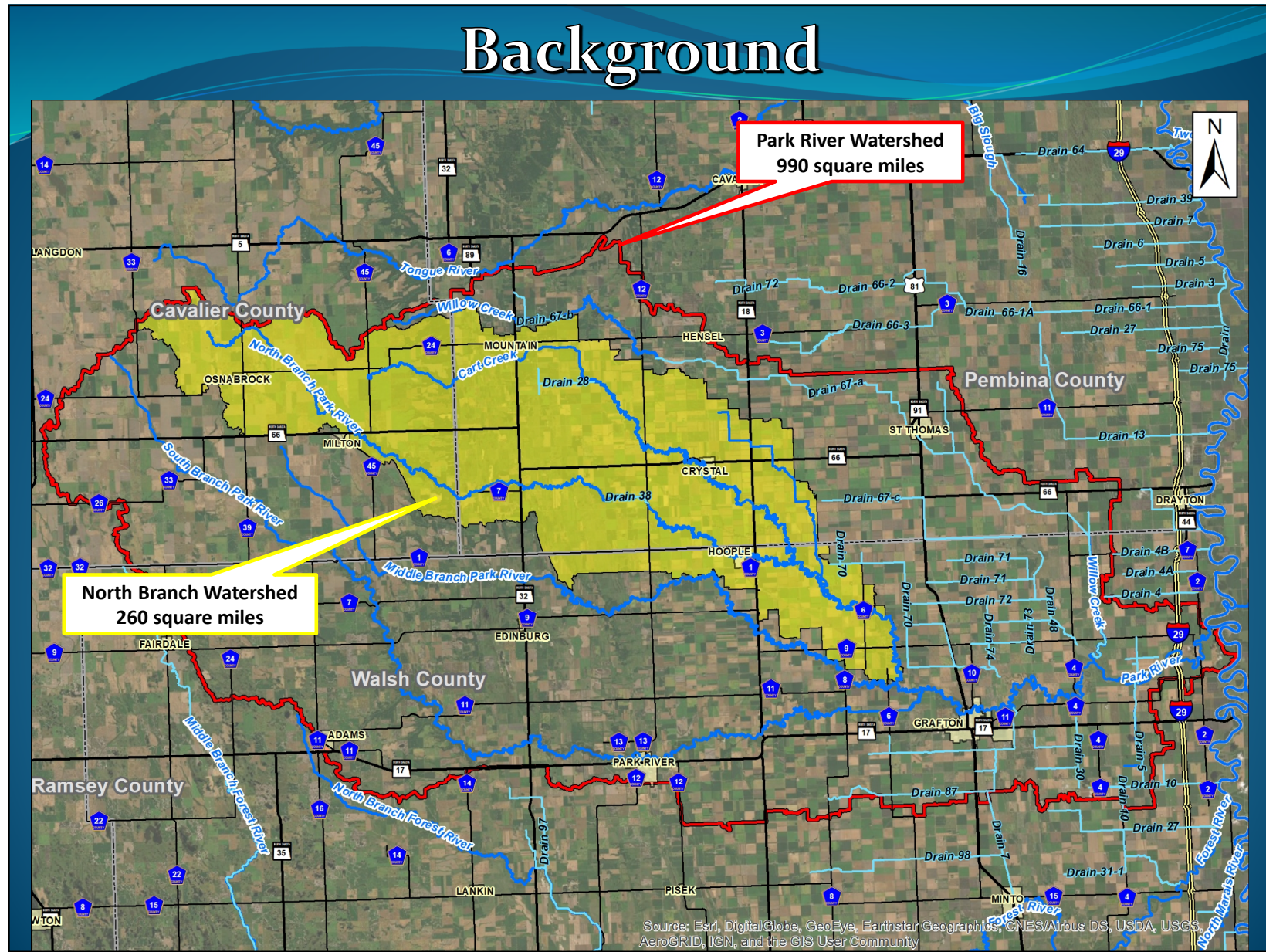


Establishment of Pembina County Drain 80

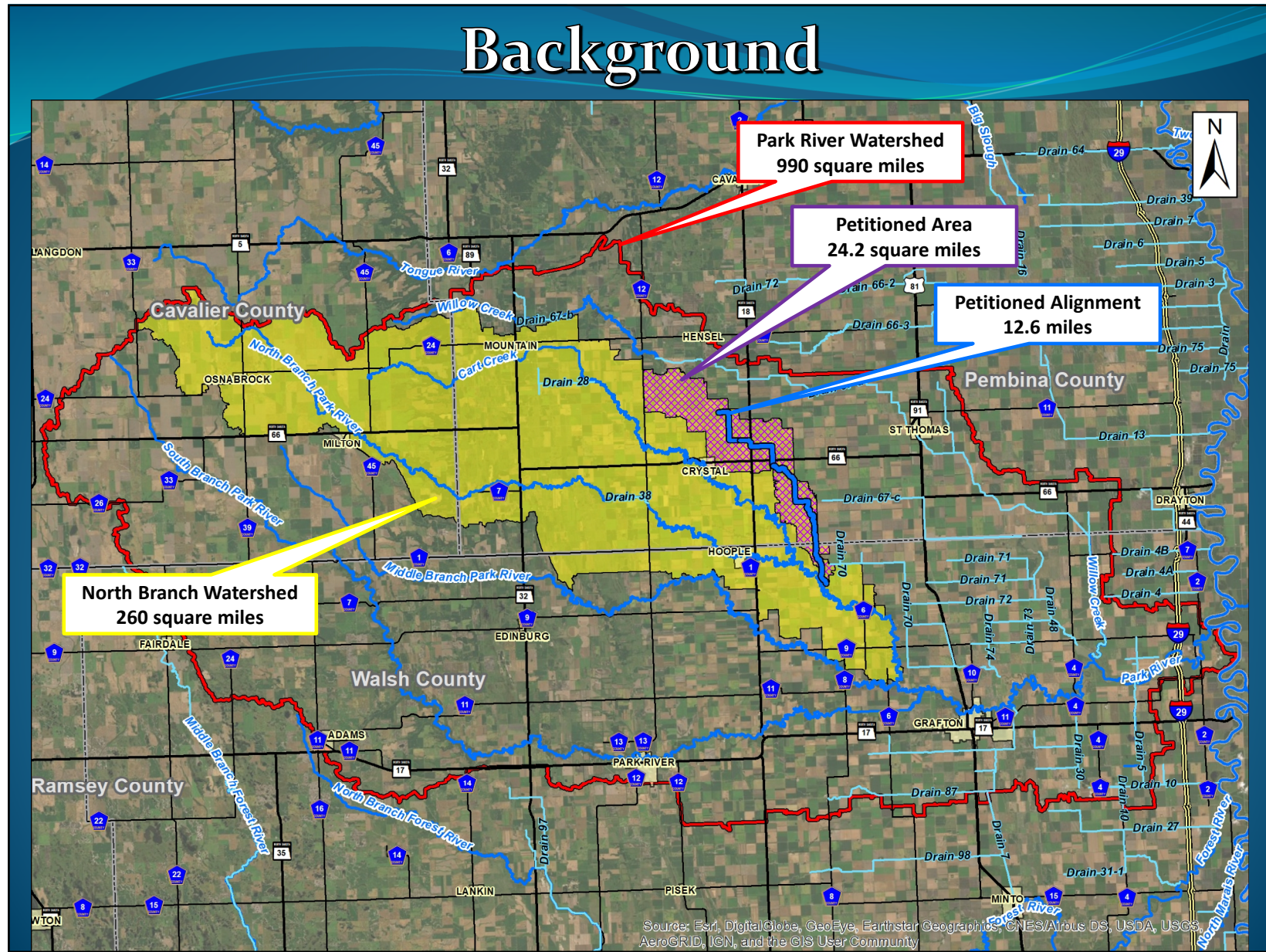
Public Information Meeting

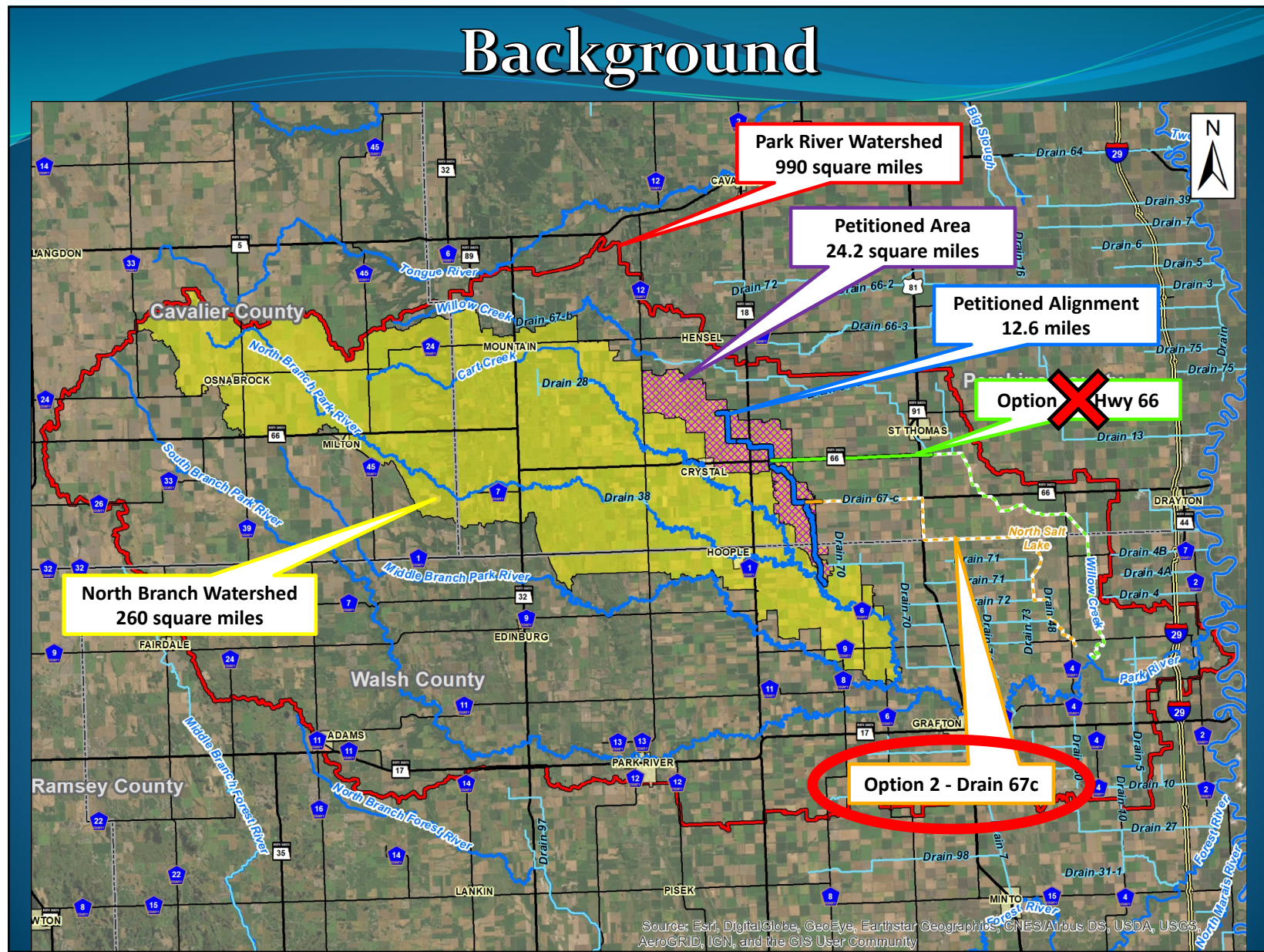
November 16, 2021
Grafton, ND

Background



Background





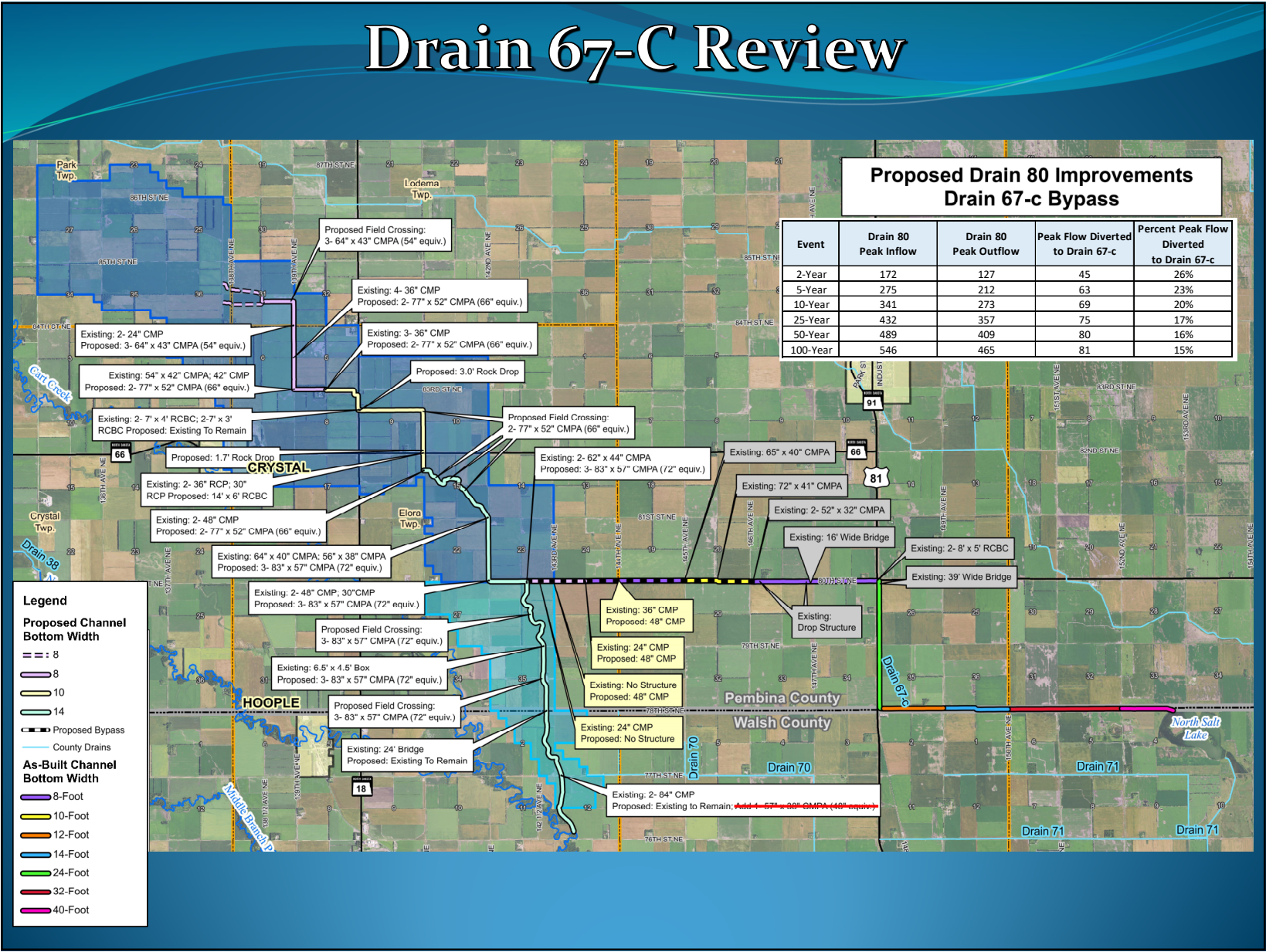
Drain 67-C Review

Purpose:

- Determine how much flow could be diverted into Drain 67-C
- Criteria/considerations:
 - No improvements at North Salt Lake required (do not activate Emergency Spillway more frequently)
 - No adverse effects on downstream Drain 67-C channel
 - Downstream channel is maintained to as-built condition

Results:

- 20% of peak flow diverted during the 10-year event
- 31% overall volume diverted during 10-year event



Additional Concerns

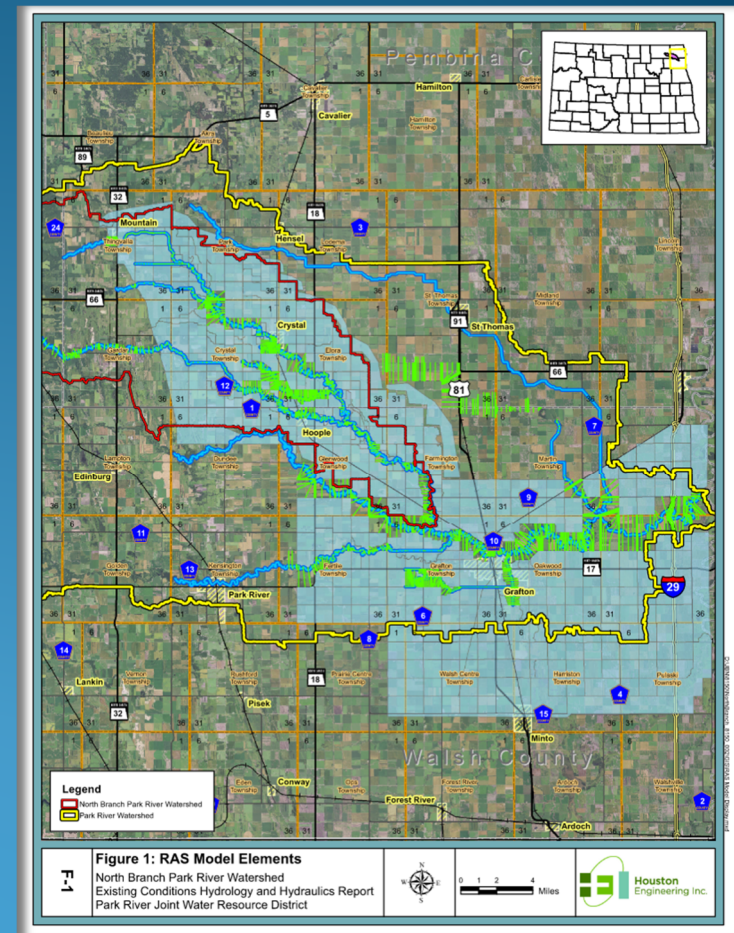
June 15, 2021 Public Information Meeting (Grafton, ND)

- Impacts downstream along North Branch Park River
- Impacts to Walsh County Drain 70
- Impacts to City of Grafton Flood Control

Petitioners authorized additional analysis based on the above concerns.

Hydrology and Hydraulics Review

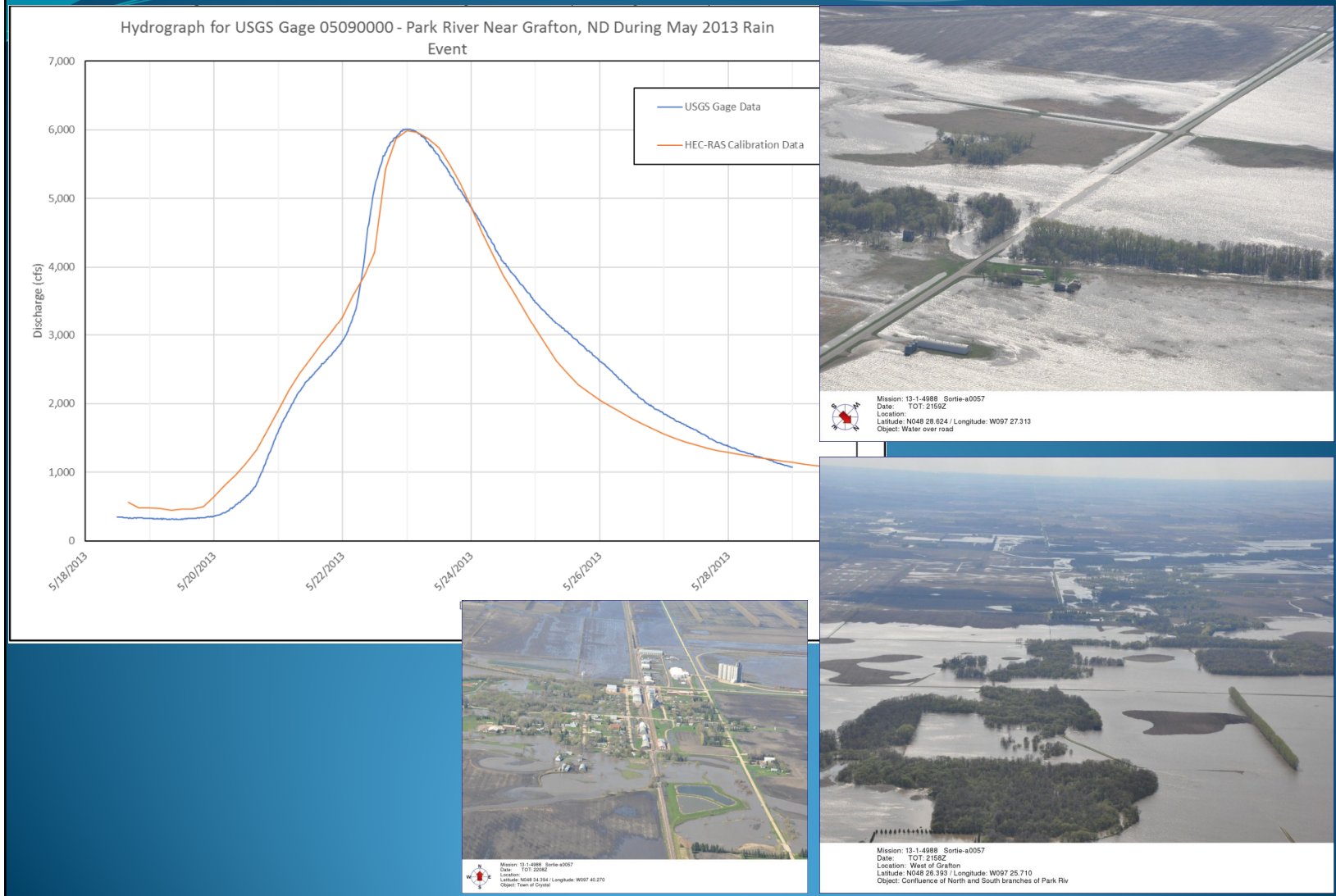
- Source Model: North Branch Park River Regional Conservation Partnership Program (RCPP).
 - *Park River Joint Water Resource District (Walsh and Pembina Counties)*
- Hydrology includes the entire Park River Watershed.
- Hydraulic analysis includes portions of Cart Creek, North Branch, Middle Branch, South Branch, and Park River (See map).
- Detail added to Drain 80 and Drain 67-C (existing and proposed).



Hydrology and Hydraulics Review

- Hydrologic and Hydraulic models calibrated based on late May 2013 rainfall event.
 - Overall flood volume, peak discharge, and timing of the event were compared to results at USGS Gage 05090000 in Grafton.
 - Model flood extents compared with flood extents observed during the late May 2013 flood event (Civil Air Patrol images).

Hydrology and Hydraulics Review



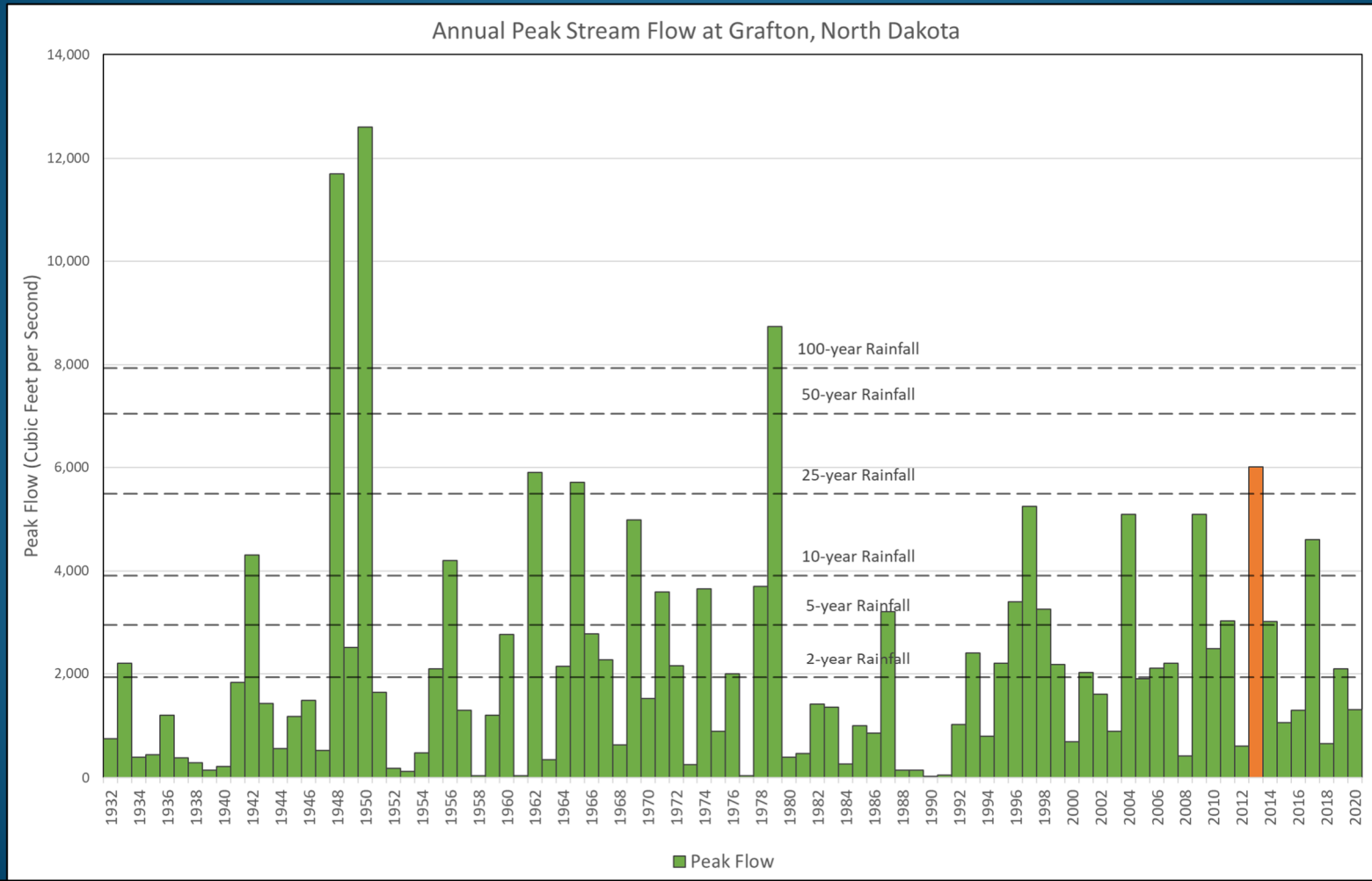
Hydrology and Hydraulics Review

- Synthetic rainfall analyzed.
- Rainfall depths based on NOAA Atlas 14 depths.
- 4-Day duration rainfall.

Recurrence Interval	4-day Rainfall Depth (in)
2-year	2.7
5-year	3.4
10-year	3.9
25-year	4.8
50-year	5.5
100-year	6.3

Hydrology and Hydraulics Review

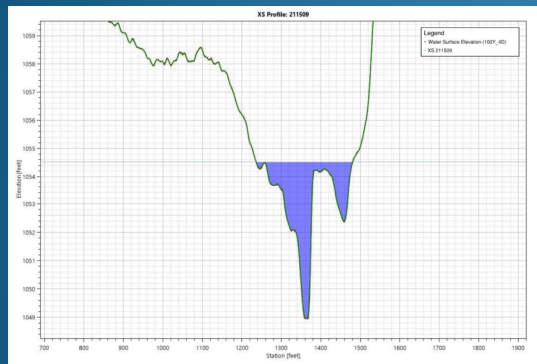
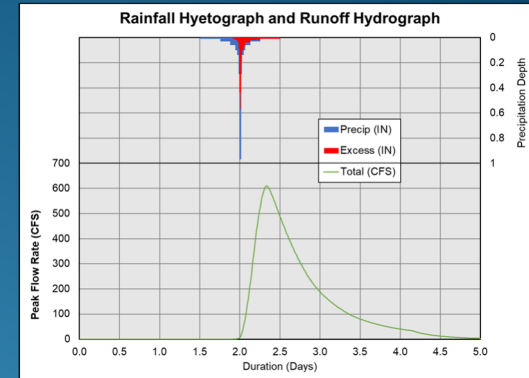
- Comparison of peak streamflow compared to recurrence events.



Hydrology and Hydraulics Review

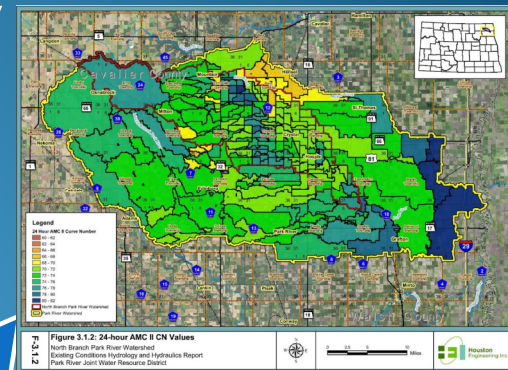
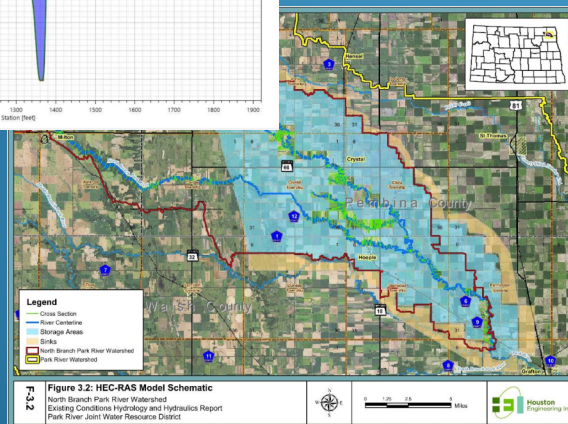


Meteorology
(Rainfall)

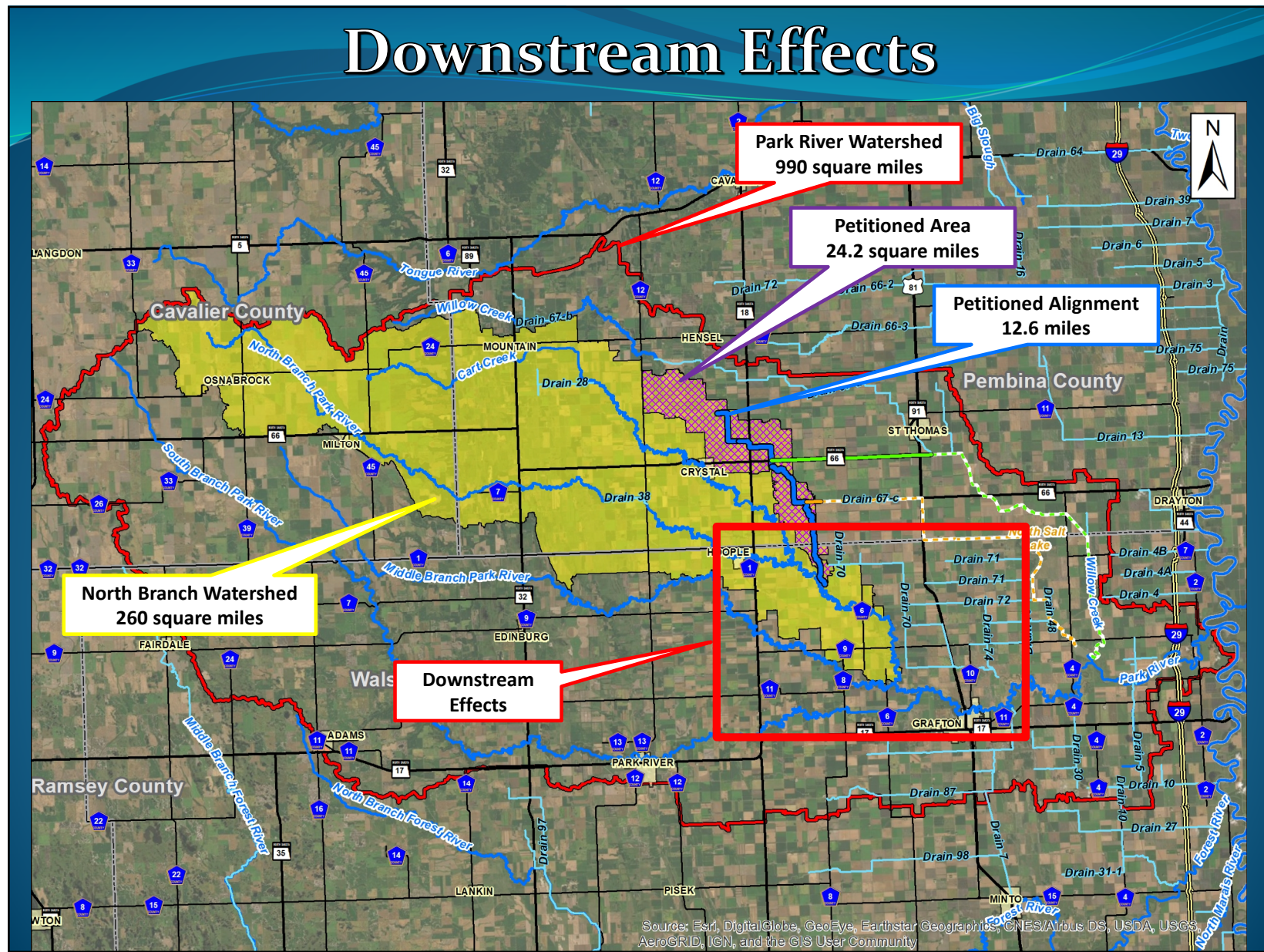


Hydrology

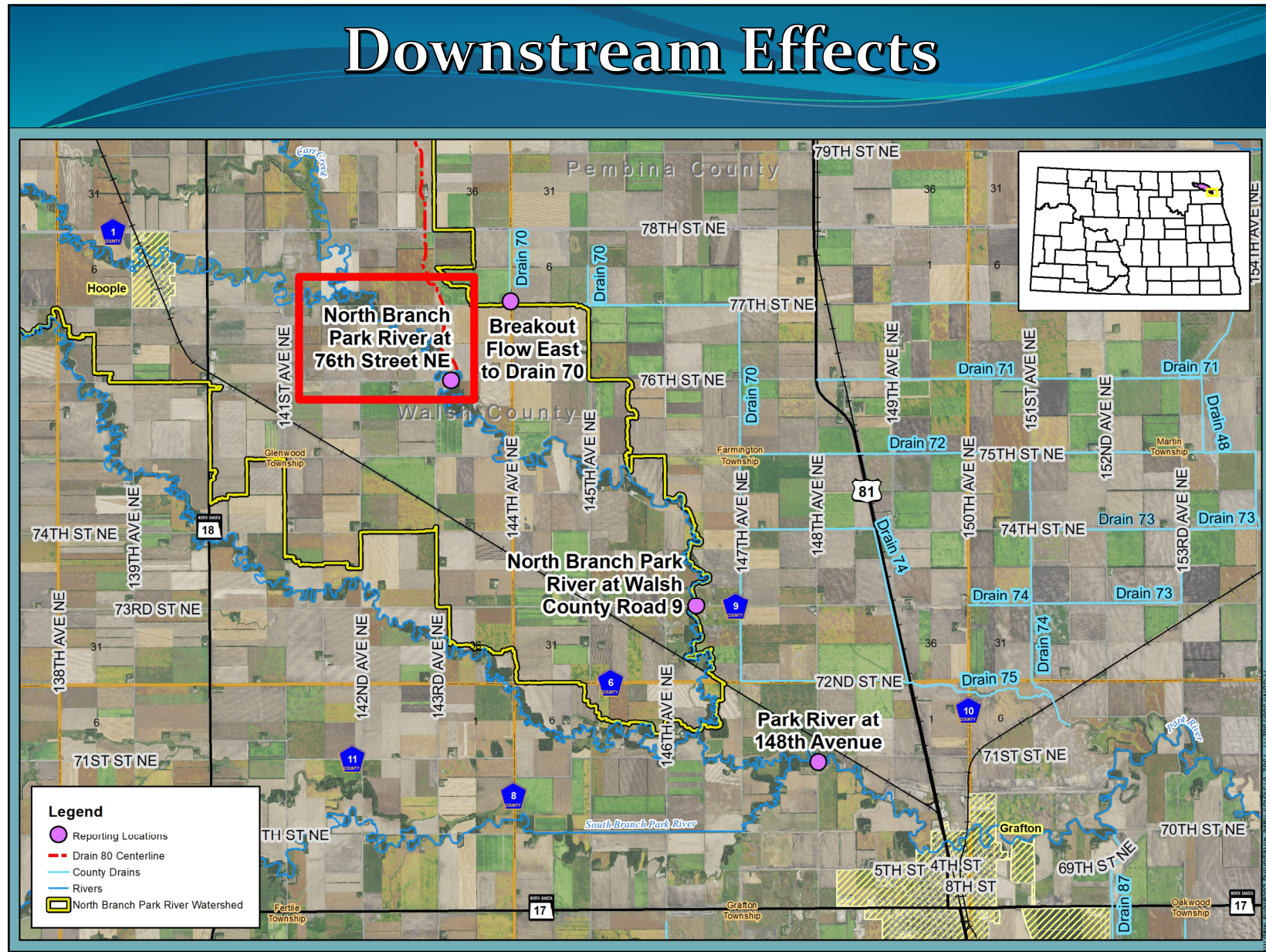
Hydraulics



Flood Levels

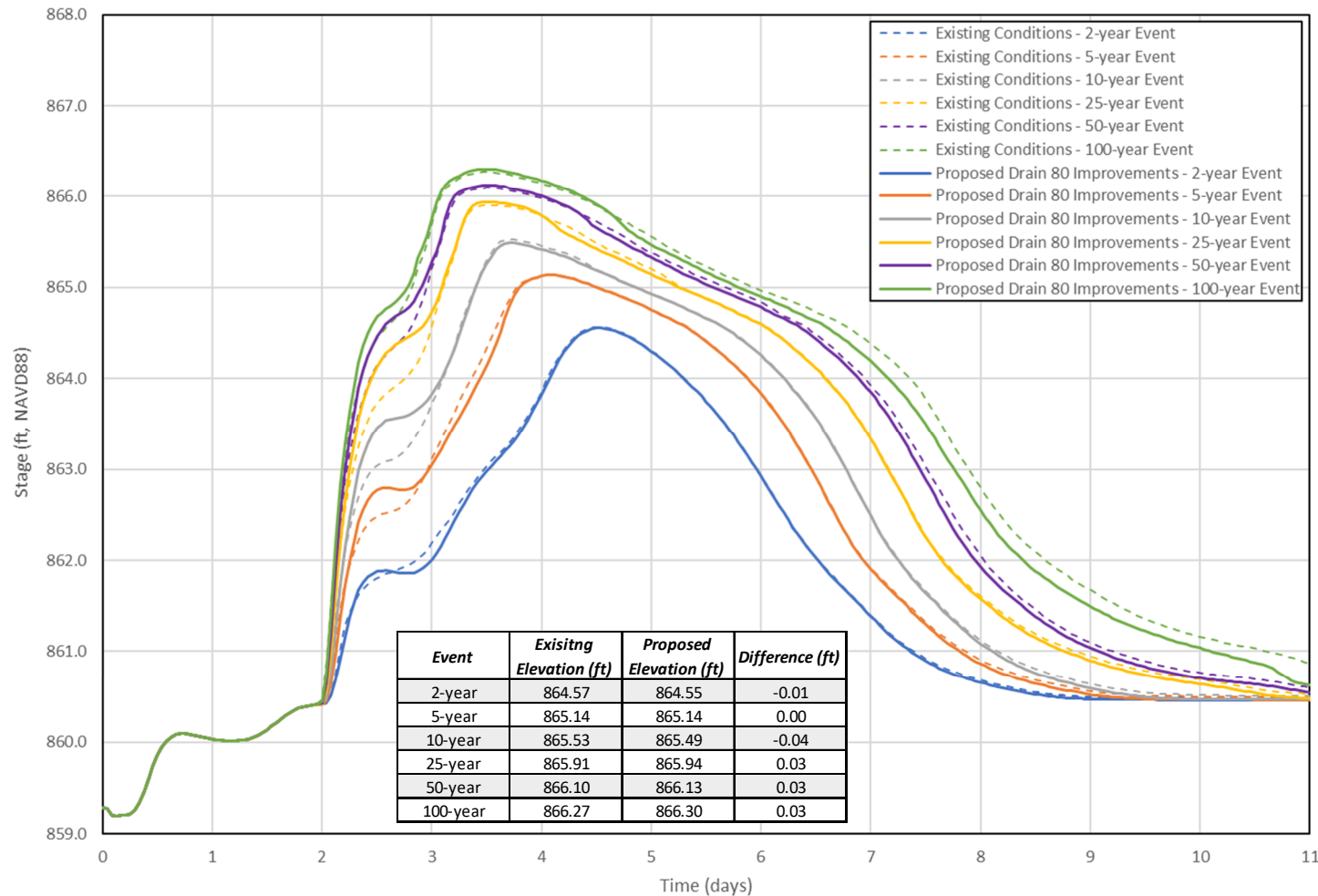


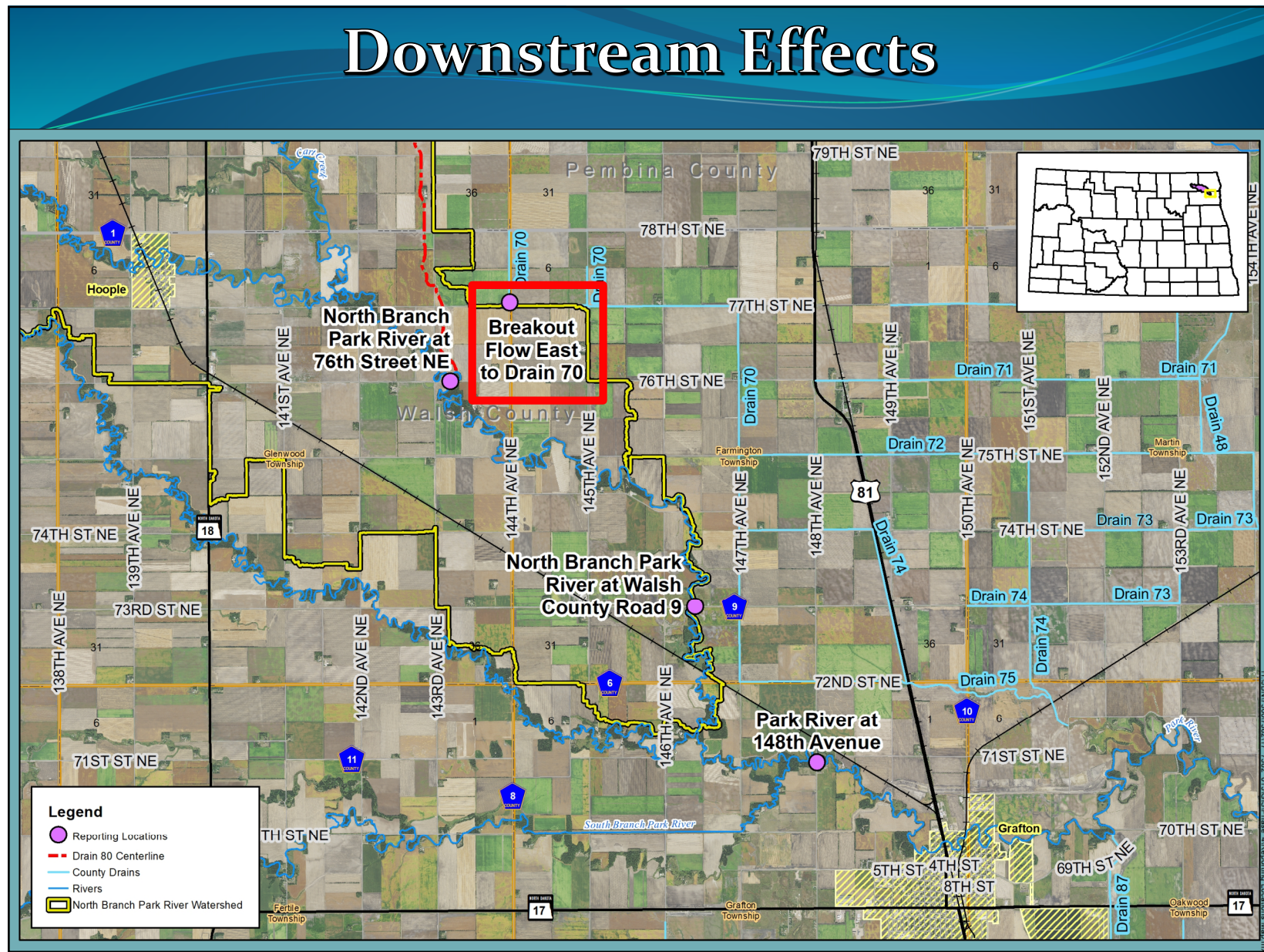
Downstream Effects



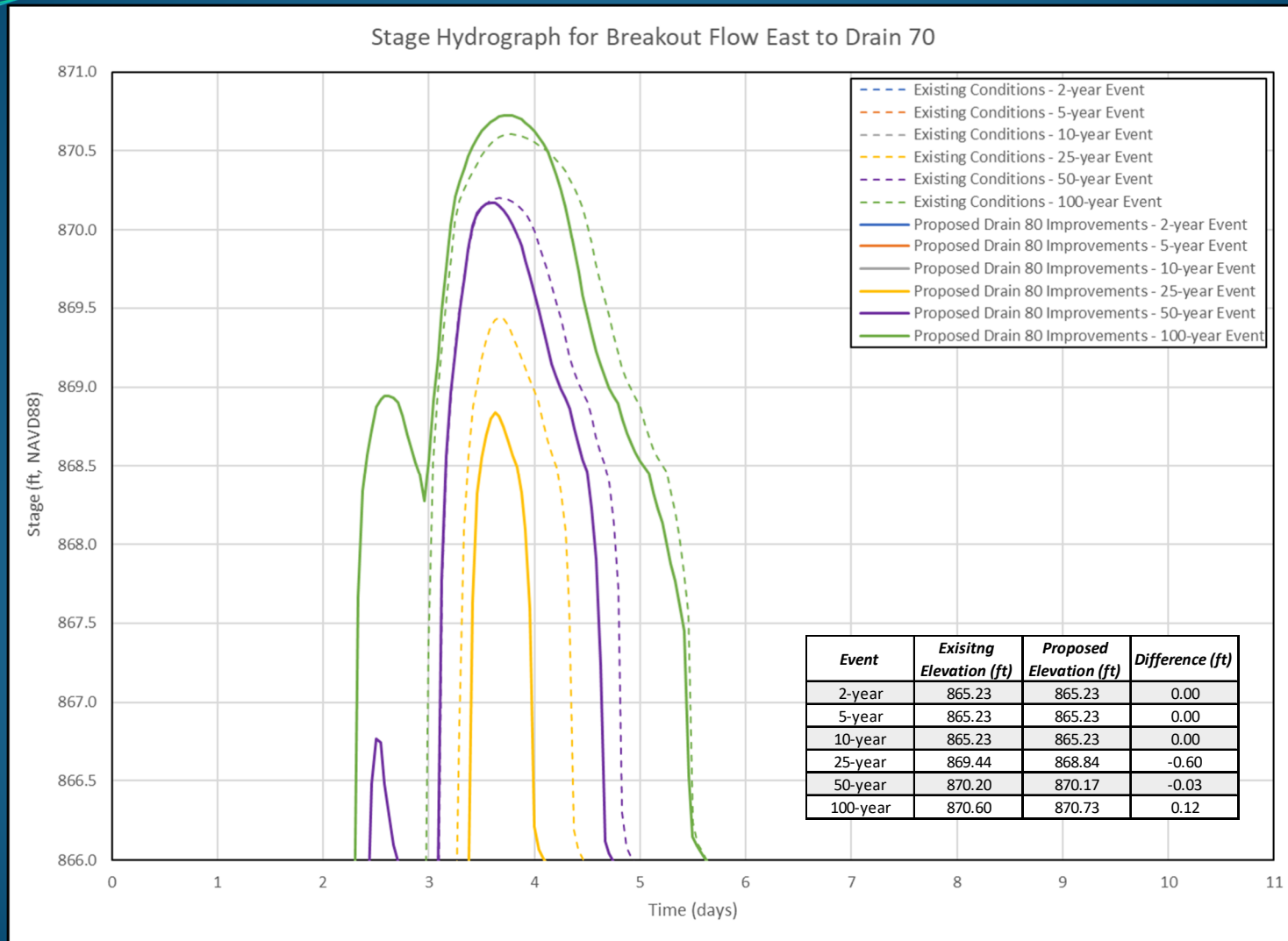
Downstream Effects

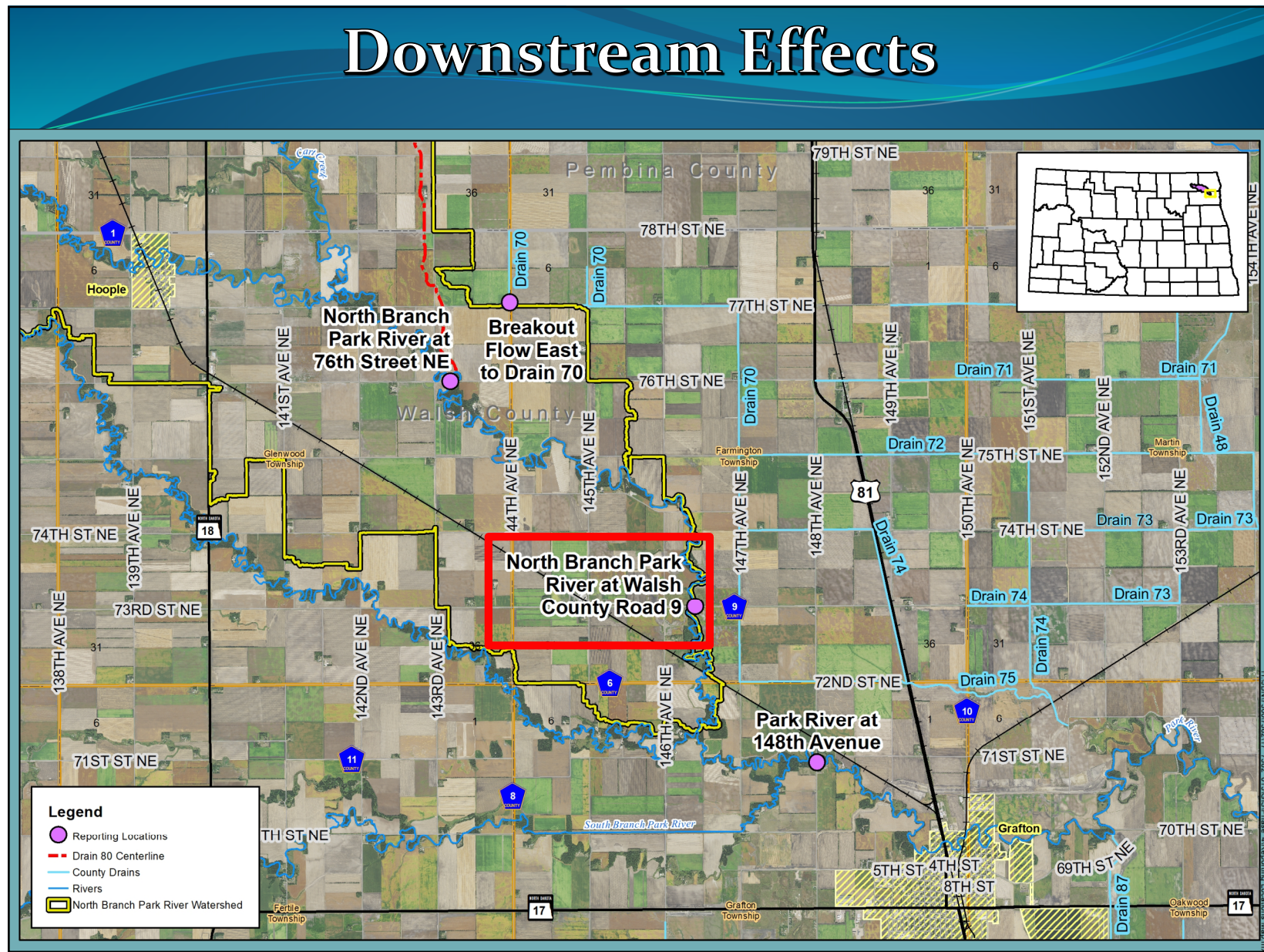
Stage Hydrograph for North Branch Park River at 76th Street NE





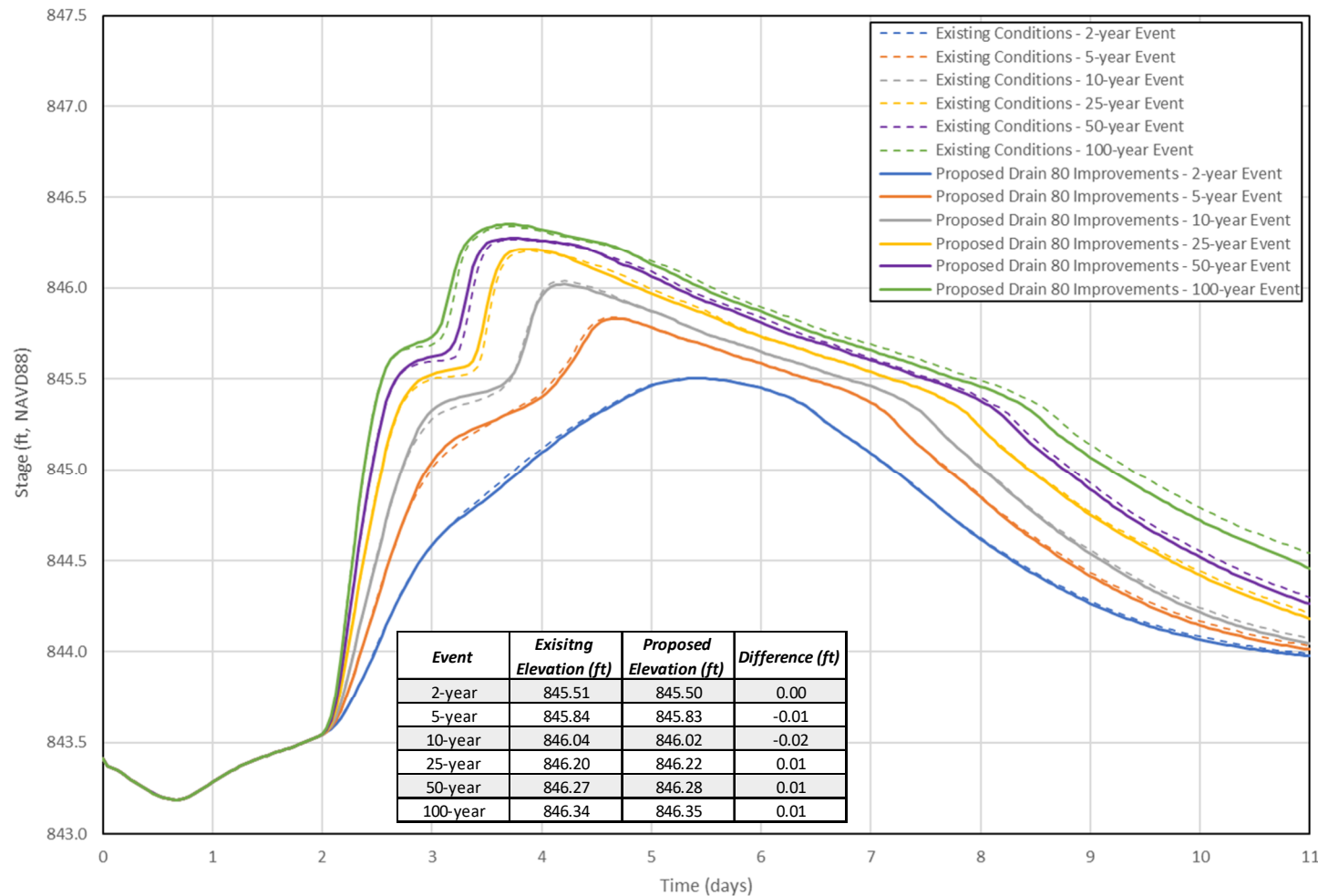
Downstream Effects

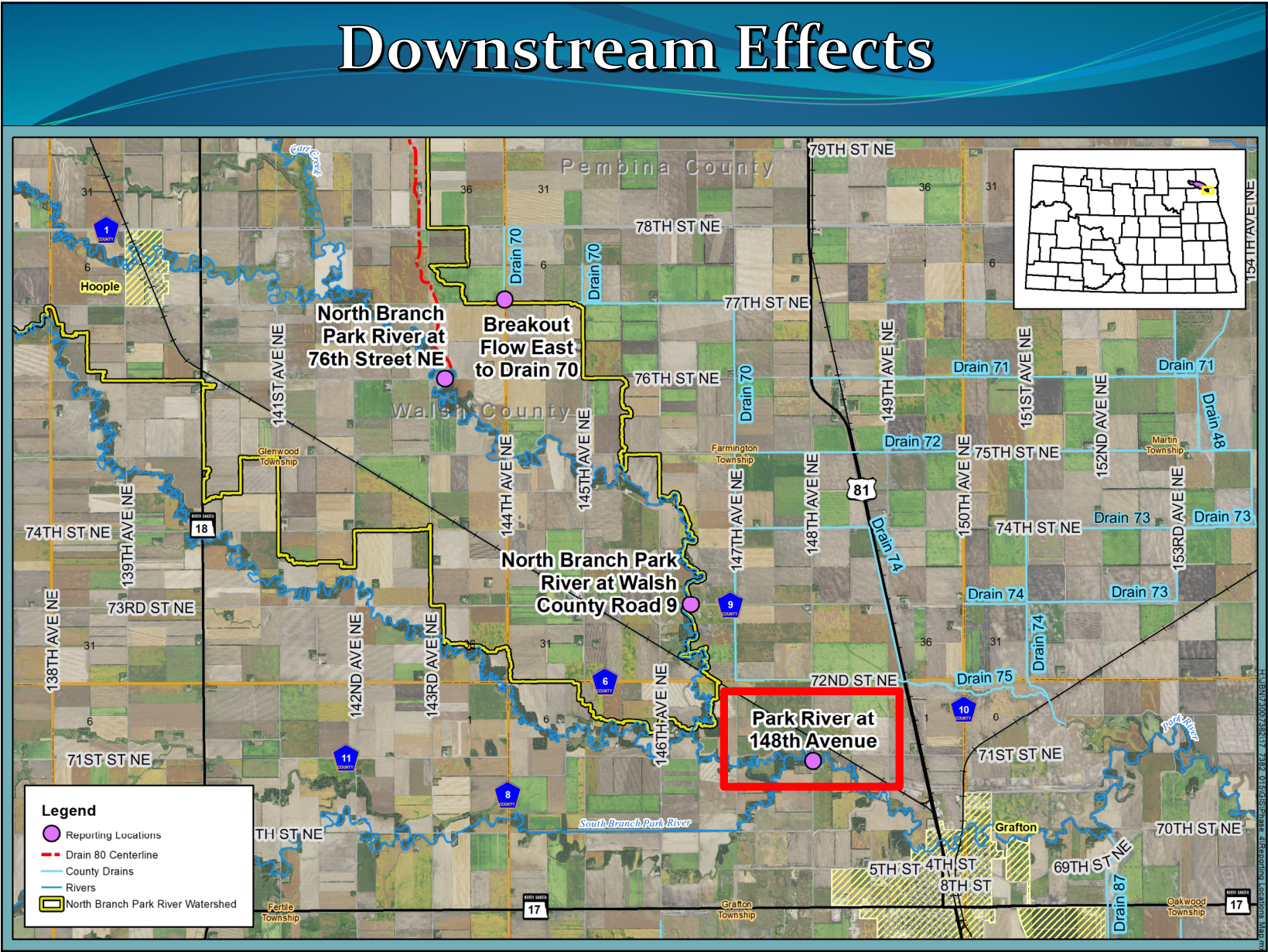




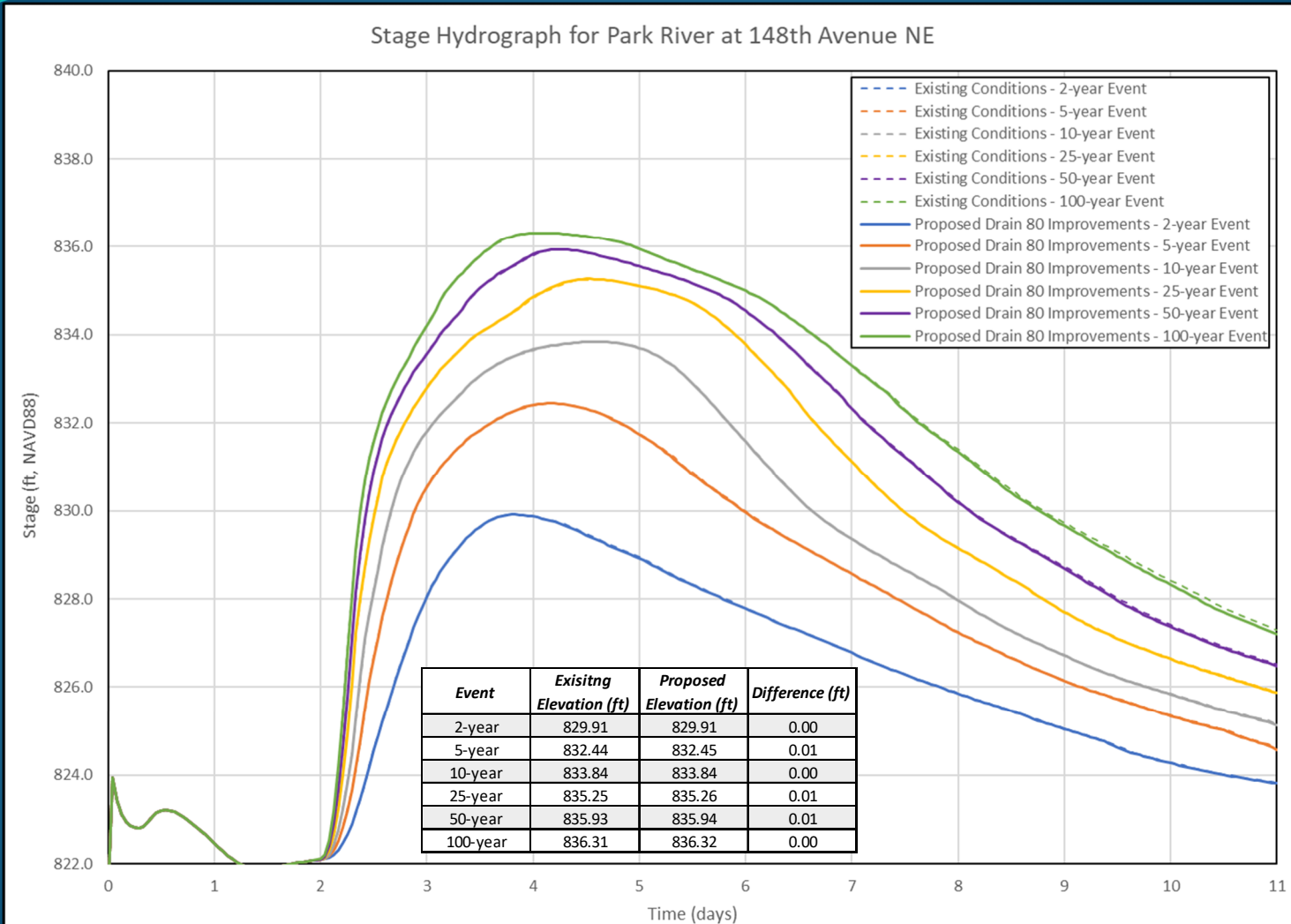
Downstream Effects

Stage Hydrograph for North Branch Park River at Walsh County Road 9





Downstream Effects



Project Costs

- Review of Project Cost is a Preliminary Estimate
- Preliminary estimate includes:
 - Quantities from conceptual design
 - Unit costs from recent bids
 - Anticipated cost share opportunities
 - Contingency on construction costs
 - Non-construction costs
- Assessed costs are based on actual costs incurred

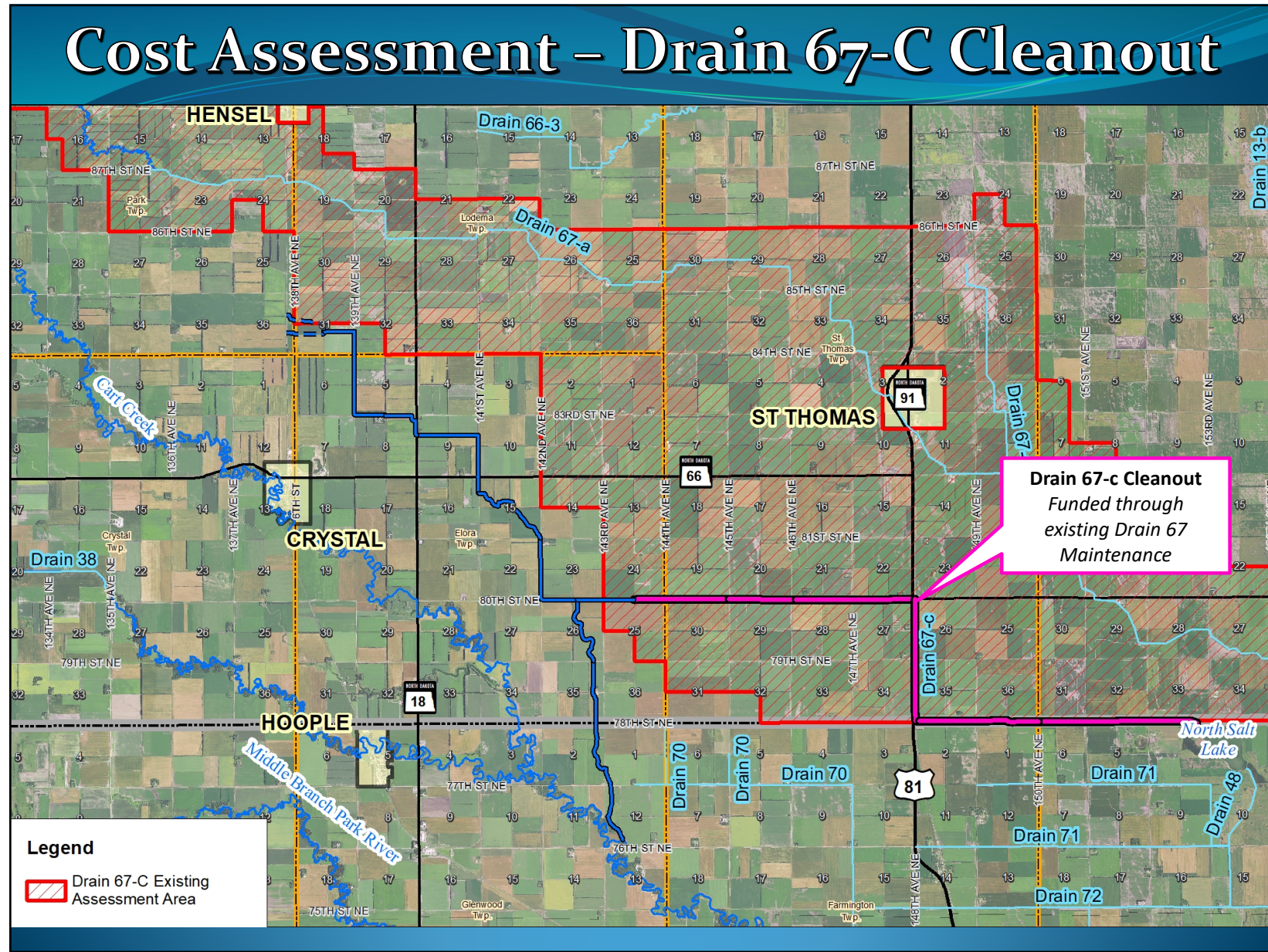
Project Costs

Segment	Total Cost (Less NDDOT Costs ^[1])	NDSWC Cost Share Potential Contribution ^[2]	Remaining Local Costs
Drain 80	\$4,844,000 - \$5,612,000	\$2,142,000 - \$2,488,000	\$2,702,000 - \$3,125,000
Drain 67-C Improvements	\$874,000	\$385,000	\$490,000
Drain 67-C Cleanout ^[3]	\$224,000	\$0	\$224,000
Total Costs	\$5,942,000 - \$6,710,000	\$2,527,000 - \$2,873,000	\$3,416,000 - \$3,839,000

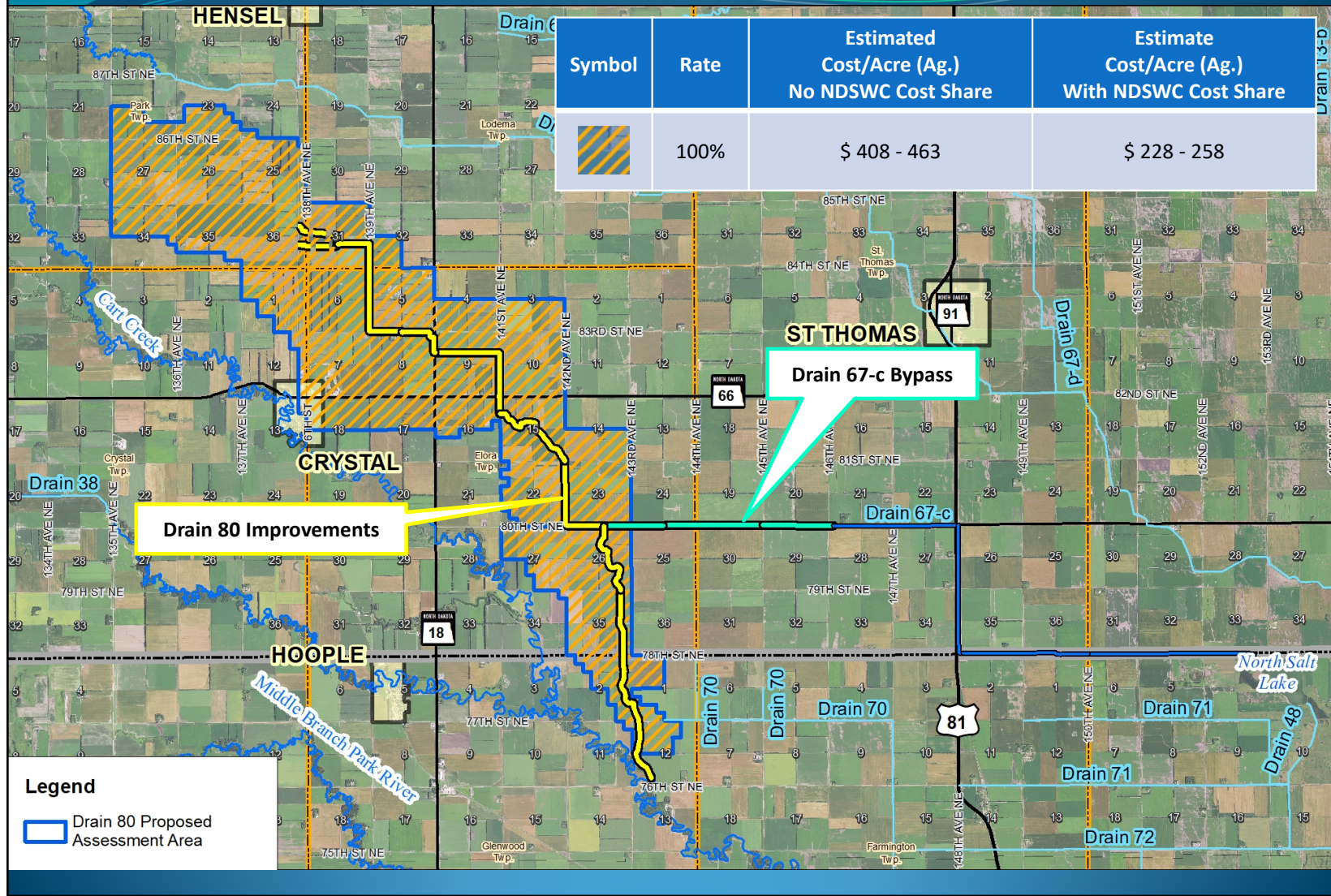
[1] NDDOT required to provide drain crossings when ordered by the Water Resource District

[2] ND State Water Commission cost share is subject to SWC approval, and is not guaranteed at this time.

[3] Maintenance is not eligible for ND State Water Commission cost share.



Cost Assessment – Drain 80 & Drain 67-C Improvements



Questions and Comments