



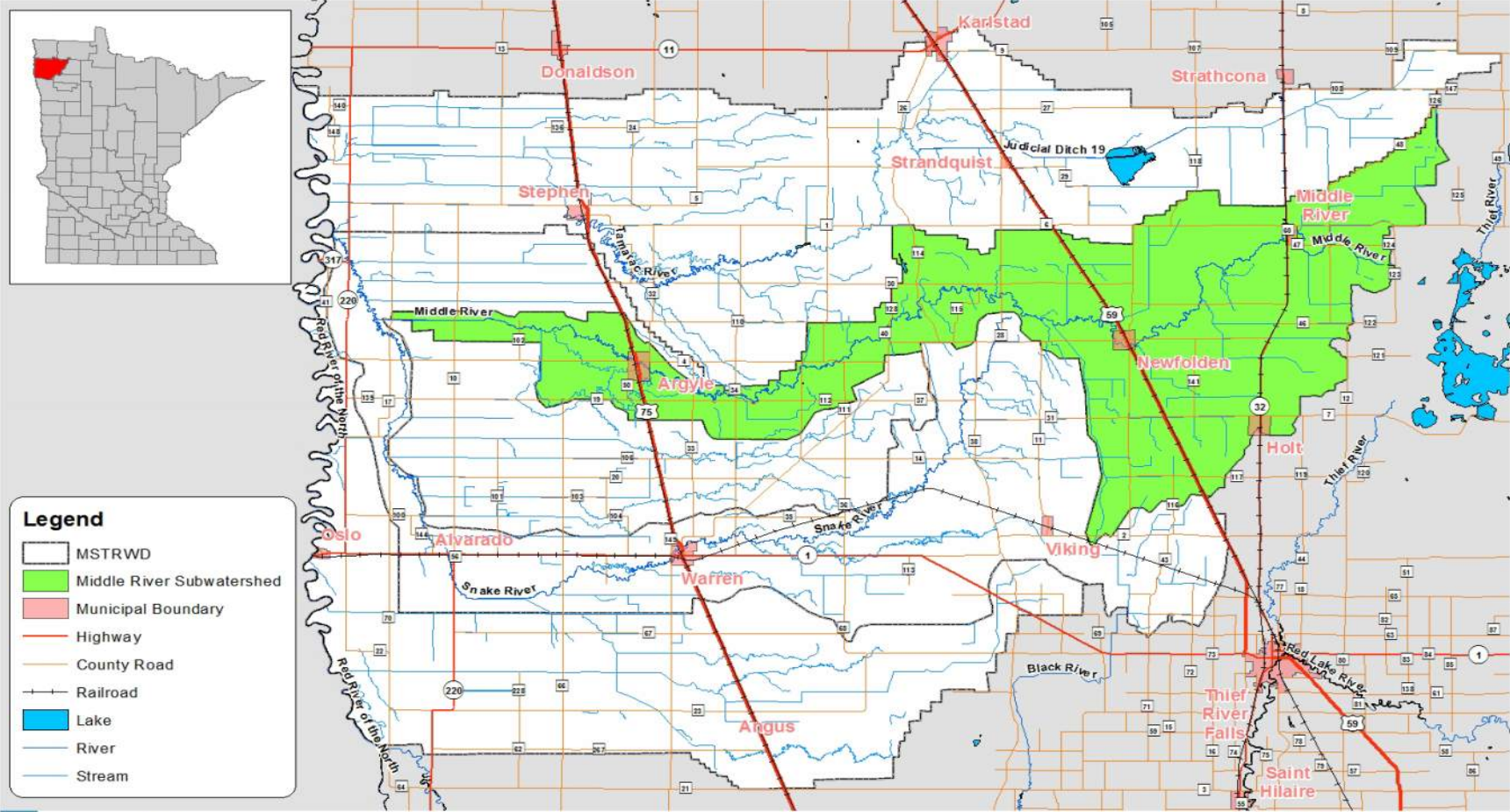
Newfolden / Middle River
Subwatershed Flood Reduction
Project



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





Legend

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



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MIDDLE RIVER FEASIBILITY STUDY
MIDDLE SNAKE TAMARAC WATERSHED DISTRICT MAP



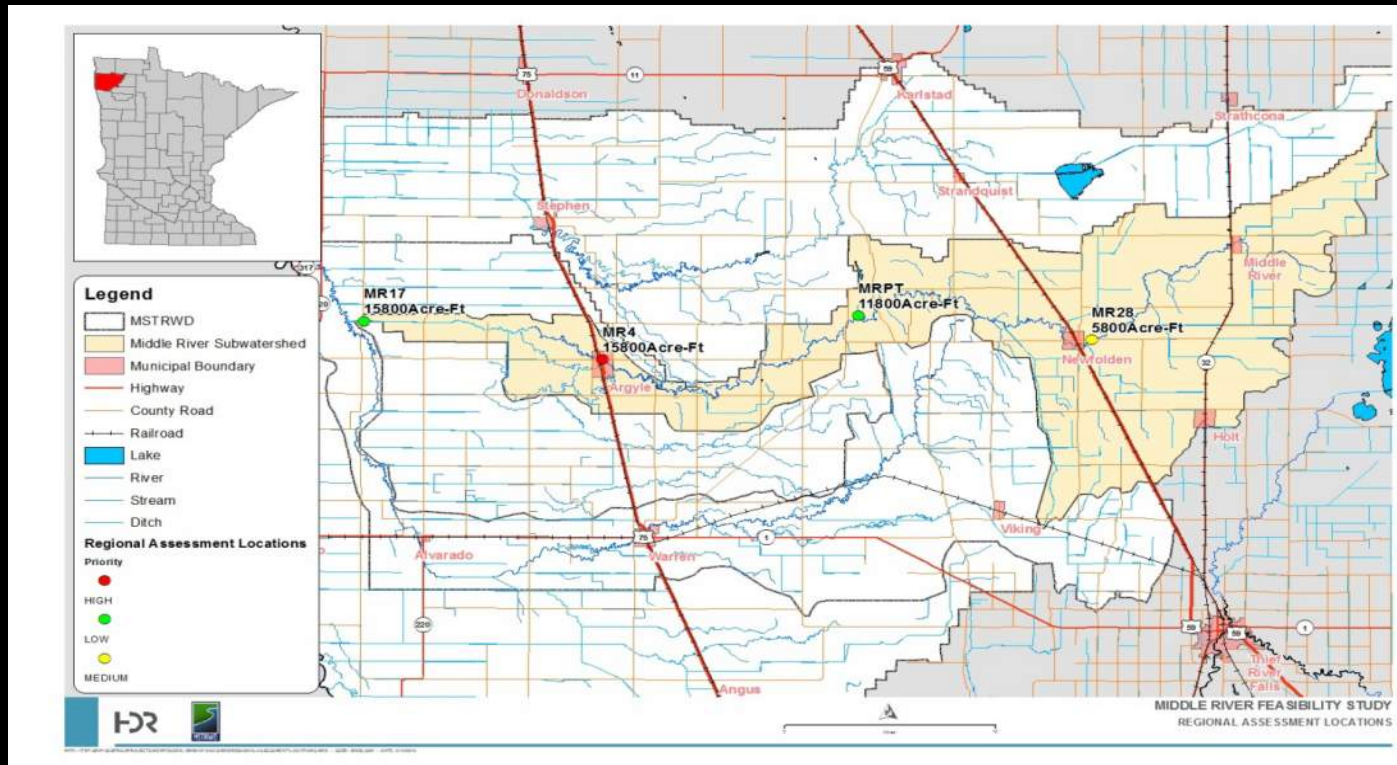
Minnesota Center for Environmental Advocacy (MCEA) Assessment

- 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

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





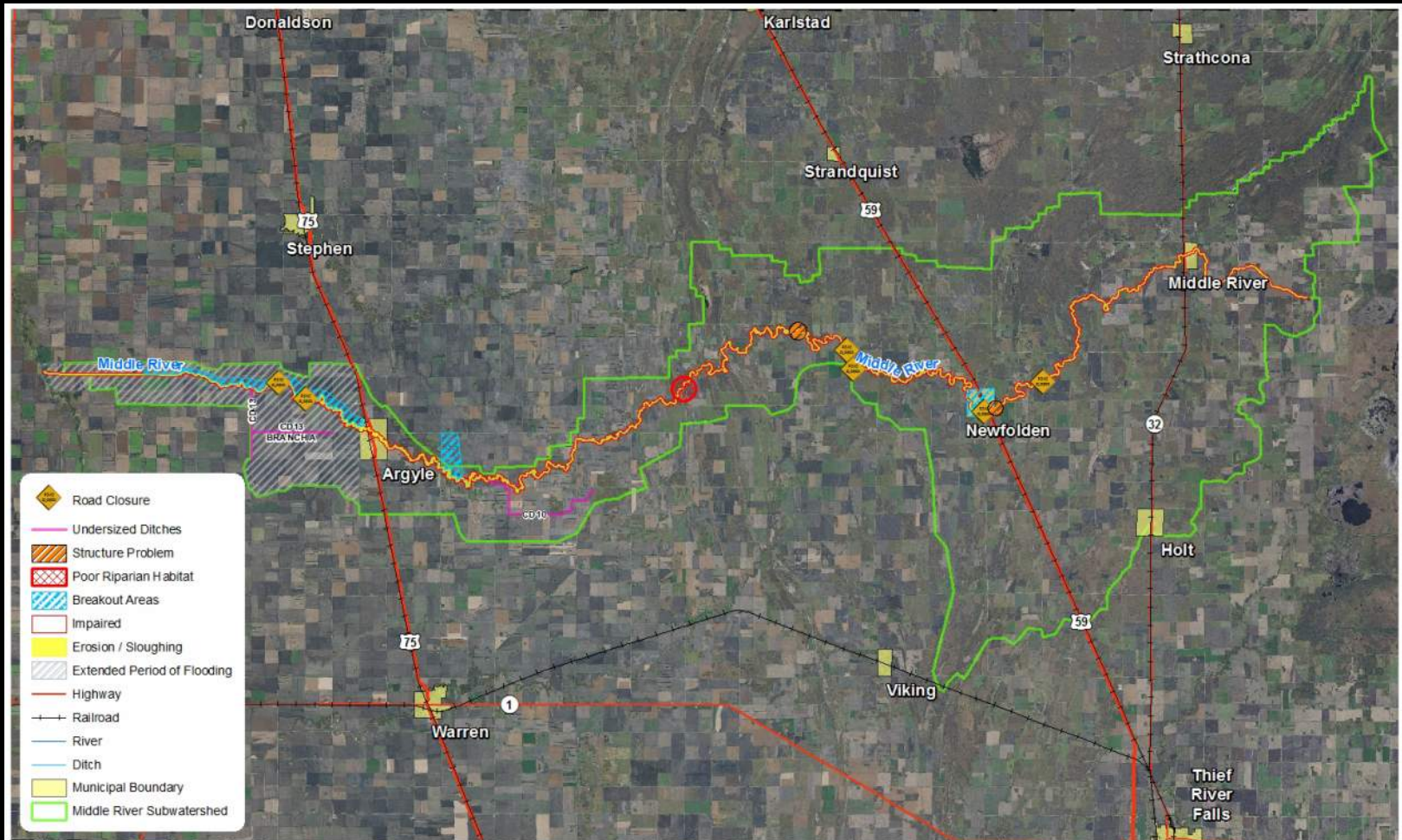
Red River Basin Commission goal of 20% reduction of peak flows to the Red River




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

Four regional assessment locations within the sub-watershed

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 FEASIBILITY REPORT
 KNOWN SUBWATERSHED PROBLEM AREAS

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.

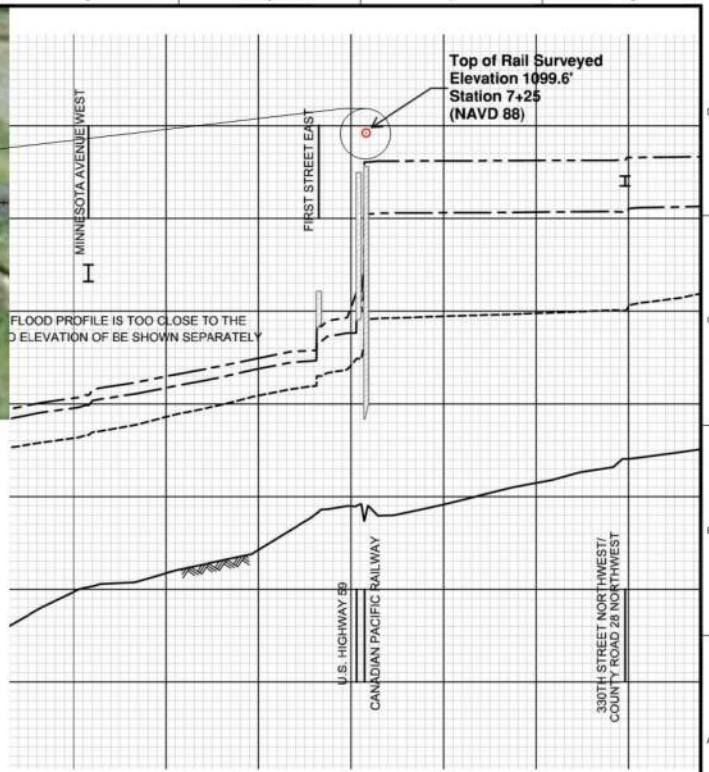
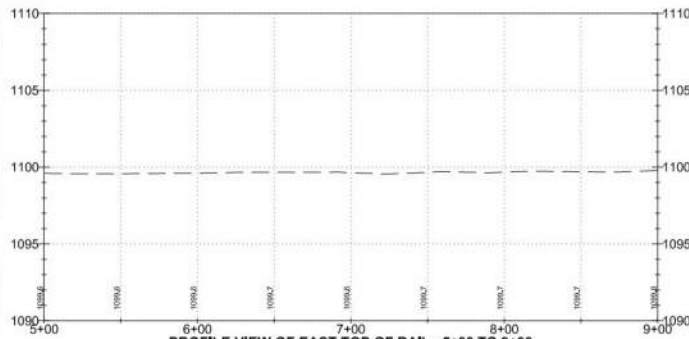
The next step in the process has begun. FEMA has published a notice of flood hazard determination and a public notification concerning the appeal process. The end result will be a final Federal Flood Insurance Rate Map, in which base flood elevations are determined and 100 and 500 flood hazard areas 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 Insurance Study (FIS)



- 14 Elevation certificates requested
- FEMA issued an updated FIRM
- HDR surveyed railroad tracks
- City of Newfolden filed an appeal with FEMA....Denied



ISSUE	DATE	DESCRIPTION

PROJECT MANAGER	Nathan P. Dalager
DESIGNED	D. Hallock
CHECKED	FL Knott
DRAWN	D. Hallock

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

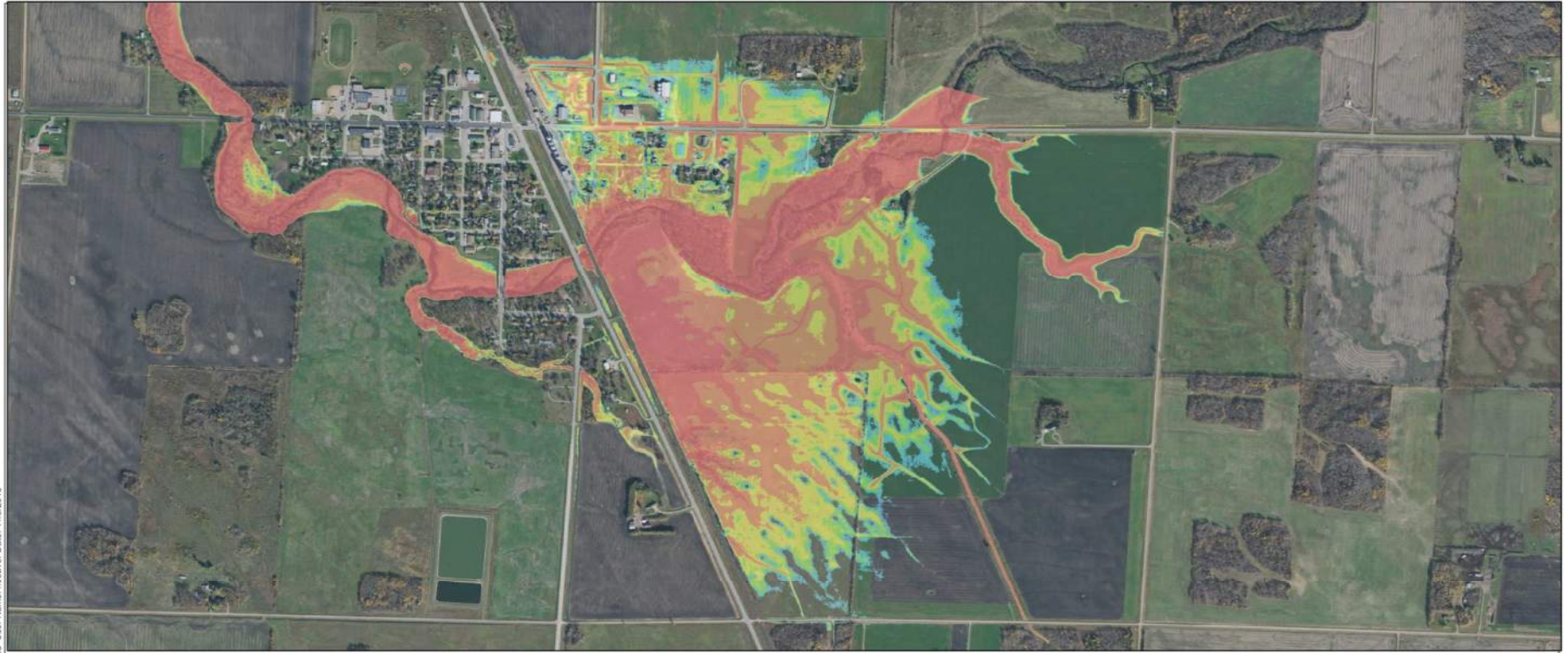
DATE: 11/19/2016 REG. NO. 23308
Nathan P. Dalager
 Nathan P. Dalager

CITY OF NEWFOLDEN, MN
 PO BOX 188 • 145 EAST FIRST ST.
 NEWFOLDEN, MN 56738 (218) 874-7135

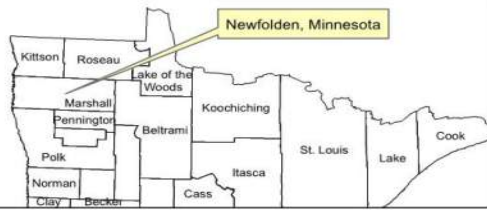
CANADIAN PACIFIC RAILWAY
 TOP OF RAIL SURVEY 11-17-16
 FIGURE 1-2

SCALE: 1" = 10'	RELEASED	SHEET
		2

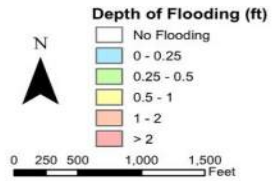
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SITE LOCATOR



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.

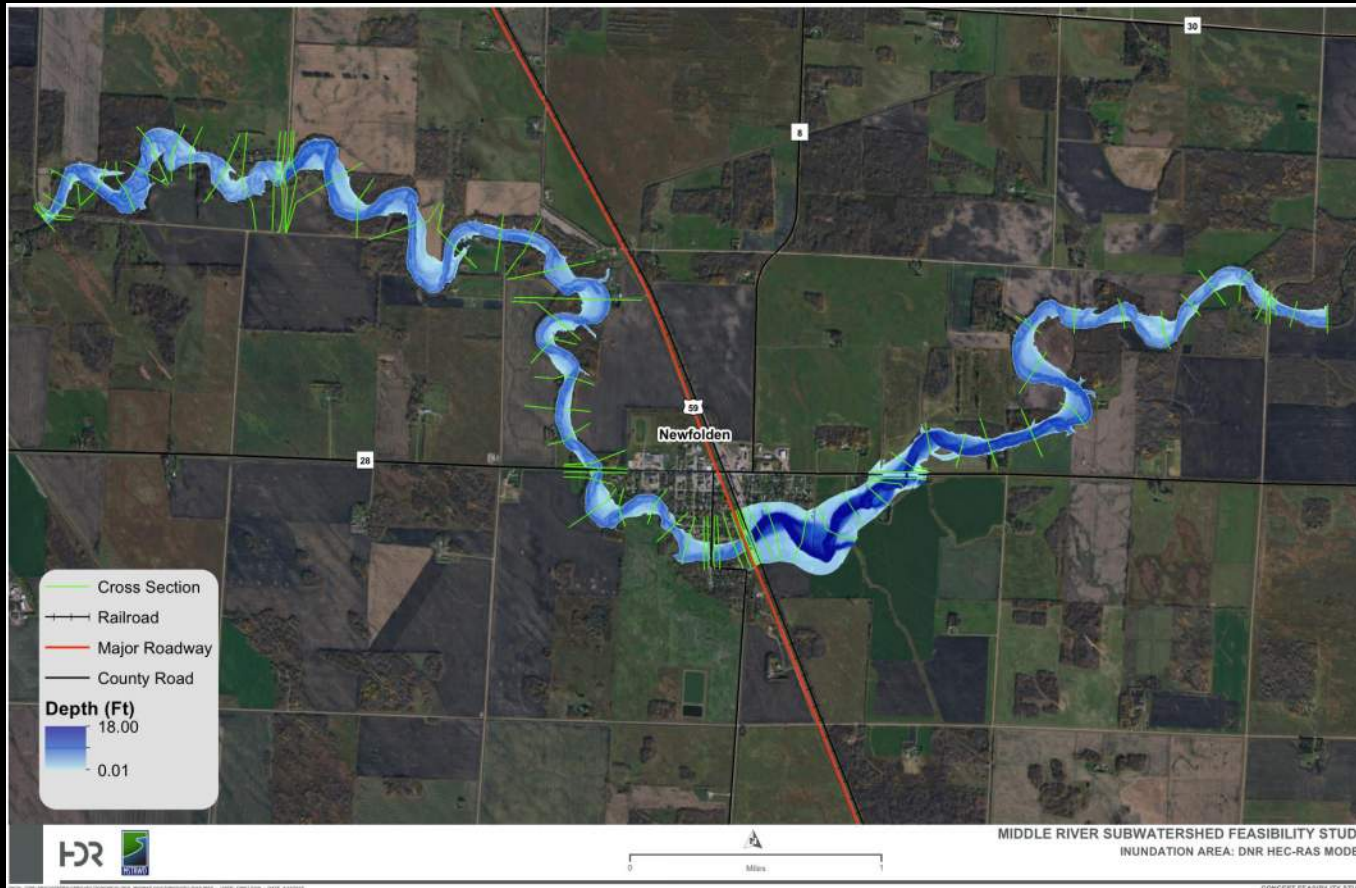
Flood elevations were calculated using a revised version of the Middle River HEC2 model developed for the 1987 Marshall County Flood Insurance Study.

2 – 96" CSP

3 – 66" CSP



CURRENT MAPPING FROM DNR HEC-RAS MODEL







Newfolden
1975



**CD 15 At 130th Ave NW & North of
300th St. NW**



03 30 2017 12 32

**JD 15 Along 150th Ave NW & North
of 310th St. NW**

03.30.2017 12:40



Petition to Middle Snake Tamarac Rivers Watershed District and Affiliates

<p>Petition summary and background</p>	<p>Many property owners in Newfolden have received notification that they are now in the preliminary stages of being mapped into FEMA's 100 year floodplain. This action is expected to become final in 2017. It is our understanding that, in addition to the risk of flooding, we will be mandated to carry costly flood insurance and will be further limited in terms of how and where our property can be developed.</p> <p>On a larger scale, we recognize that this issue will likely impact Newfolden's future. Our ability to develop, grow, and thrive as a community impacts each resident's current and future investment in Newfolden. It impacts the future of our business community and our school district. The short term and long term consequences of un-mitigated flood risk is a high-priority concern!</p>
<p>Action petitioned for</p>	<p>We, the undersigned, are concerned citizens who urge the leaders of the Middle Snake Tamarac Rivers Watershed District and affiliates to act now to move forward with a Newfolden flood mitigation project. The expertise of the MSRTWD and subsequent relationships with legislators and other critical resources, positions you well to lead this initiative.</p> <p>Please say yes to partnering with the City of Newfolden, coordinating, planning, developing, and bringing to fruition the proposed flood reduction project.</p>

PROJECT OBJECTIVES

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



FAILURE TO ADDRESS FLOODPLAIN ISSUES

- Hinder economic development
- Remove dollars from the local economy
- Flood risk will continue to compromise “peace of mind”
- Historical flood risks will remain

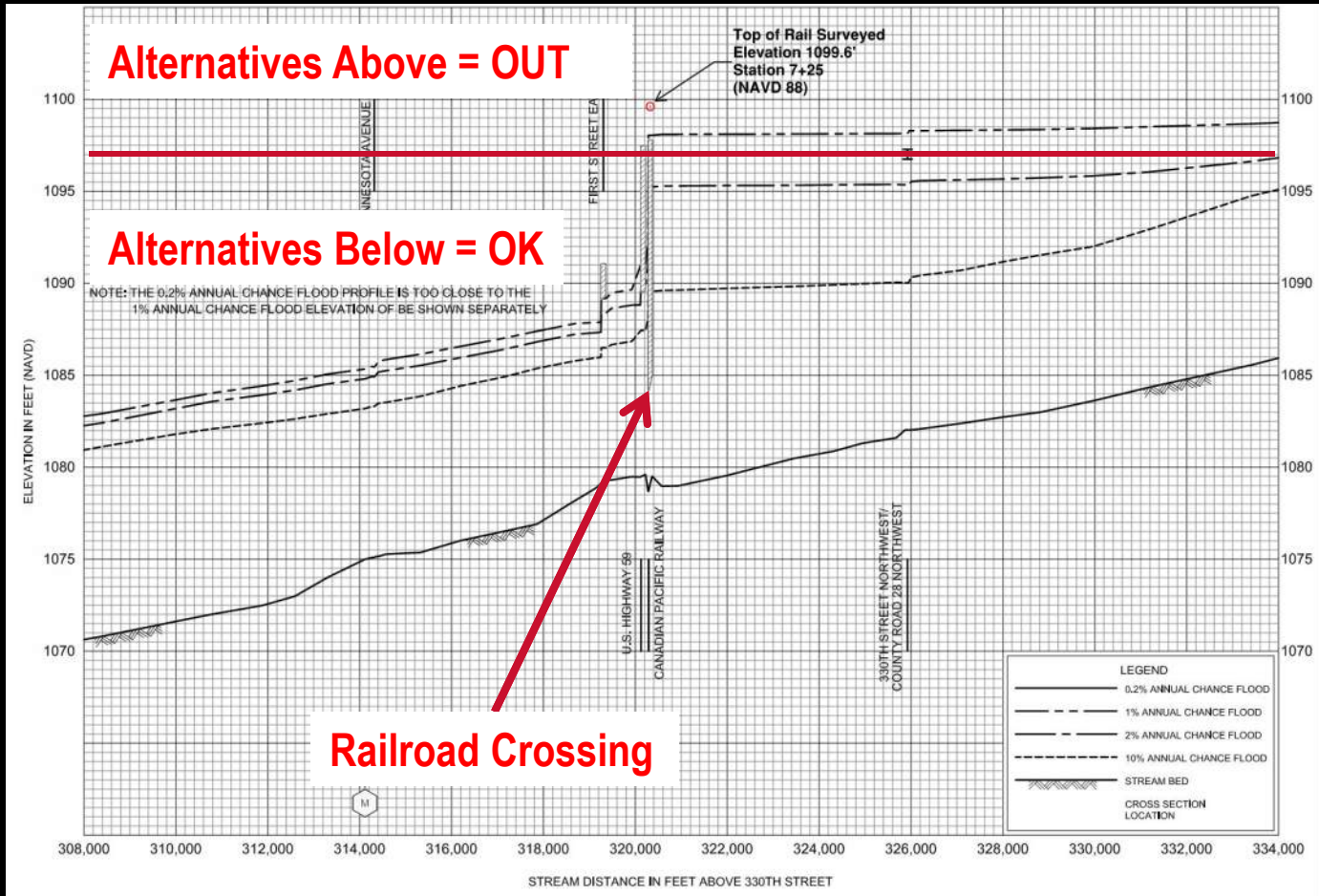


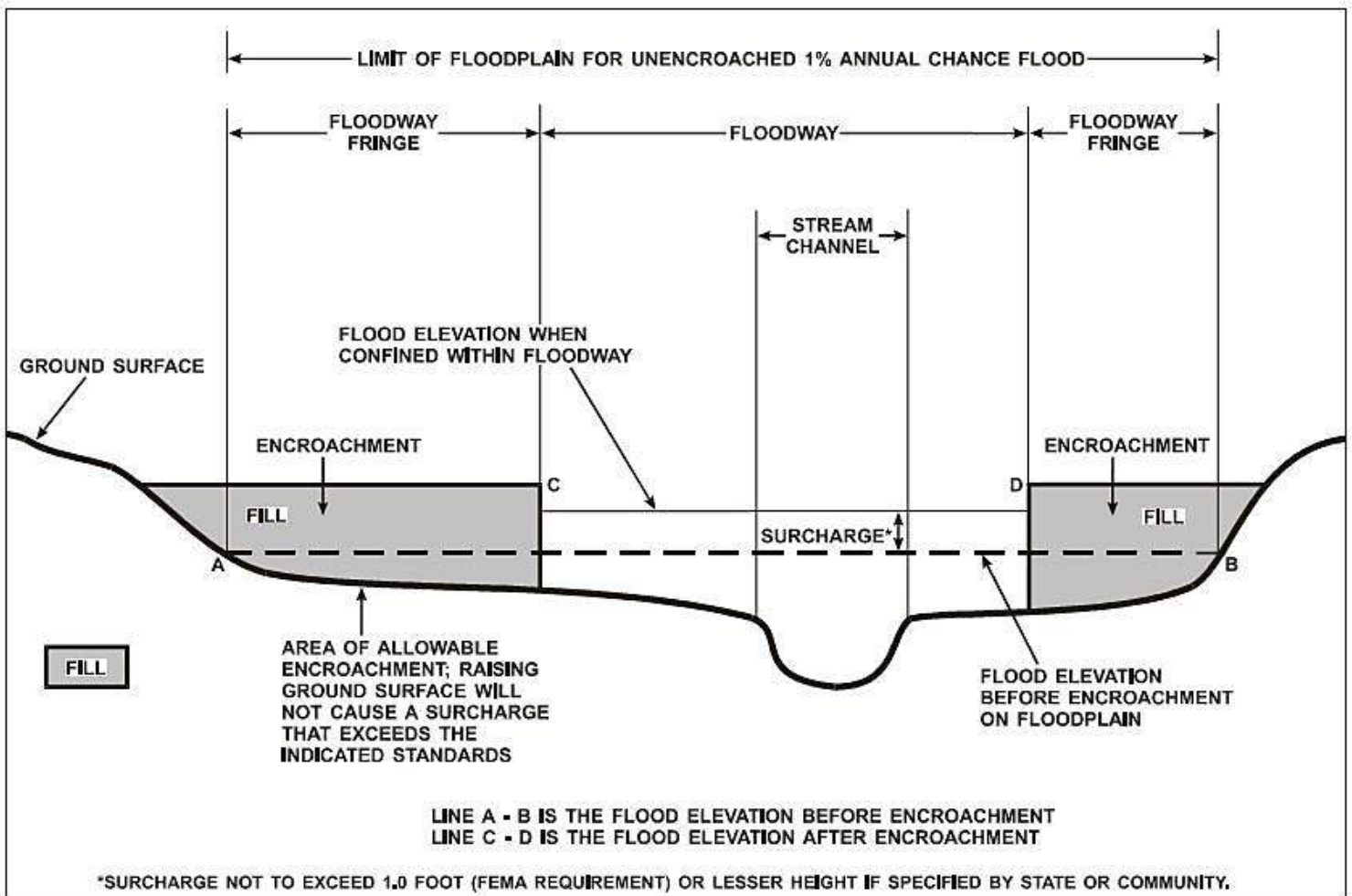
FEMA / MNDNR MEETING

- FEMA appeal not acted upon, BFE is set at 1098.1'. Concerns about raised RR and LIDAR topo will not be re-evaluated at this time.
- Maps could be finalized in 12-15 months
- Can use preliminary BFE for Elevation Certificates
- Model floodplain ordinance states new construction must be 1.5' above BFE
- If WSE lowered 0.01' below ground el. = could be removed from floodplain.
HOWEVER.....

- Recommend a Factor of Safety (FS) due to floodway and future development
 - 1' below lowest ground in city minimum
- Would account for additional growth and construction within the floodplain
- FEMA can remap at anytime - LOMR / LOMA could remove areas from floodplain
- Steps to remove Newfolden
 - Design a project
 - Submit a CLOMR (Conditional Letter of Map Revision)
 - Construct Project
 - Submit a LOMR

WSE 1097.1'





PURPOSE

Remove Newfolden from 1% Annual (100 year) Floodplain

or

Remove Newfolden from 1% Annual (100 year) Floodplain a minimum of 1' below the BFE.

Pros

- Revised Purpose would quickly eliminate alternatives not meeting 1' goal
- Greater Factor of Safety for Newfolden and future development

Cons

- Potentially lead to larger project (multi solution vs. single solution)
- May not be required & may complicate USACE process





Concept Feasibility Study

Middle River Subwatershed
Middle-Snake-Tamarac Rivers Watershed
District

Marshall County, Minnesota
July XX, 2016



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. Construct a bypass channel
7. Retention area upstream or downstream
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/upstream flood impacts

Definition of Early, Middle, and Late Areas Relative to the Red River Main Stem

Figure 24 identifies early, middle, and late runoff areas within the Red River basin relative to the main stem at the Canadian border. This generalized map was based on the evaluations of historical flood hydrographs, knowledge of more recent floods, and computed runoff travel times. This map can be used to help define which types of FDR measures to use in different areas of the basin to help reduce peak flows on the Red River main stem, while also achieving local and watershed FDR goals. The lines between early, middle, and late areas are not exact. For example, smaller late areas may exist within the identified middle area. Therefore, this map should be used in conjunction with local knowledge of runoff timing.

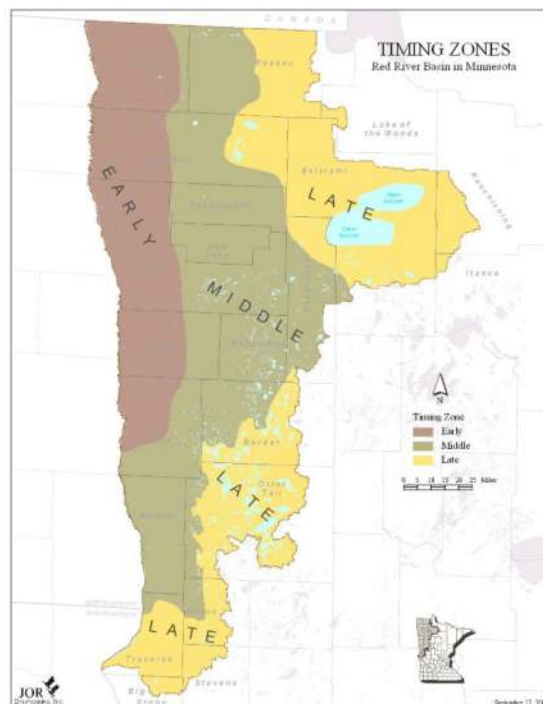


Figure 24. Early, Middle, and Late Runoff Timing Zones in the Red River Basin

Table 1. Expected Peak Flow Reduction Effects on the Red River Main Stem of FDR Measures Applied in Early, Middle, and Late Areas Upstream

Flood Damage Reduction Measure	Early* Upstream Area	Middle* Upstream Area	Late* Upstream Area
1) Reduce Flood Volume	+	++	++
a) Wetlands	+	+	++
b) Cropland BMPs	+	++	++
c) Conversion to grassland	+	++	++
d) Conversion to forest	+	++	++
e) Other beneficial uses of stored water	+	++	++
2) Increase Conveyance Capacity	+	-	--
a) Channelization	+	-	--
b) Drainage	+	-	--
c) Diversion	+	Variable	-
d) Setting back existing levees (to increase conveyance capacity)	+	-	--
e) Increasing bridge capacity	+	-	-
3) Increase Temporary Flood Storage	Variable	++	+
a) Gated impoundments	+	++	++
b) Ungated impoundments	-	+	+
c) Restored or created wetlands	-	+	+
d) Drainage	-	+	++
e) Culvert sizing	-	+	+
f) Setting back existing levees (to increase floodplain storage)	+	++	+
g) Overtopping levees	++	+	Variable
4) Protection/Avoidance	Variable	Variable	Variable
a) Urban levees	-	-	-
b) Farmstead levees	-	-	-
c) Agricultural levees	-	-	-
d) Evacuation of the floodplain	0	0	0
e) Floodproofing	0	0	0
f) Warning and emergency response	0	0	0

* Location of FDR measure relative to the Red River main stem at the international border.

ALTERNATIVES ANALYSIS

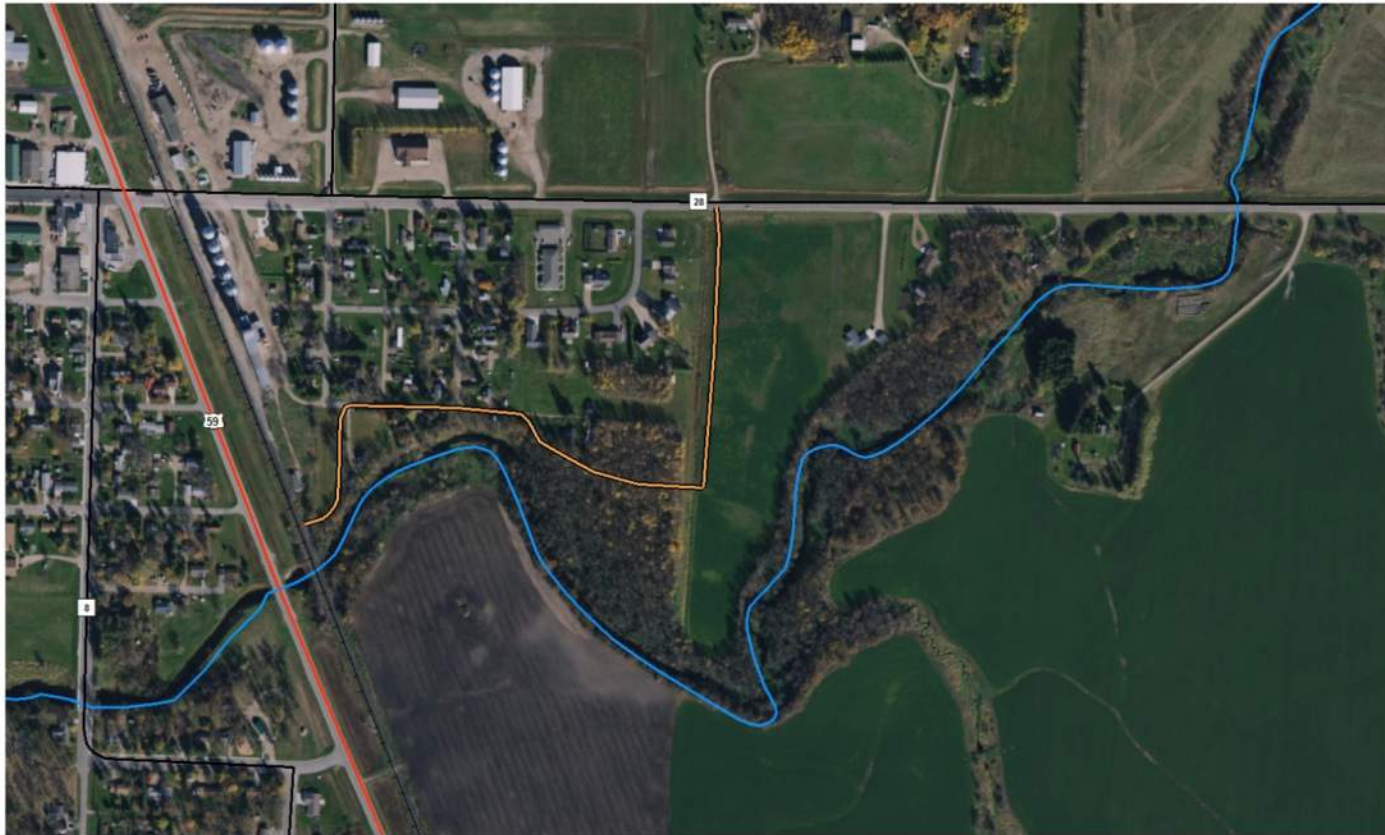
- Minimal Railroad Crossing Improvements
- Certified Levees
- Diversion Channel
- Retention Site
- Multipurpose Project



Newfolden West of Railroad Tracks



Potential Levee Alignment #1



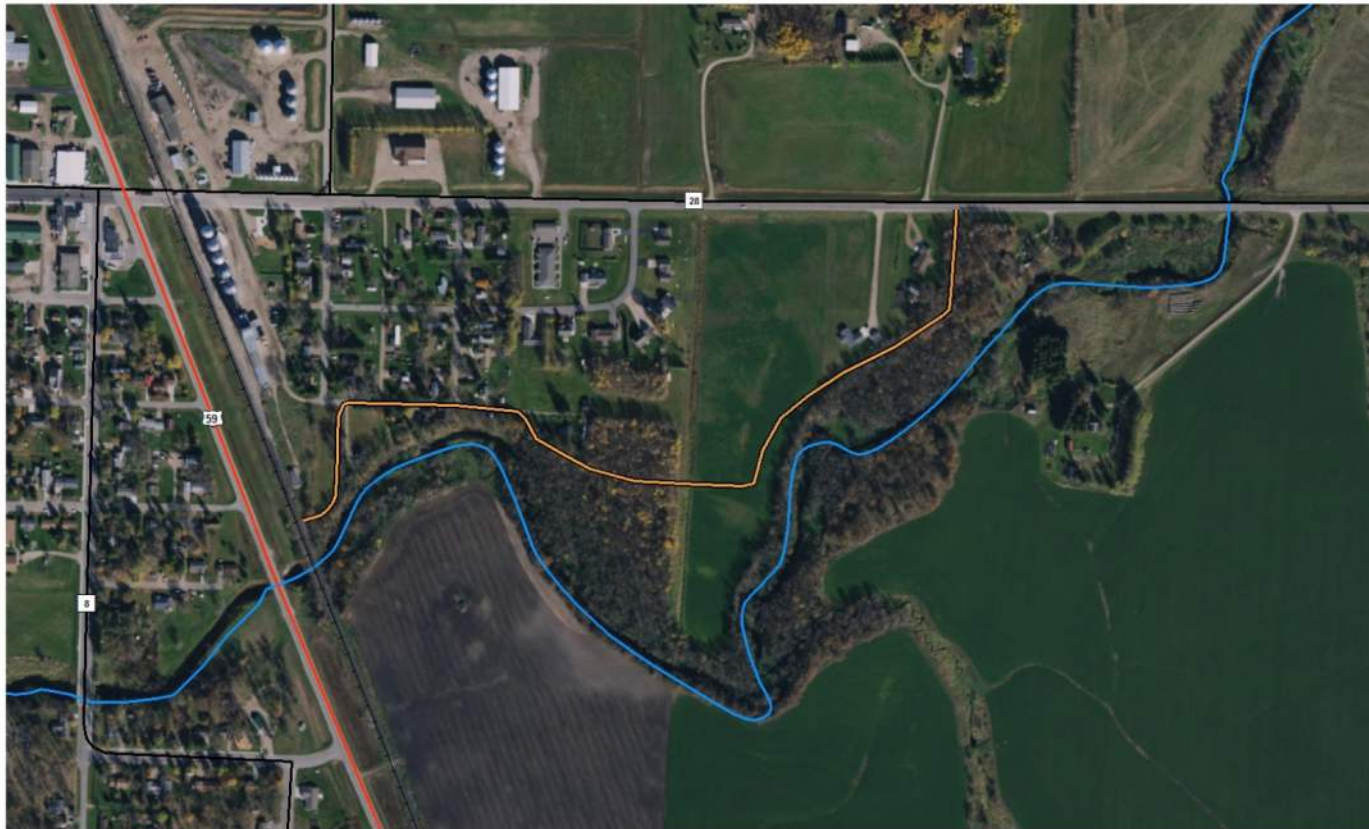
- levee
- Major Roadway
- Railroad
- River
- County Road



MIDDLE RIVER SUBWATERSHED FEASIBILITY STUDY
POTENTIAL LEVEE ALIGNMENT

CONCEPT FEASIBILITY STUDY

Potential Levee Alignment #2

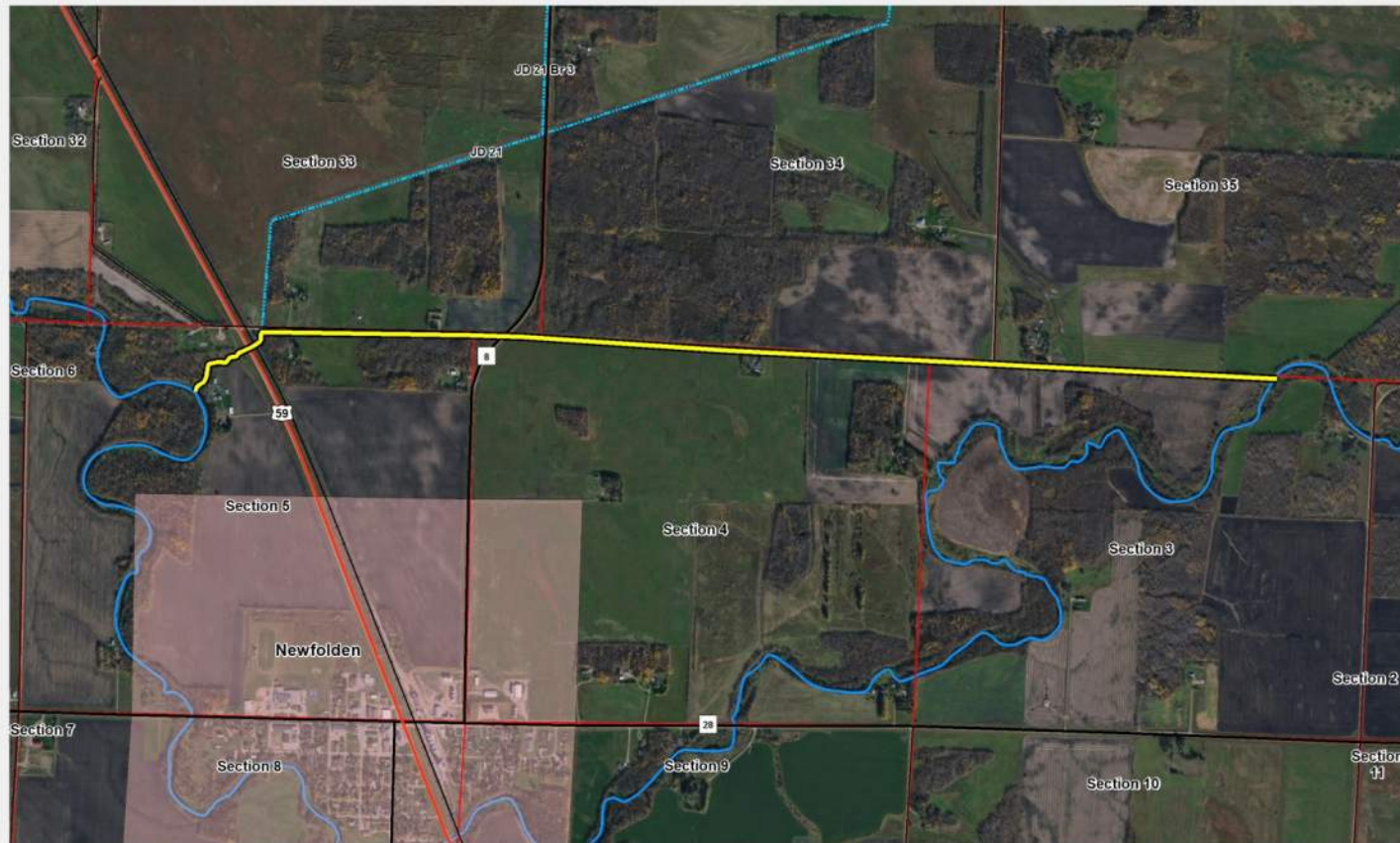


- Levee
- Major Roadway
- Railroad
- River
- County Road



MIDDLE RIVER SUBWATERSHED FEASIBILITY STUDY
POTENTIAL LEVEE ALIGNMENT WITH EXPANDED CITY LIMITS

Potential Diversion Alignment



- Bypass Ditch
- MSTRWD Ditch
- River
- County Road
- Major Roadway
- Railroad
- Municipal Boundary



NEWFOLDEN/MIDDLE RIVER FLOOD REDUCTION
POTENTIAL BYPASS ALIGNMENT

Potential Retention Sites Ranking Matrix

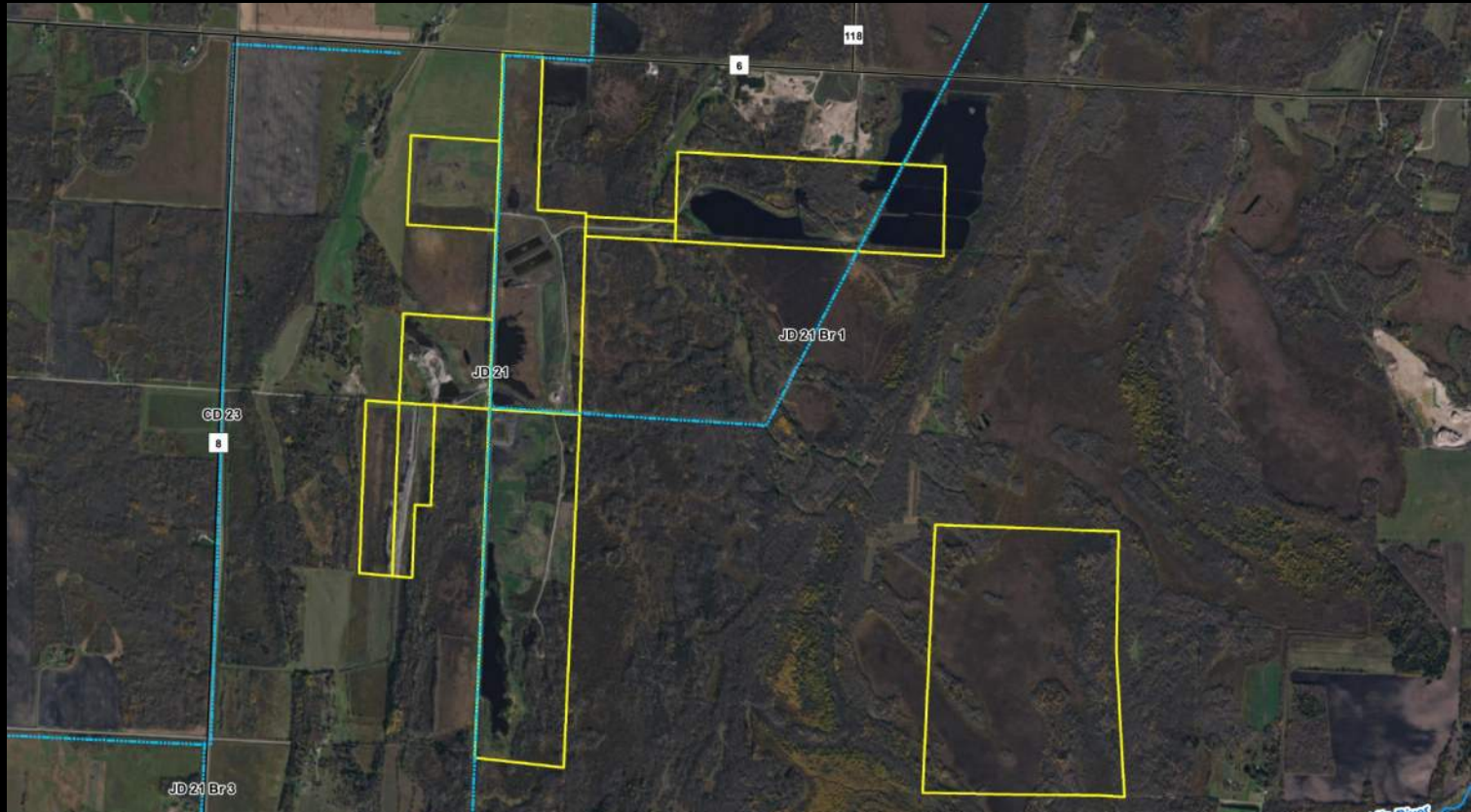
Rating Multiplier	3.5		1		0.5		3		4		2.5		2		1.5			
SITE	Drainage Area Captured (Sq. Mi)	Rank	Elevation Drop Across Site (Ft)	Rank	Embankment Height (Ft)	Rank	Acres of Wetlands Impacted	Rank	AC-FT Storage	Rank	Inches of Runoff Captured	Rank	Number of Landowners Affected	Rank	Footprint (Acres)	Rank	Sum	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 Retention Locations



Kevin Pierce Parcels



Multi-Purpose Solution?



RETENTION SITE
(BRANDT ANGUS IMPOUNDMENT)



DIVERSION CHANNEL
(RICHARD P. NELSON FLOODWAY)



IMPROVED RAILROAD CROSSING

PROS AND CONS

Pros

- Improves drainage along system
- Removes Newfolden from floodplain
- Increases level of safety for train traffic

Improved Railroad Crossing

Cons

- Increases flows and water elevations downstream
 - Difficult to obtain permitting
- Limited funding partners (No FDR or RRWMB)

Pros

- Improves drainage along system
- Removes Newfolden from floodplain
- Provides improved drainage upstream

Diversion Channel

Cons

- Increases flows and water elevations downstream
 - Difficult to obtain permitting
- Limited funding partners (No FDR or RRWMB)
- Does not address railroad crossing issues

Levee

Pros

- Removes Newfolden from floodplain

Cons

- Large Costs (Relocating of utilities, infrastructure, homes, etc.)
- Increases flows and water elevation upstream/downstream
 - Must be certified
- Can be insufficient if BFE is re-evaluated in future

Pros

- Improves drainage along system
- Removes Newfolden from floodplain
- Reduces peak flows / volumes downstream
- Improves rural flooding along drainage systems
- Can provide riparian and environmental benefits
- Alleviates large head of water on railroad crossing

Retention Site / Multipurpose Project

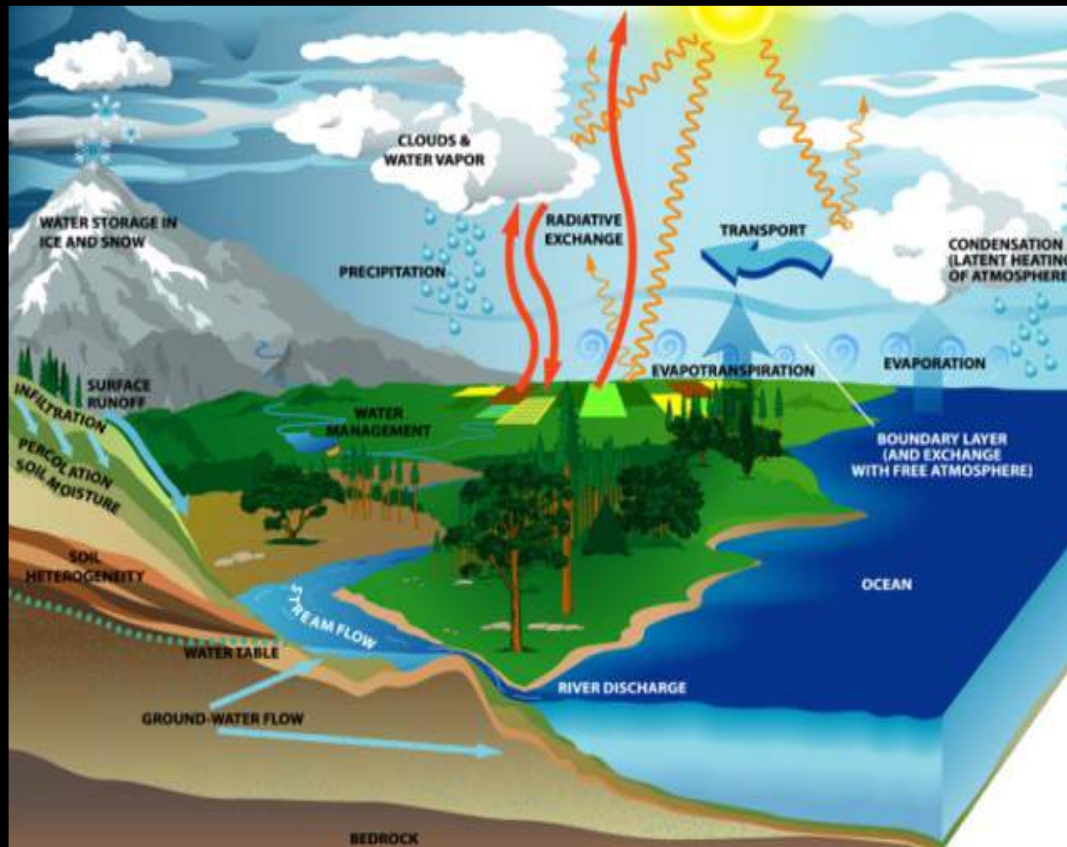
Cons

- Large Costs

Alternatives shaded in blue may reduce WSE 1' below lowest natural ground in Newfolden east of the RR.

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 A	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 A 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

Hydrologic Accuracy



STREAMSTATS (FEMA)

USACE HEC-HMS MODEL

MSTRWD DETENTION

STUDY HEC-HMS MODEL

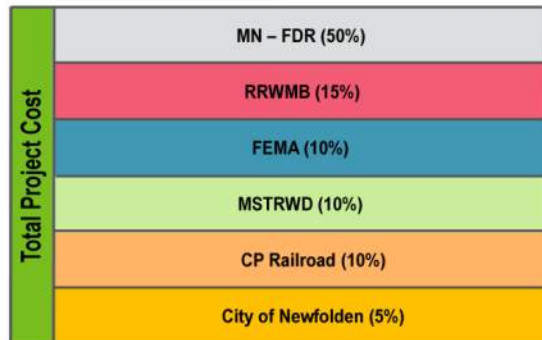
POTENTIAL PARTNERS

- State of MN – FDR
- RRWMB
- FEMA
- CP Railroad
- Middle Snake Tamarac Rivers Watershed District
- City of Newfolden

MINNESOTA STATUTES & DRAINAGE LAWS

- 103 D Project?
- 103 D Project w/ 103 E Portion?
- 103 E Project?

Newfolden / Middle River Subwatershed – Potential Funding Breakdown



PERMITTING

Potential Permits:

- MN DNR Public Waters Permit
- U.S. Army Corps of Engineers 404 Wetlands Permit?
- Marshall County SWCD WCA Permit?
- MPCA Stormwater Permit

Timeline

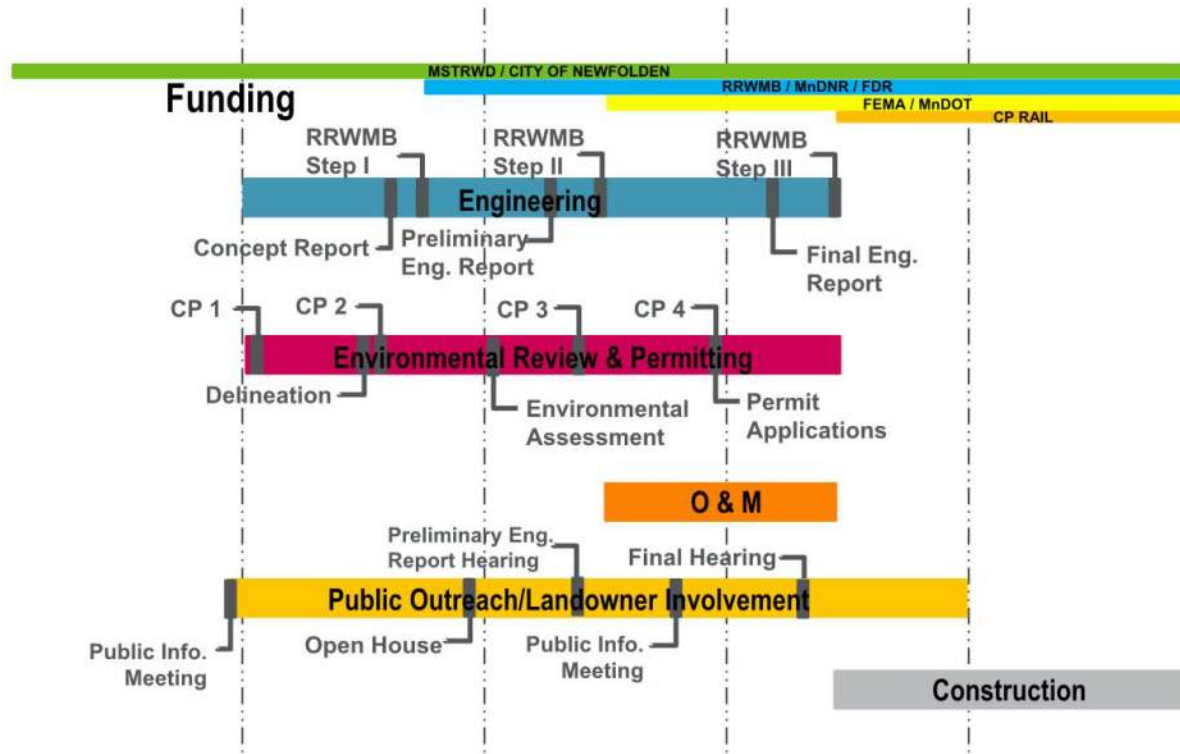
2016

2017

2018

2019

2020



PROJECT DEVELOPMENT AND NEXT STEPS

- Project Team Meeting
- Finalize Alternatives Analysis
- Update MSTRWD Board
- Determine project direction / Coordinate with funding partners
- Meet with Railroad



HDR