



Middle River Subwatershed  
Project Team Meeting  
September 19, 2016



# MIDDLE RIVER SUBWATERSHED

- Middle River drainage area is approximately 295 square miles
- River is approximately 98 miles long
- Is a tributary to the Snake River
- Passes through Middle River, Newfolden, Old Mill State Park, and Argyle

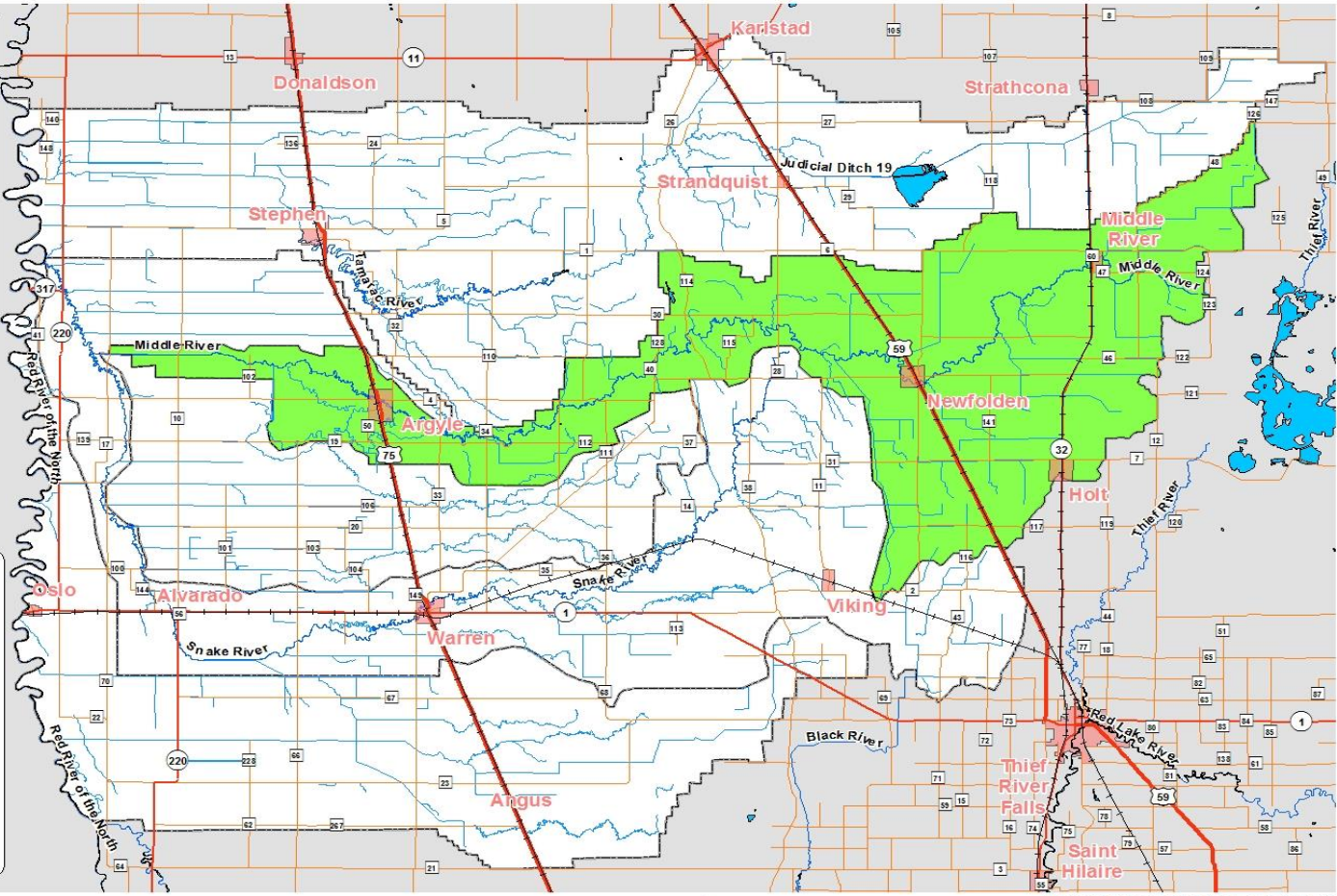






## Minnesota Center for Environmental Advocacy (MCEA) Assessment

- East portion identified as high priority area for wildlife and game species
- Middle River classified as a Class III warm water stream
- Key habitats such as surrogate grasslands and native plant communities
- Contains conservation regions & wetlands throughout



**Legend**

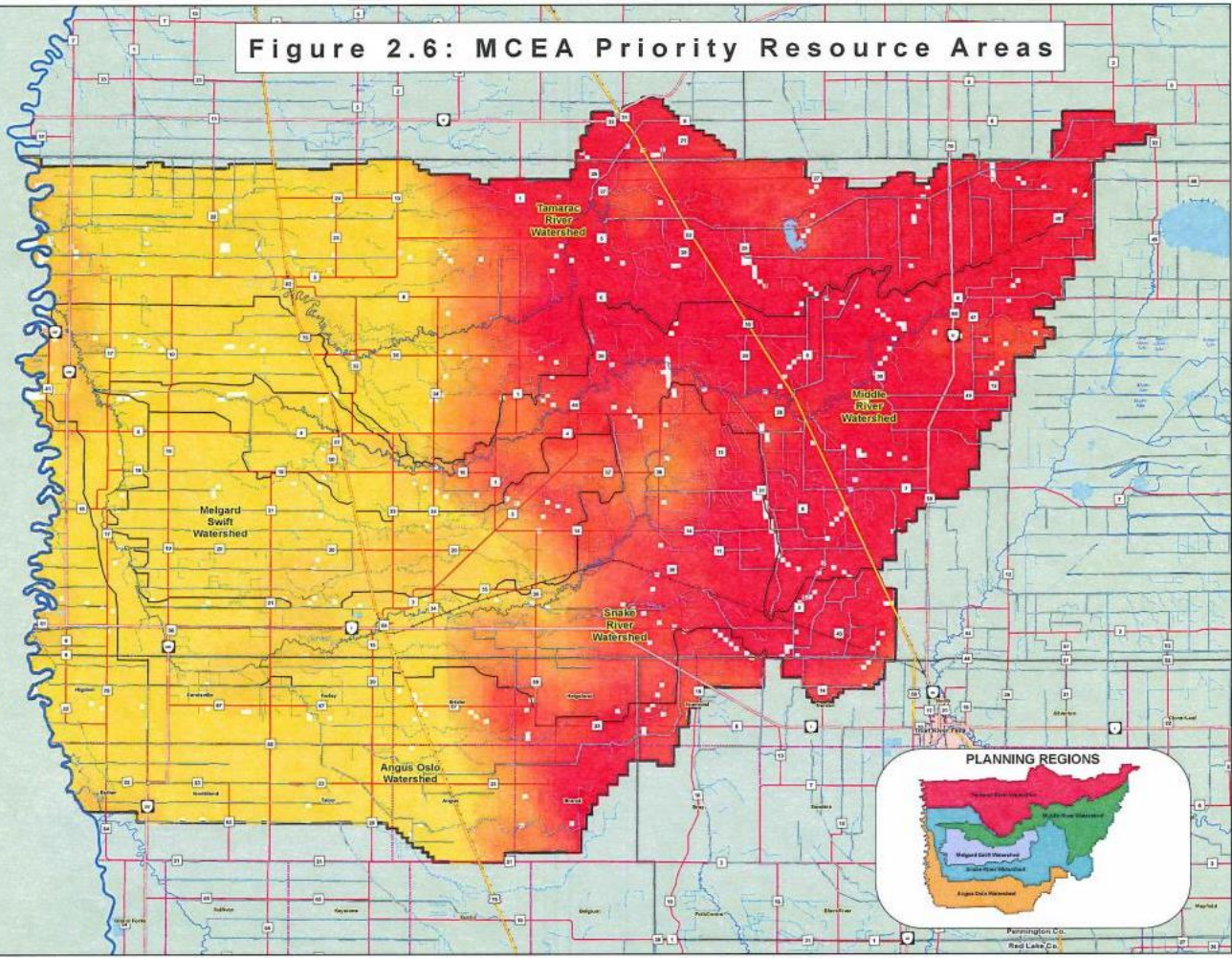
- MSTRWD
- Middle River Subwatershed
- Municipal Boundary
- Highway
- County Road
- Railroad
- Lake
- River
- Stream



MIDDLE RIVER FEASIBILITY STUDY  
MIDDLE SNAKE TAMARAC WATERSHED DISTRICT MAP



Figure 2.6: MCEA Priority Resource Areas



- Legend**
- County Boundary
  - Legal Boundary
  - Cities
  - Sections\_Watershed
  - Townships
- Transportation**
- US Highway
  - State Highway
  - County Highway
  - County Road
  - Legal Drainage Ditch
  - Railroads
- Water Features**
- Cantierline (River)
  - Stream (Perennial)
  - Drainage Ditch (Perennial)
  - Stream (Intermittent)
  - Drainage Ditch (Intermittent)
  - Waterbody



Data source: MN DNR Data Cell



Location Map



Middle-Snake-Tamarac Rivers Watershed District

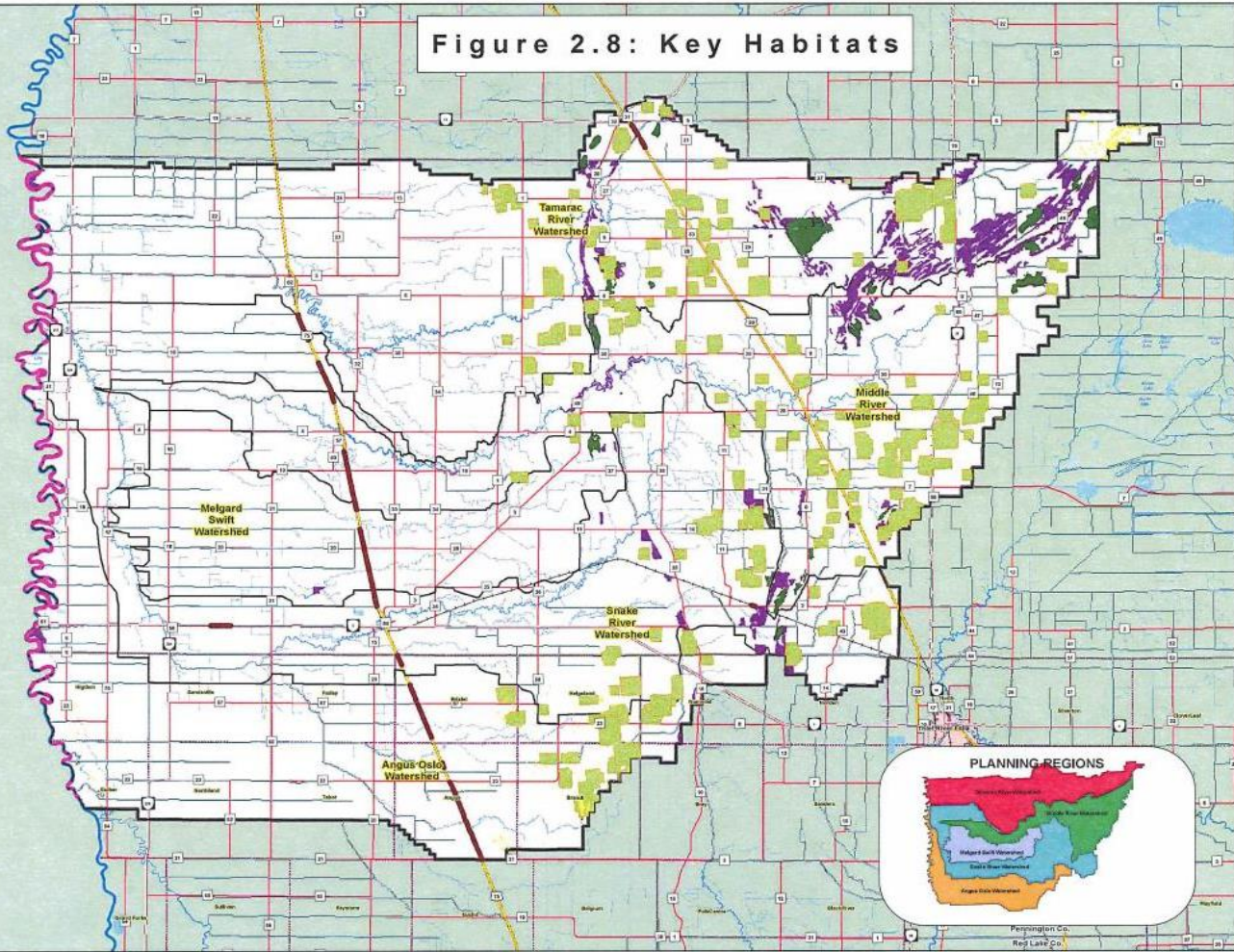
Scale: 1:50,000	Drawn by: ERM	Prepared by: ERM	Project No.: 21-004	Date: 10/20/20	Sheet: 701.237.5065
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**Houston Engineering Inc.**  
 1401 21st Avenue North Fargo ND 58102

E:\Projects\2021\21-004\GIS\Map\_Series\21-004\_Mapsheet\_001.mxd  
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Figure 2.8: Key Habitats



- Legend**
- County Boundary
  - Legal Boundary
  - Cities
  - Sections\_Watershed
  - Townships
- Transportation**
- US Highway
  - State Highway
  - County Highway
  - County Road
  - Legal Drainage Ditch
  - Railroads
- Water Features**
- Centerline (River)
  - Stream (Perennial)
  - Drainage Ditch (Perennial)
  - Stream (Intermittent)
  - Drainage Ditch (Intermittent)
  - Waterbody

- Key Habitats**
- Prairie ROW
  - River Reaches
  - GAP
  - Semipalm Grassland
  - Shadow Lakes
  - Native Plant Community
- Date source: MN DNR Data Del



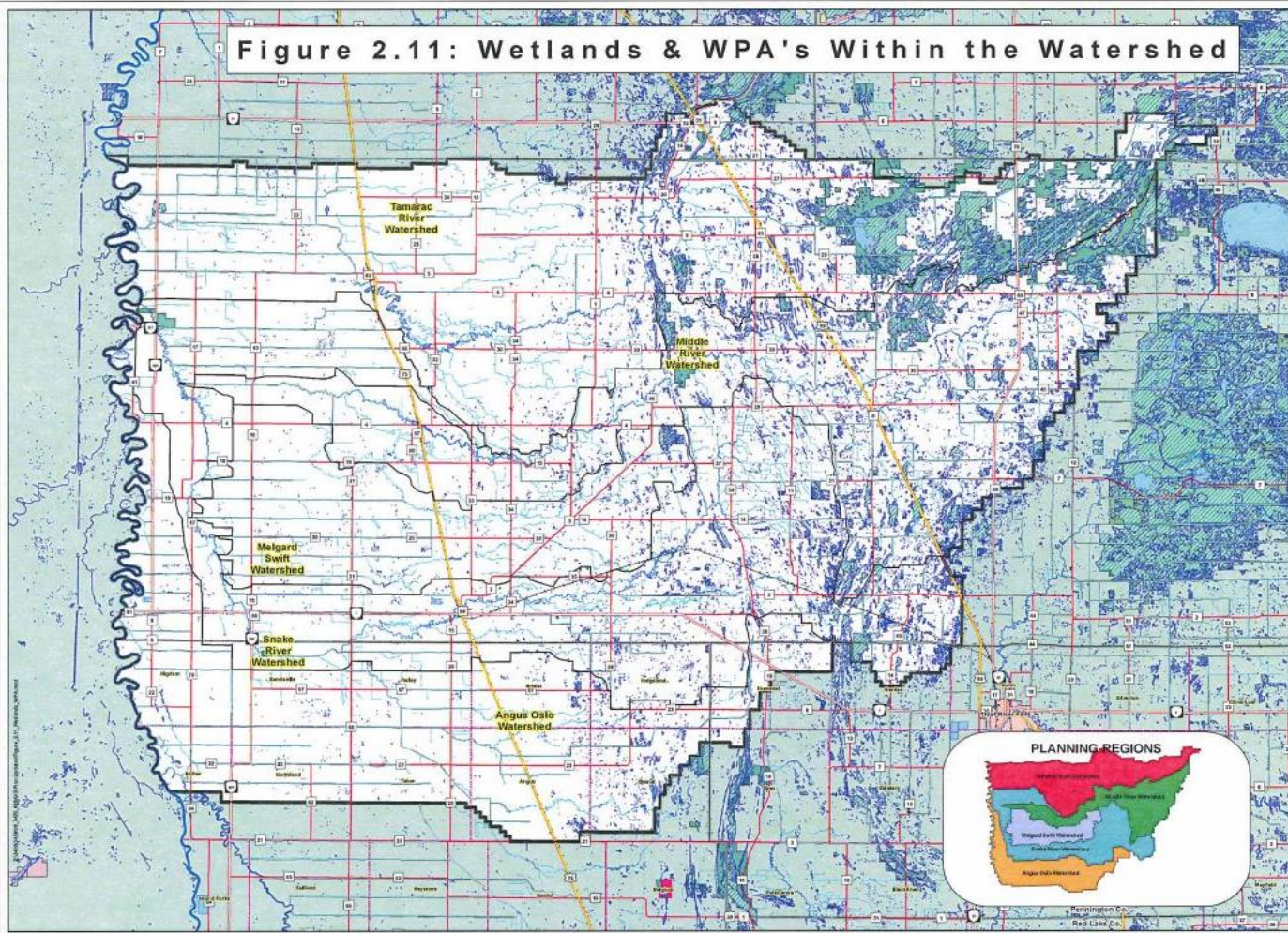
Location Map



Middle-Snake-Tamarac Rivers Watershed District						
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1:25,000	WHS	JHS	305893	3/2013	1	701.237.5065



**Figure 2.11: Wetlands & WPA's Within the Watershed**



- Legend**
- County Boundary
  - Legal Boundary
  - Cities
  - Sections\_Watershed
  - Townships
- Transportation**
- US Highway
  - State Highway
  - County Highway
  - County Road
  - Legal Drainage Ditch
  - Railroads
- Water Features**
- Centerline (River)
  - Stream (Perennial)
  - Drainage Ditch (Perennial)
  - Stream (Intermittent)
  - Drainage Ditch (Intermittent)
- Waterbody
  - Waterflow/Production Areas
  - Wetlands
  - National Wildlife Refuge
  - Scientific and Natural Areas
  - Wildlife Management Areas
- Data source: MN DNR Data Del



**Location Map**

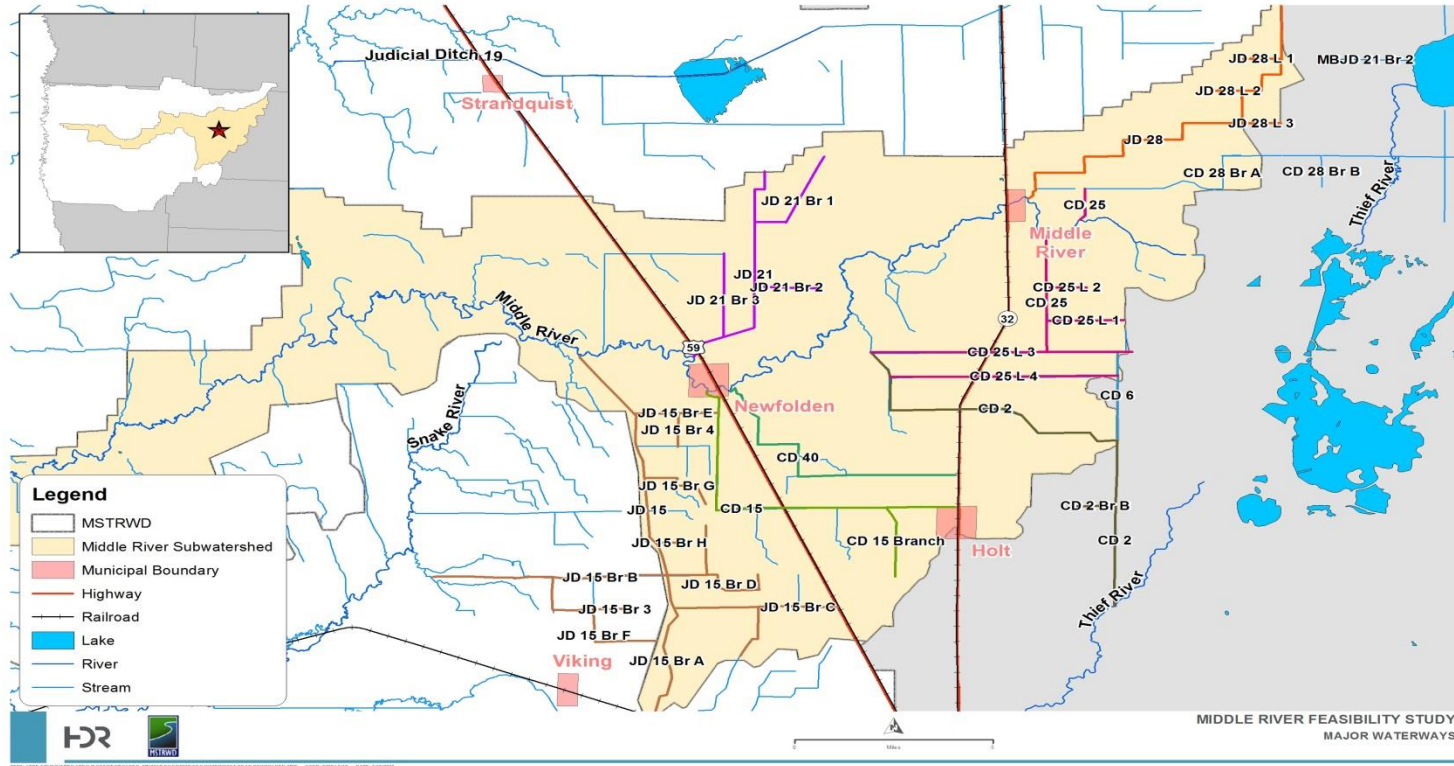


Middle-Snake-Tamarac Rivers Watershed District

Date:	Drawn by:	Checked by:	Project No.:	Date:	Scale:
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701.237.5045

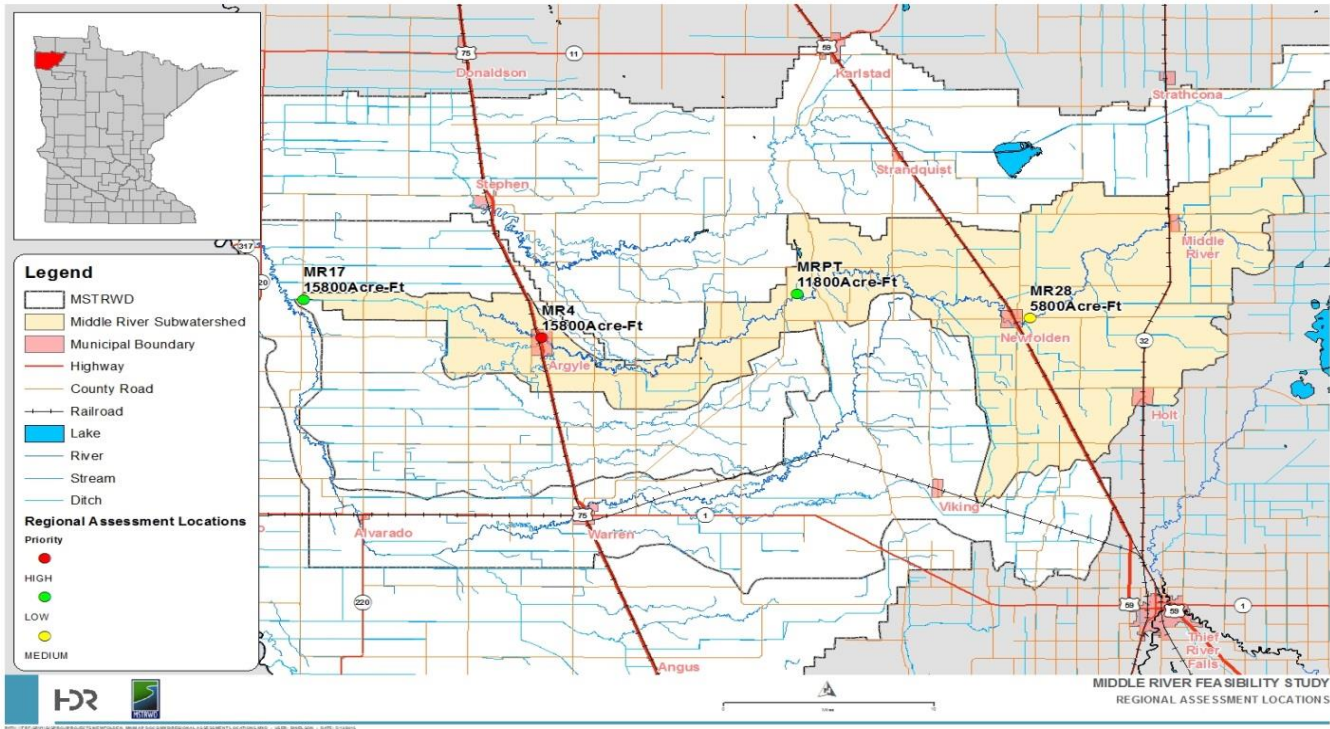
**Houston Engineering Inc.**  
1601 21st Avenue North Fargo ND 58102



# KEY WATERWAYS

- Middle River
- CD 40
- CD 25
- CD 15
- CD 2
- JD 28
- JD 21
- JD 15





Red River Basin Commission goal of 20% reduction of peak flows to the Red River

Approximately 15,000 – 16,000 acre-feet of storage needed for the Middle River Subwatershed

Four regional assessment locations within the sub-watershed

# GOALS OF MSTRWD

- Flood Damage Reduction
- Manage Legal Drainage Systems
- Manage Natural Resources & Recreation Areas
- Manage & Improve Water Quality
- Provide Erosion & Sediment Control
- Educate
- Coordinate with Agencies
- Collect & Manage Data





**Middle-Snake-Tamarac Rivers Watershed District**  
**Project Work Team**  
**Middle River Meeting #1 - Agenda**  
1:00 p.m. Monday, May 16<sup>th</sup>, 2016  
Newfolden, Minnesota

- 1:00 Call to Order / Introductions
- 1:05 Project Team – Introduction to the Process
- 1:15 Middle River Subwatershed History & Discussion
- 1:45 Project Team Goals and Objectives Discussion
- 2:00 Permitting and Natural Resource Enhancement (NRE) Discussion
  - ~ Problem Statement
  - ~ Concurrence Point #1 – Purpose and Need
- 2:15 Discussion of next step(s) / Info Needed to Address Alternatives / How to Proceed
  - ~ FDR &/or NRE
  - ~ Feasibility Study
  - ~ Funding
- 2:25 Action Items Needed Before Next Meeting
  - Schedule Next Meeting
  - Task Assignments
- 2:30 Adjourn

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**CONVERSATION GROUND RULES:**

1. Everyone participates; no one dominates.
2. There is not one "right" answer.
3. Keep an open mind.
4. Listen carefully to others.
5. Help keep the discussions on track.
6. Try hard to understand the views of those who disagree with you.
7. Ask questions if you are uncertain of the meaning of someone else's comments.
8. It is okay to have friendly disagreements – everyone has a right to his/her own views.
9. To help bring closure to a discussion, use the "I can live with it" rule.



## Concept Feasibility Study

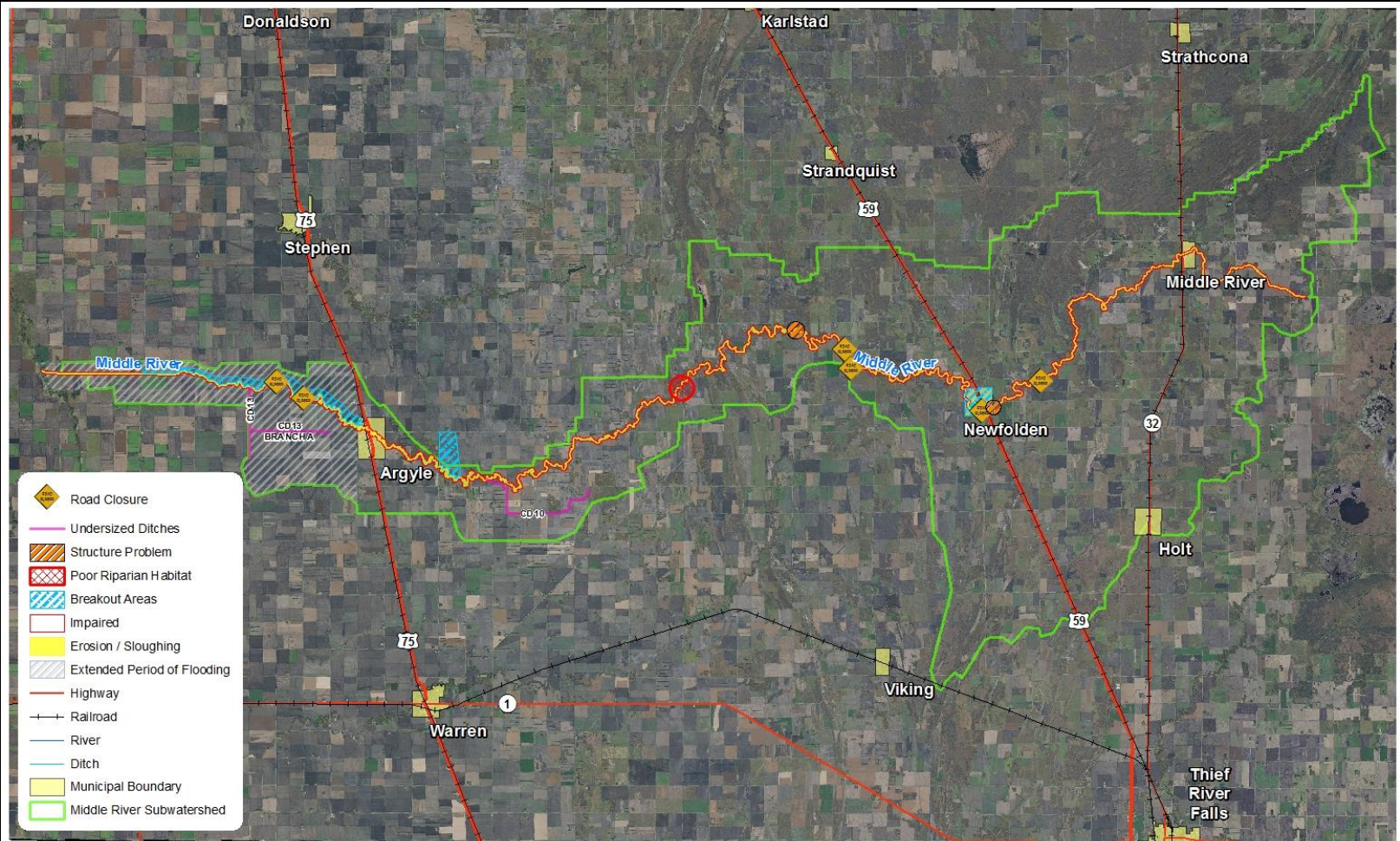
Middle River Subwatershed  
Middle-Snake-Tamarac Rivers Watershed District















*Marshall County, Minnesota*  
September XX, 2016



## Problems Identified within the Middle River Subwatershed

- Runoff contribution and timing is excessive from Eastern portion
- Remove or prevent structures in the floodplain (Newfolden)
- Flooding problems throughout the watershed (Extended flooding in Western region)
- Undersized ditch systems
- Insufficient waterway structures
- Impairment of the Middle River for turbidity, dissolved oxygen, fish & aquatic life
- Banks of Middle River are eroding/sloughing
- Base flows too small for fish passage & other habitat needs
- Roads overtop in high water events



-  Road Closure
-  Undersized Ditches
-  Structure Problem
-  Poor Riparian Habitat
-  Breakout Areas
-  Impaired
-  Erosion / Sloughing
-  Extended Period of Flooding
-  Highway
-  Railroad
-  River
-  Ditch
-  Municipal Boundary
-  Middle River Subwatershed

MIDDLE RIVER SUBWATERSHED FEA SIBILITY REPORT  
 KNOWN SUBWATERSHED PROBLEM AREAS





# Newfolden West of Railroad Tracks



09/09/2016



# Newfolden West of Hwy 59



09/09/2016



# West of Newfolden: 180<sup>th</sup> Ave NW



09/15/2016

# West of Newfolden: 180<sup>th</sup> Ave NW





# East of Argyle



# West of Argyle: 380<sup>th</sup> Ave NW



09/15/2016



# West of Argyle: 440<sup>th</sup> Ave NW Looking West




09/15/2016

# CITY OF NEWFOLDEN FLOODPLAIN MITIGATION







Newfalden  
1975

Arlene, Donna & Nancy  
Big rain in Newfolden









**Traffic was slowed Wednesday on highway 59 four miles south of Newfolden as water was flowing over county road seven as well as highway 59. The Soo Line tracks near this intersection were under water as gravel under the rails washed away.**



**ATTENTION PROPERTY OWNERS! FLOOD INSURANCE RATE MAPPING**

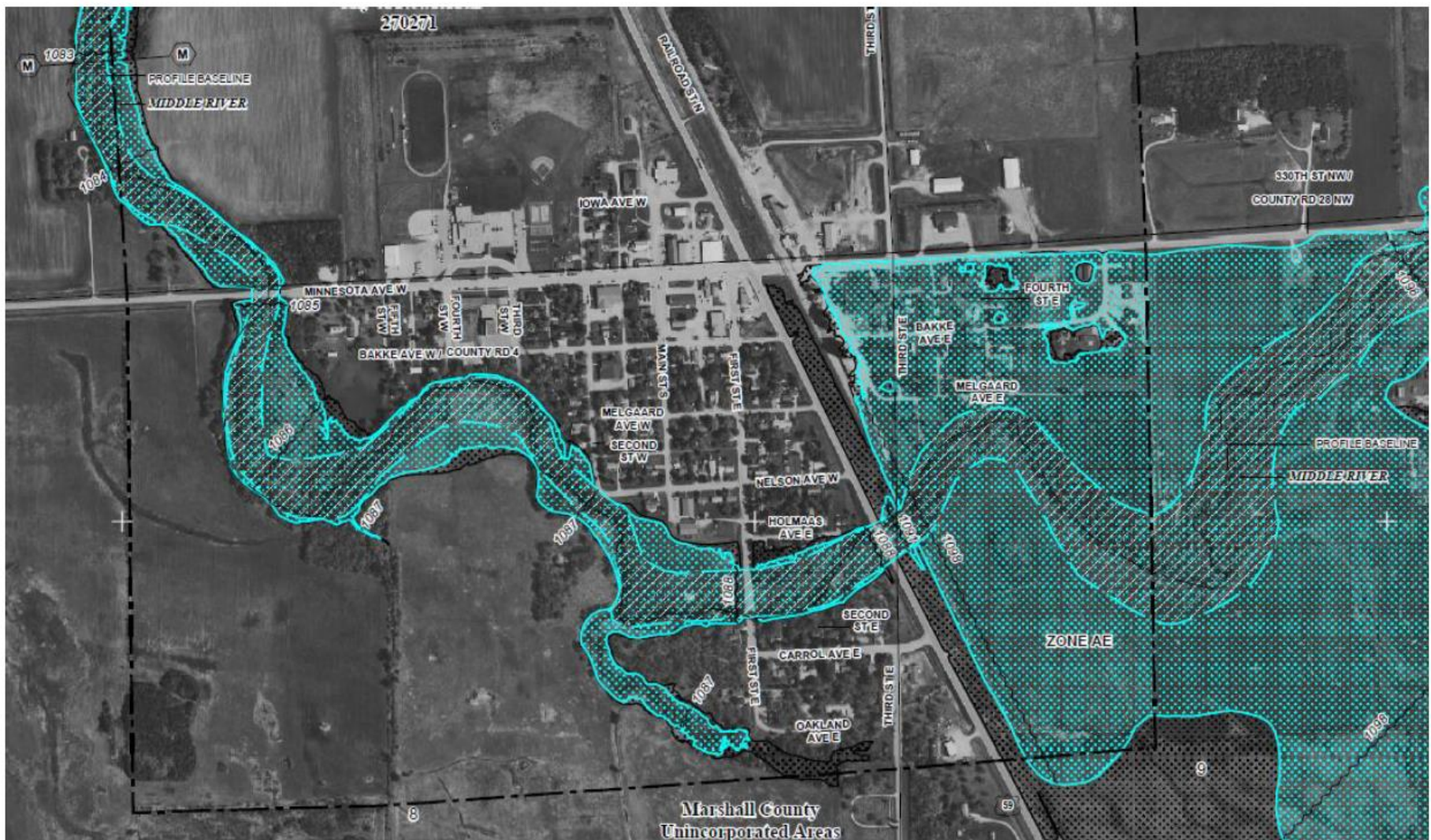


Newfolden's East Side - proposed 100 year flood plain

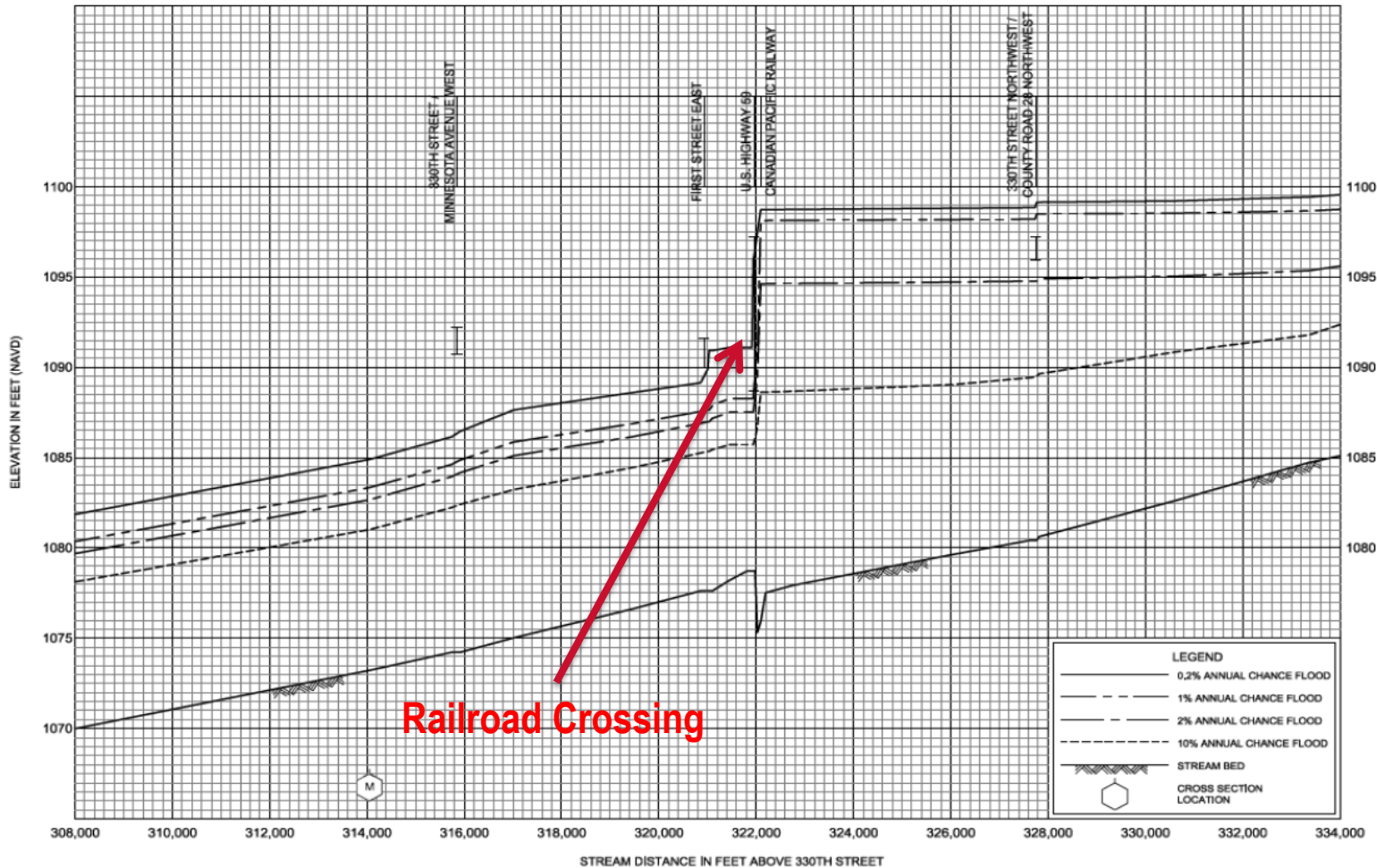
The Department of Homeland Security's Emergency Management Agency (FEMA) has completed a Preliminary Flood Insurance Rate Map (FIRM) and a Flood Insurance Study (FIS) for the City of Newfolden. Up until now, Newfolden did not have flood plain elevation data or floodplain maps. For this reason, Newfolden was not required to adopt a flood-plain ordinance; nor were residents in Newfolden required to carry flood insurance.

The next step in the process has begun. FEMA has published a notice of flood hazard determination and a public notification concerning the appeal process. The end result will be a final Federal Flood Insurance Rate Map, in which base flood elevations are determined and 100 and 500 flood hazard areas are identified. Once this is final, residents with structures in these flood plains, and who have a federally secured mortgage, will be required to obtain flood insurance.

Click [HERE](#) to for more QUESTIONS AND ANSWERS for property owners in FEMA's proposed 100 year flood plain.







**FLOOD PROFILES**

MIDDLE RIVER

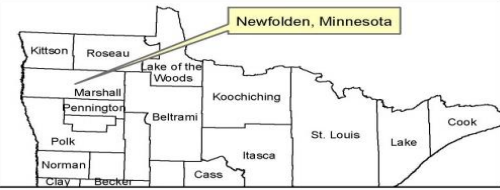
FEDERAL EMERGENCY MANAGEMENT AGENCY  
MARSHALL COUNTY, MN  
AND INCORPORATED AREAS



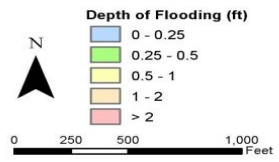
Existing CP Rail Crossing

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroX, Getmapping, Aergrid, IGN, IGP, swisstopo, and the GIS User Community

**SITE LOCATOR**



**Depth of Flooding in the City of Newfolden  
1-Percent-Annual-Chance Event**



**Risk Mapping, Assessment, and Planning  
(Risk MAP)**

**About this map:**  
This map shows the depth of flooding during the 1-percent-annual-chance (100-year) flood event. The depths were created using 2-foot LIDAR data for the City of Marshall.

Flood elevations were calculated using a revised version of the Middle River HEC2 model developed for the 1987 Marshall County Flood Insurance Study.



**2 – 96" CSP**

**3 – 66" CSP**



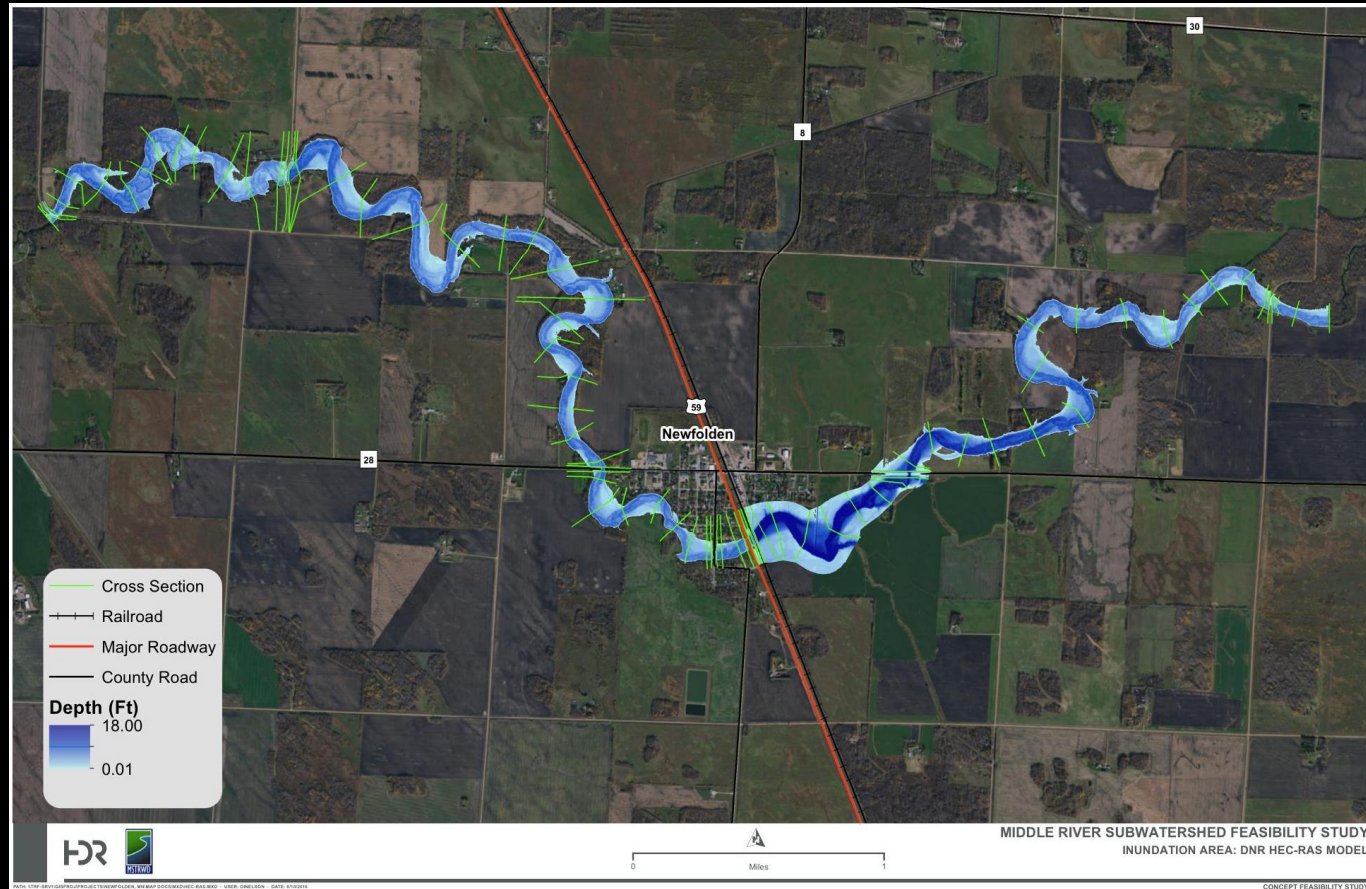
# PROJECT OBJECTIVES

- Remove ~40 structures from floodplain and eliminate flood damages
- Minimize flood insurance
- Future development
- Minimize upstream / downstream impacts
- Build efficient and economical system

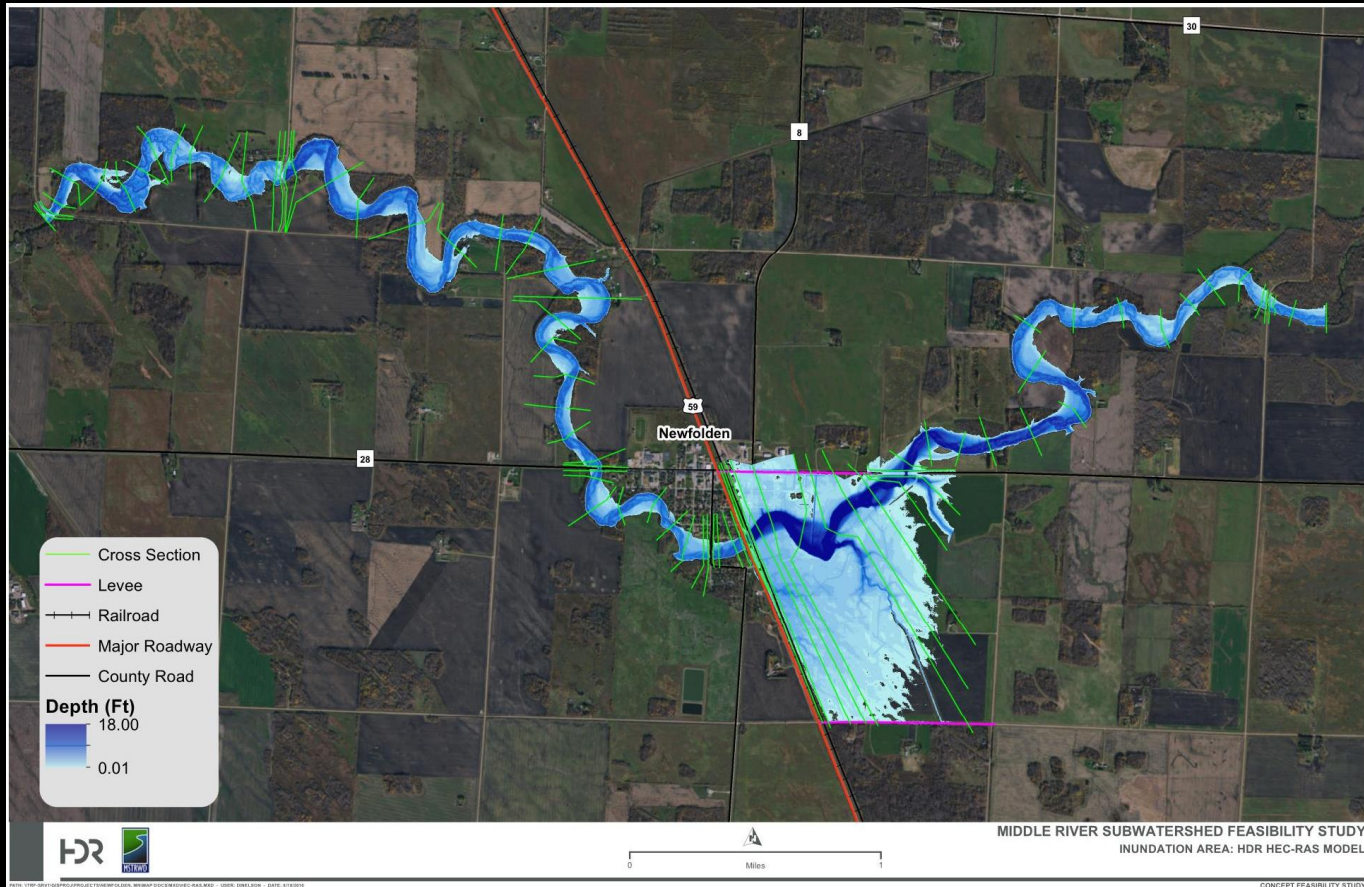




# CURRENT MAPPING FROM DNR HEC-RAS MODEL



# MAPPING FROM HDR MODIFIED HEC-RAS MODEL



MIDDLE RIVER SUBWATERSHED FEASIBILITY STUDY  
INUNDATION AREA: HDR HEC-RAS MODEL



# ALTERNATIVES

1. Do nothing – residents may raise lots, obtain LOMAs, etc.
2. Bore 1 or 2 – 48” to 54” steel pipes
3. Install 3 to 5 – 9’ x 9’ reinforced concrete boxes
4. Construct certifiable dike on north side of river, upstream of crossing
5. Construct dikes downstream of crossing or buyout affected properties
6. Retention area upstream or downstream
7. Construct a diversion channel
8. Some combination of the above measures

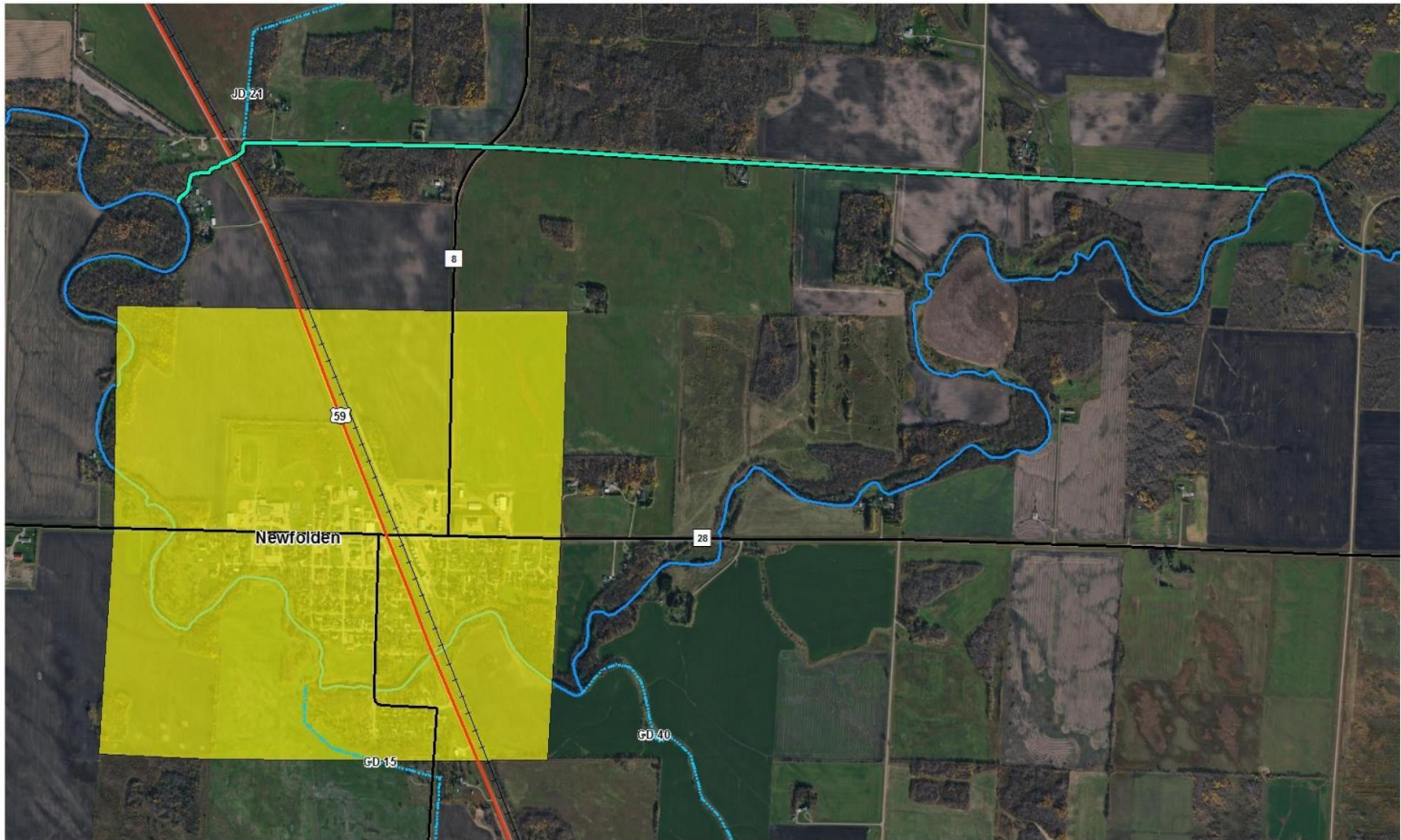
# BENEFITS

- New crossing with extended lifespan
- Lower headwater
- Removal of high-head embankment dam
- 40 homes removed from 100-year floodplain
- Flood risk reduced
- Dam hazard reduced
- Improve downstream flood impacts

# EXISTING CONDITIONS VS. PROPOSED RAILROAD ALTERNATIVES

Alternative	Peak WSE at Railroad (FT)	Difference in WSE (FT)	Peak WSE at Hwy 59 (Ft)	Difference in WSE (FT)	Peak WSE at E. 1st St. (Ft)	Difference in WSE (FT)	Peak Flow at Railroad (CFS)
<b>Existing</b>	1098.01	N/A	1092.63	N/A	1089.57	N/A	2612
<b>48" CSP</b>	1097.68	-0.33	1092.49	-0.14	1089.50	-0.07	2579
<b>54" CSP</b>	1097.57	-0.44	1092.52	-0.11	1089.52	-0.05	2587
<b>(2) 48" CSP</b>	1097.28	-0.73	1092.60	-0.03	1089.56	-0.01	2605
<b>(2) 54" CSP</b>	1097.06	-0.95	1092.67	0.04	1089.59	0.02	2622
<b>(3) 9' x 9' Box Culverts</b>	1096.11	-1.9	1092.95	0.32	1089.71	0.14	2689
<b>(5) 9' x 9' Box Culverts</b>	1094.50	-3.51	1093.28	0.65	1089.86	0.29	2764





Diversion Ditch



River

County Road

Municipal Boundary



MSTRWD Ditch

Major Roadway

Railroad

0



Miles

0.5

MIDDLE RIVER SUBWATERSHED FEASIBILITY STUDY

POTENTIAL DIVERSION ALIGNMENT







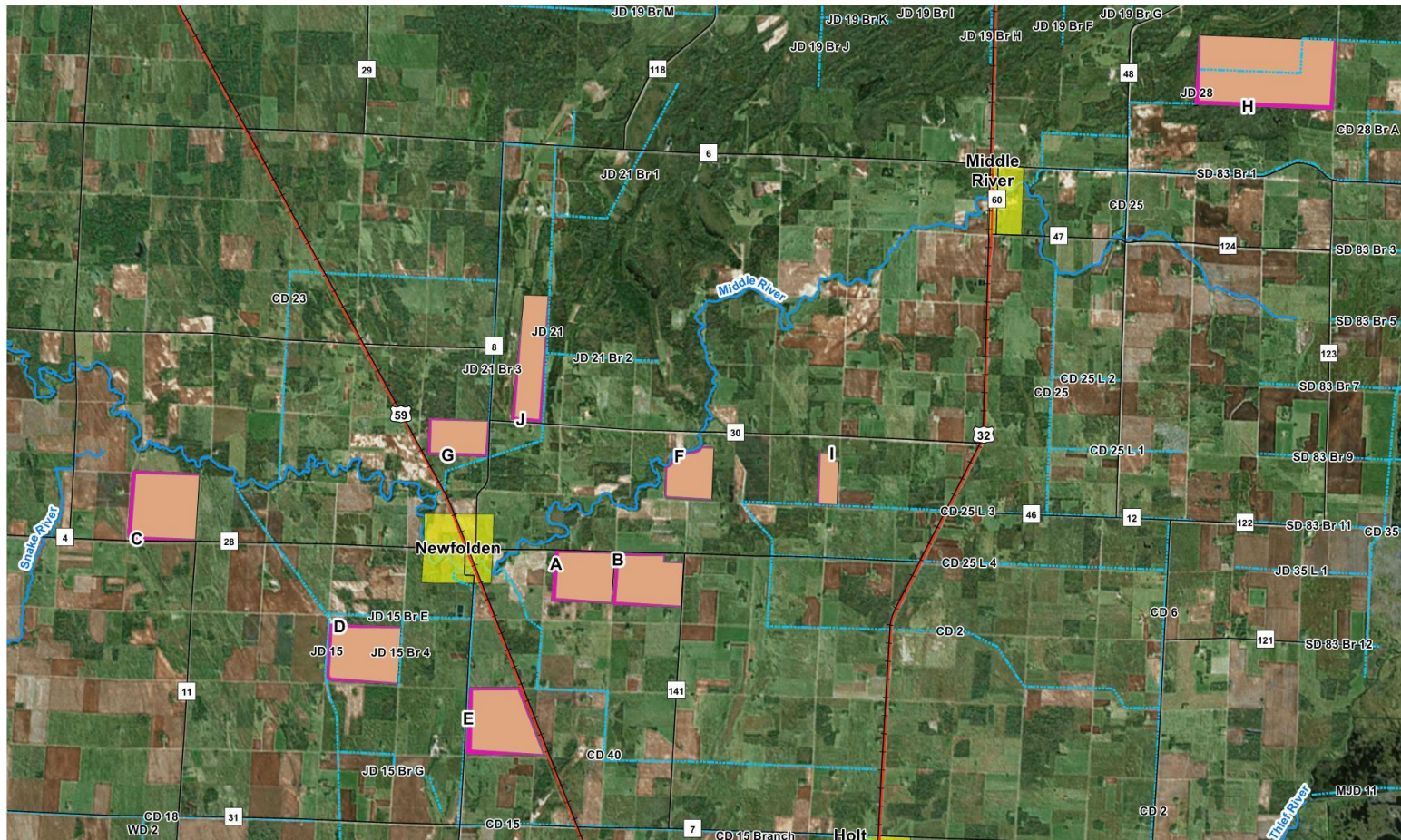
Alternative	Reduces Subwatershed Peak Flows	Reduces Subwatershed Runoff Volume	Decreases WSE at Newfolden	Improves Riparian Habitat	Enhances Water Quality	Benefits Highways	Benefits Railroad
48" CSP	N	N	Y	N	N	N	Y
54" CSP	N	N	Y	N	N	N	Y
(2) 48" CSP	N	N	Y	N	N	N	Y
(2) 54" CSP	N	N	Y	N	N	N	Y
(3) 9' x 9' Box Culverts	N	N	Y	N	N	N	Y
(5) 9' x 9' Box Culverts	N	N	Y	N	N	N	Y
Certified Levee	N	N	N	N	N	N	N
Certified Levee Expanded	N	N	N	N	N	N	N
Diversion Channel	N	N	Y	N	N	Y	Y
Detention Site B	Y	Y	Y	Y	Y	Y	Y
Detention Site C	Y	Y	Y	Y	Y	Y	Y
Detention Site D	Y	Y	Y	Y	Y	Y	Y
Detention Site F	Y	Y	Y	Y	Y	Y	Y
Detention Site G	Y	Y	Y	Y	Y	Y	Y
Detention Site B w/ Culvert Alt.	Y	Y	Y	Y	Y	Y	Y
Detention Site C w/ Culvert Alt.	Y	Y	Y	Y	Y	Y	Y
Detention Site D w/ Culvert Alt.	Y	Y	Y	Y	Y	Y	Y
Detention Site F w/ Culvert Alt.	Y	Y	Y	Y	Y	Y	Y
Detention Site G w/ Culvert Alt.	Y	Y	Y	Y	Y	Y	Y



# Potential Retention Sites Ranking Matrix

Rating Multiplier	3.5		1		0.5		3		4		2.5		2		1.5			
SITE	Drainage Area Captured (Sq. Mi)	Rank	Elevation Drop Across Site (Ft)	Rank	Embankment Height (Ft)	Rank	Acres of Wetlands Impacted	Rank	AC-FT Storage	Rank	Inches of Runoff Captured	Rank	Number of Landowners Affected	Rank	Footprint (Acres)	Rank	Sum	Final Rank
A	22.7	4	10.0	6	12.0	5	27	5	1640.7	6	1.4	8	5	6	411	5	101.0	7
B	20.7	5	10.5	5	12.5	6	4	1	2493.0	3	2.3	4	2	2	463	6	63.5	1
C	62.7	1	11.5	2	13.5	8	6	2	2256.8	4	0.7	10	3	3	622	8	74.5	2
D	33.5	2	11.5	2	13.5	8	65	9	2876.1	2	1.4	7	7	10	642	9	99.0	6
E	25.0	3	6.0	8	8.0	2	50	7	1582.0	8	1.2	9	5	6	581	7	117.5	9
F	19.5	6	11.0	4	13.0	7	8	4	1630.5	7	1.6	6	3	3	293	3	94.0	4
G	9.7	7	9.0	7	11.0	4	6	3	1747.0	5	3.4	2	3	3	292	2	76.5	3
H	8.9	8	17.5	1	19.5	10	467	10	11318.0	1	23.8	1	5	6	1295	10	97.5	5
I	4.5	10	4.5	10	6.5	1	44	6	452.9	10	1.9	5	5	6	134	1	129.5	10
J	7.7	9	6.0	8	8.0	2	52	8	991.4	9	2.4	3	1	1	364	4	116.0	8

Legend	
1	Most Favorable
2	
3	
4	
5	
6	
7	
8	
9	
10	

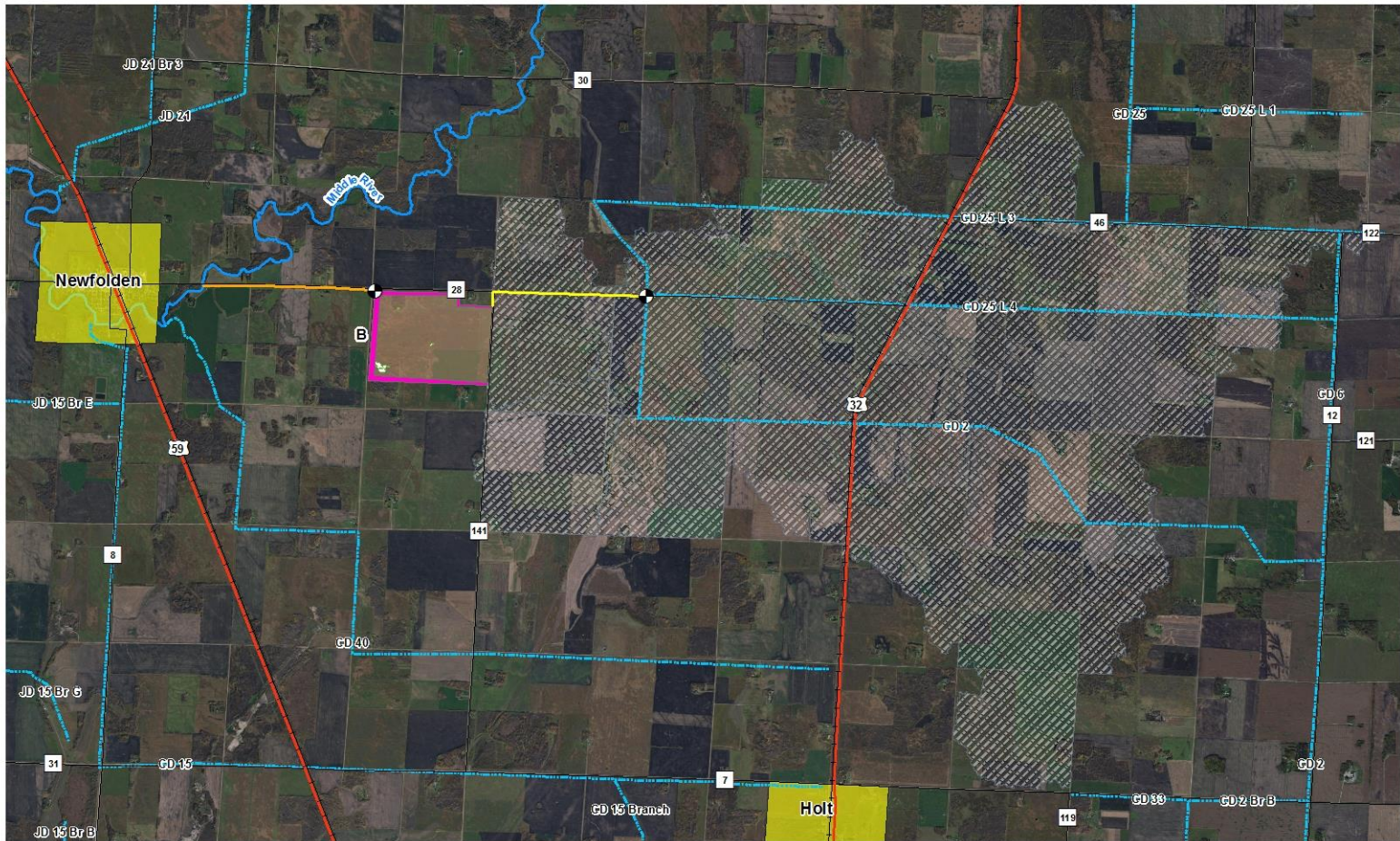


- Potential Site Footprint
- Footprint
- River
- MSTRWD Ditch
- Major Roadway
- County Road
- Railroad
- Municipal Boundary



**MIDDLE RIVER SUBWATERSHED FEASIBILITY STUDY**  
**POTENTIAL DETENTION SITES**







 MSTRWD Ditch
  Diversion Ditch
  Drainage Area
  Potential Site Footprint
  Major Roadway
  River

 Outlet Ditch
  Structure
  Wetland Impacts
  Railroad
  County Road
  Municipal Boundary

MIDDLE RIVER SUBWATERSHED FEASIBILITY STUDY  
RETENTION SITE B



















# EXISTING CONDITIONS VS. ADDED DETENTION SITE

Alternative	Peak WSE at Railroad (FT)	Difference in WSE (FT)	Peak WSE at Hwy 59 (Ft)	Difference in WSE (FT)	Peak WSE at E. 1st St. (Ft)	Difference in WSE (FT)	Peak Flow at Railroad (CFS)
Existing	1098.01	N/A	1092.63	N/A	1089.57	N/A	2612
Site B	1095.87	-2.14	1091.21	-1.42	1088.89	-0.68	2266
Site C	1096.16	-1.85	1091.26	-1.37	1088.80	-0.77	2323
Site D	1096.16	-1.85	1091.26	-1.37	1088.80	-0.77	2323
Site F	1097.29	-0.72	1091.90	-0.73	1089.23	-0.34	2440
Site G	1098.01	0.00	1092.62	-0.01	1089.56	-0.01	2612



# THREE STEPS LEAD TO A SOLUTION

## STEP 1-

### *Feasibility Report Development*

- *Agency Coordination*
- *Review Hydrology & Hydraulics*
- *Technical Feasibility*
- *Cost Estimates*
- *Funding Options*
- *Permit Identification*
- *Decision Matrix*
- *Engineering report*

## STEP 2

### *Design, Permitting, and Funding*

- *Finalize Permits*
- *Value Engineering*
- *Secure Funding*

## STEP 3

### *Final Plans and Construction*

- *Construction Management*
- *Project Certification and accreditation*

# POTENTIAL PARTNERS

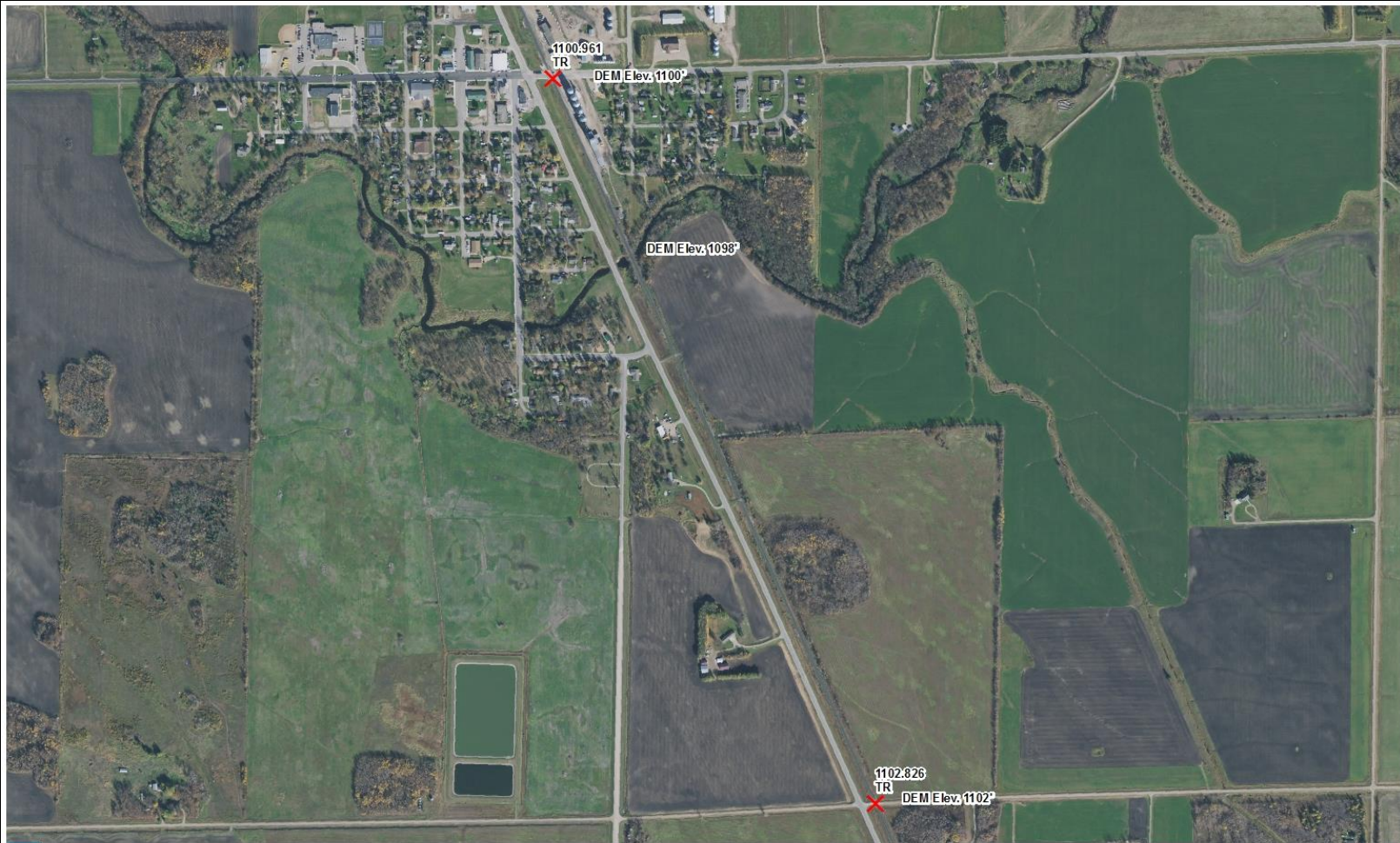
- FEMA – MN HSEM
- RRWMB
- NWRDC (Northwest Regional Development Commission)
- CP Railway
- State of MN – DNR & FDR
- MnDOT
- Marshall County
- Middle-Snake-Tamarac Rivers WD
- City of Newfolds



# PROJECT DEVELOPMENT AND NEXT STEPS

- Finalize Feasibility Report
- Communicate with potential funding partners
- Proceed with action items assigned by MSTRWD Board & Project Team





MIDDLE RIVER SUBWATERSHED FEA SIBILITY STUDY  
LIDAR ACCURACY





05.12.2016 08:25

# Site B



08.10.2016 10:41



# Site B



08.10.2016 10:43

# Site C



07/29/2016



# Site C



07/29/2016

# Site D



07/29/2016



# Site D



07/29/2016

# Site F



07/29/2016



# Site F



07/29/2016

# Site G



07/29/2016



# Site G



07/29/2016

# Diversion: Looking East from Hwy 59



07/29/2016



# Diversion



07/29/2016



# Diversion



07/29/2016



# Diversion



07/29/2016

HDR