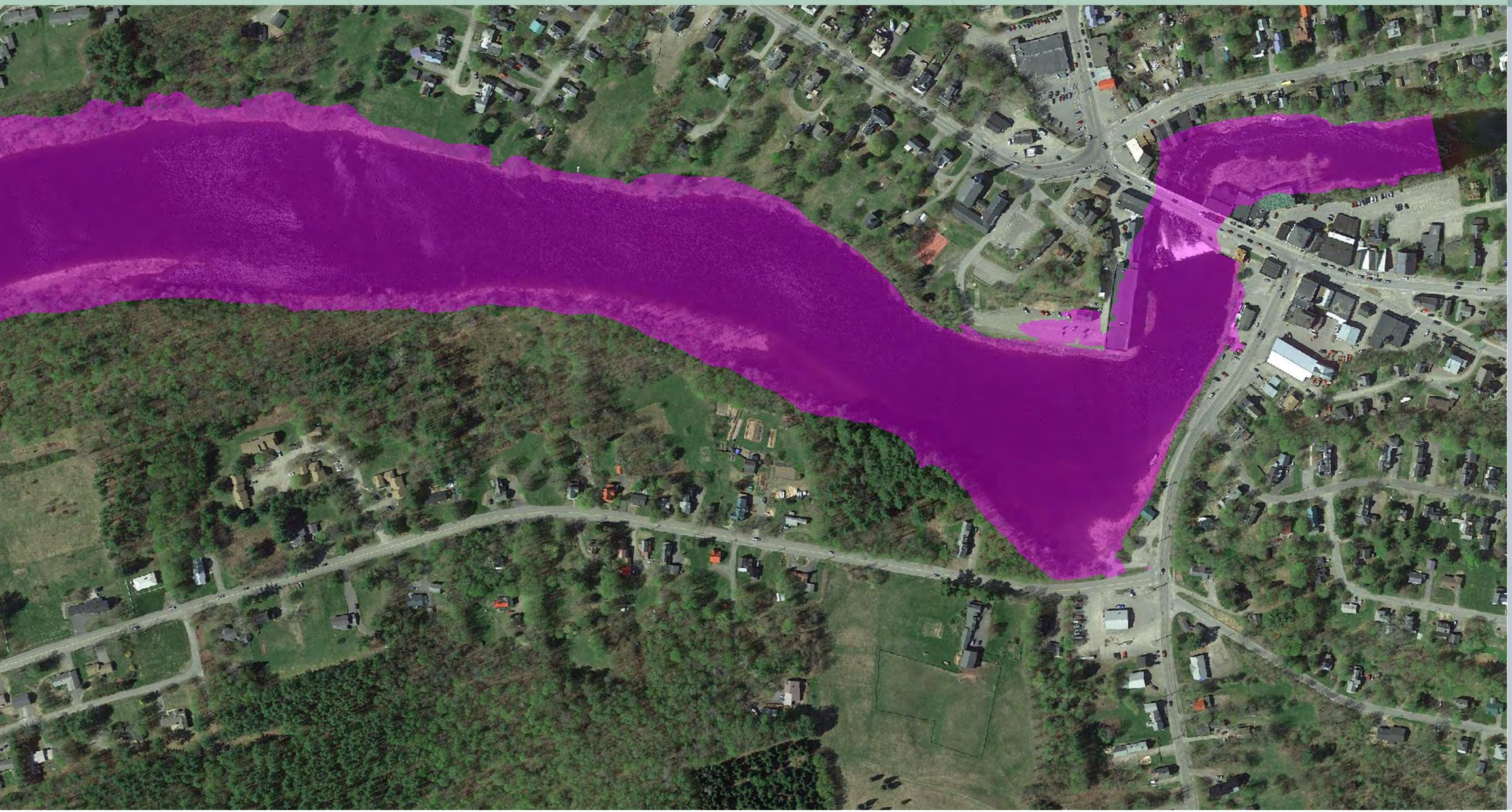
River Flow – FEMA Base (100-Year) Inundation



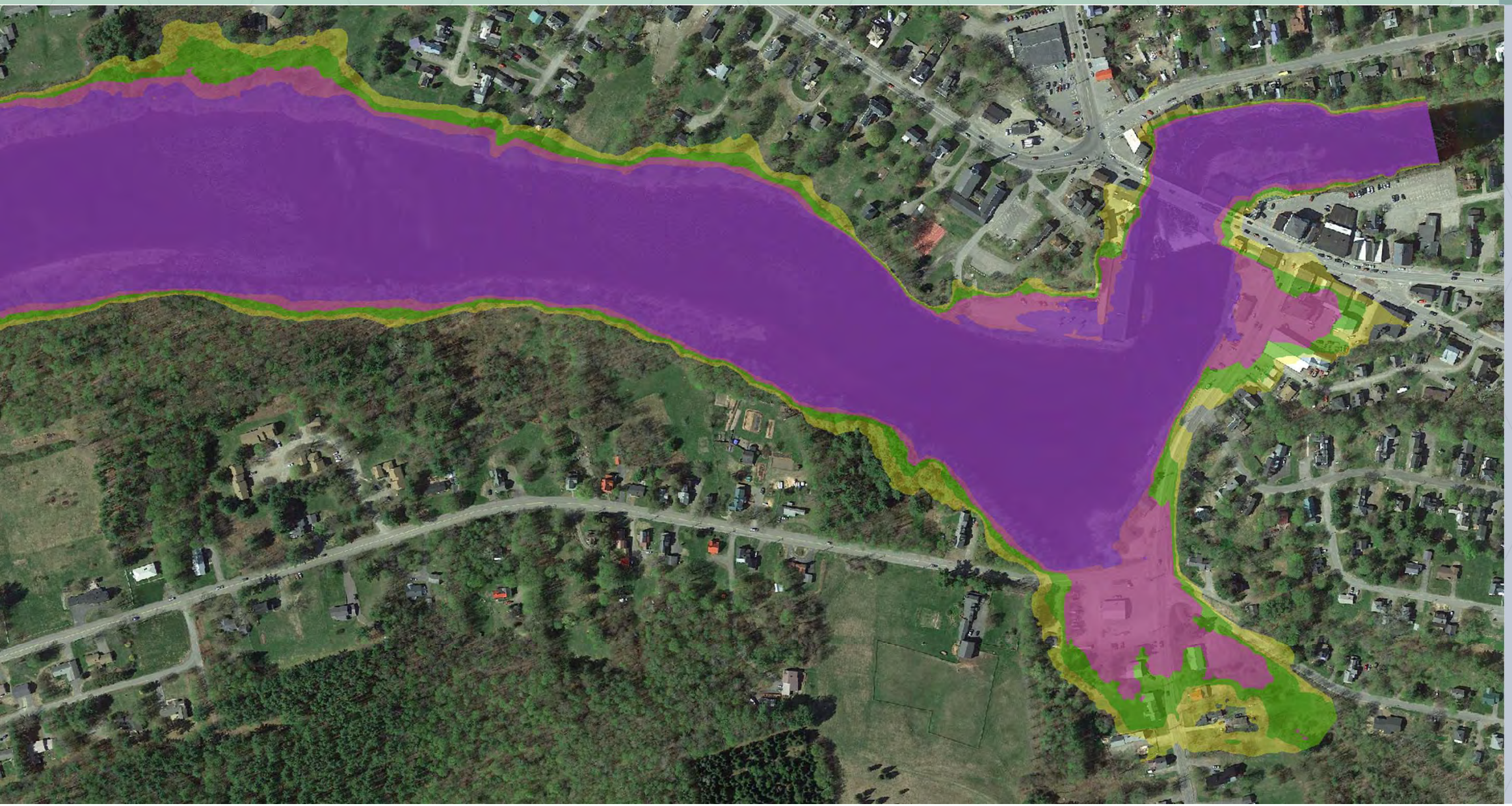
River Flow – 10-Year Inundation



River Flow – 2-Year Inundation



River Flow – 2-Year to 1987 Inundation



River Flows & Flooding at Mayo Mill Dam

Key Take-away Points:

- The Mayo Mill Dam increases the water level, or height of water, during a flood event (see slides 23-28).
- The water levels during flood events affect the downtown areas including roads and buildings. The size of the area impacted increases with the magnitude of flood (see slides 51-55) and this has been visible in history of events.
- The 1-to-10-year flood events are trending to increase in size and frequency over time (see slide 22).
- Any decision made to change or not change the infrastructure (Mayo Mill Dam and fishway) will impact the river water level, extent of flooding, and thus the downtown for decades to come.