



Newfolden / Middle River
Subwatershed Flood Reduction
Project Team Meeting
May 22, 2017



PROJECT OBJECTIVES TO DEVELOP PURPOSE & NEED

- Remove Newfolds from floodplain and eliminate flood damages
- Minimize flood insurance
- Enhance future development
- Minimize upstream / downstream flooding / impacts
- Improve water quality & natural resources



PURPOSE

- Remove Newfolden from 1% Annual (100 year) Floodplain

NEED

- ~43 Residences, multiple elevator structures, a church, park, and apartment building in floodplain
- 10 out of 14 properties surveyed are within ½ foot of the Preliminary BFE of 1098.1'
- Structures within floodplain with federally secured mortgage require flood insurance
- City of Newfolden required to adopt a floodplain ordinance
- Economic & residential expansion will be difficult
- Structures in the floodplain will have less value
- New structures must be built 1.5' above BFE
- Home additions may not exceed 50% of home value
- Eliminate unsafe dam hazard
- Rehabilitate deteriorating RR culverts
- Provide safer passage for trains carrying HAZMAT



Newfolden / Middle River Flood Damage Reduction Project
Purpose and Need
February 14, 2017

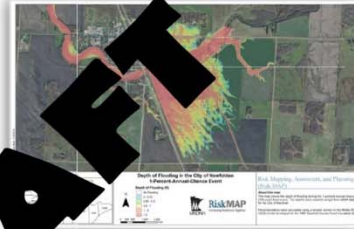
Purpose and Need Statement

The purpose of this project is to remove the City of Newfolden from the 1% Annual (100 Year) Floodplain while maintaining or reducing downstream flood levels.

Problem Statement

The City of Newfolden is located in northwestern Minnesota in Marshall County. In 2015, the Department of Homeland Security's Federal Emergency Management Agency (FEMA) performed a Flood Insurance Study (FIS) and developed a draft Flood Insurance Rate Map (FIRM) for Newfolden. As a result of that study, FEMA has mapped the majority of the eastern half of Newfolden in the 1% Annual (100 Year) Floodplain.

The eastern half of Newfolden is currently occupied by approximately 45 residences, the local grain elevator, a church, a park, and an apartment complex. All structures within the 1% Annual (100 Year) Floodplain with a federally secured mortgage will be required to obtain flood insurance. The required flood insurance will cost tens of thousands of dollars annually within the community that could otherwise be spent on the local economy. In addition to the costs of flood insurance, property owners will see a decrease in property values due to the floodplain designation.



The City of Newfolden will be required to adopt a floodplain ordinance which will make economical, residential, and recreational expansion difficult. Residents and business owners looking to construct an addition will be required to obtain a floodplain permit and construct first floor levels at a minimum of 1.0 foot above the Base Flood Elevation, which is not at the first floor elevation of existing structures. All structural improvements will be limited to 50 percent of the market value of the existing structure.

The Red River Basin Flood Damage Reduction Work Group Mediation Agreement specifies that one of the flood damage reduction goals in the Red River Basin is to prevent damage to communities, homes, and farm structures by providing flood protection from the 1% annual flood (100 year). The City of Newfolden will be in direct conflict with this goal based on the recent Floodplain mapping mandated by FEMA.

The existing railroad embankment is functioning as a high hazard dam during significant flood events. The railroad culvert structures in the Middle River do not have sufficient capacity, and thus are creating 10 feet of impounded water to the east of the embankment during a 1% chance event. This hydraulic head creates a hazard for residents and structures downstream. The culvert structures are currently in poor condition and nearing the end of their life expectancy. Multiple trains containing crude oil cars pass along this rail line on a regular basis. These circumstances create the potential for a public health, public safety, or environmental emergency.

Comment [CLJ1]: This currently has the potential to cause problems so there are a couple ways to deal with the statement of reducing ds flows.

1. If there truly is a need to reduce ds flows we will need much more information regarding the ds problems. Information such as what is flooding, how often and at what events, duration, and what are the impacts/losses of the flooding. This detailed information essentially needs to justify the need of reducing ds levels.
2. If the project is to solely focus on newfolden, we should remove this statement and leave it at removing the city from the 100 floodplain. I understand the potential of a project to increase the ds levels so, we can either handle that issue through the alternative analysis or insert languages stating, "remove newfolden...while not increasing levels downstream."

My recommendation is to keep the P&N statement clean and account for the potential of increase levels ds in the alternatives analysis. During the Alt analysis, we would look the ds impacts of a particular alternative and possibly dismiss an alternative based on increased ds impacts.

Comment [CLJ2]: This paragraph is a good addition

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.

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.

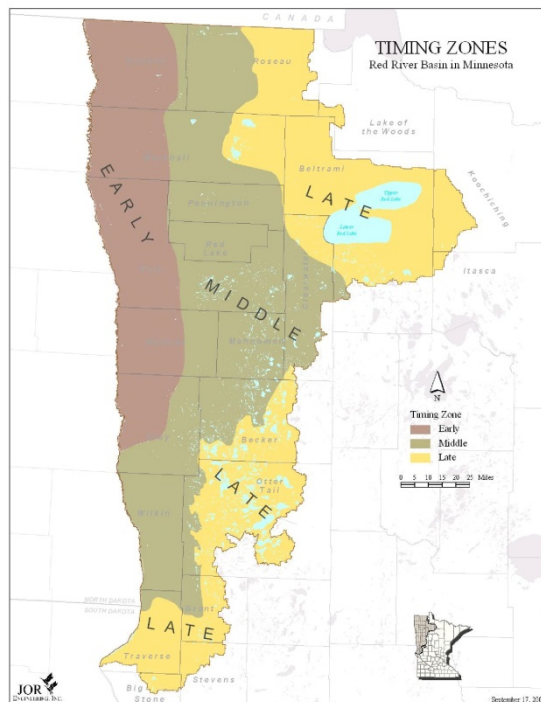


Figure 24. Early, Middle, and Late Runoff Timing Zones in the Red River Basin

ALTERNATIVES

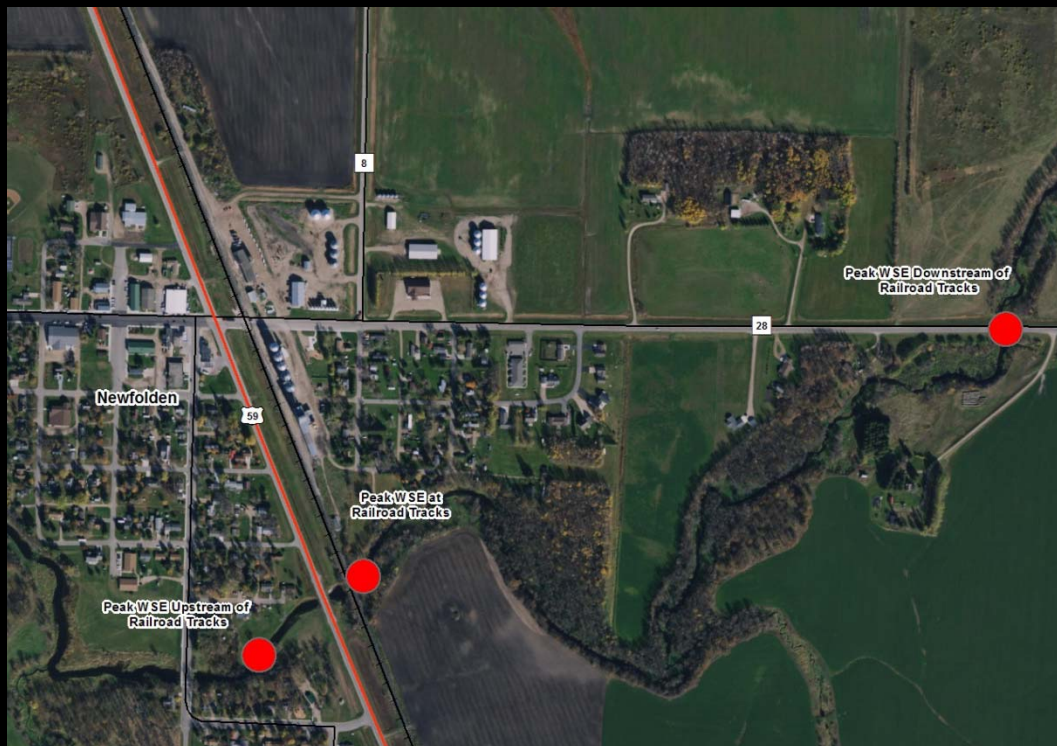
1. Do nothing – residents may raise lots, obtain LOMAs, etc.
2. Bore 1 or 2 – 48" to 54" steel pipes
3. Install 3 to 5 – 9' x 9' reinforced concrete boxes
4. Construct certifiable dike on north side of river, upstream of crossing
5. Construct dikes downstream of crossing or buyout affected properties
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

- Project Scale – What is the least that can be done?

EXISTING CONDITIONS VS. PROPOSED RAILROAD STRUCTURE ALTERNATIVES FOR A 100-YEAR, 10-DAY EVENT



Alternative	Peak WSE Upstream of Railroad Tracks (Ft)	Peak WSE at Railroad Tracks (FT)	Peak WSE Downstream of Railroad Tracks (Ft)
Existing	1098.31	1098.13	1089.66
48" CSP	1097.95 (-0.36')	1097.69 (-0.44')	1089.72 (0.06')
54" CSP	1097.86 (-0.45')	1097.57 (-0.56')	1089.74 (0.08')
(2) 48" CSP	1097.62 (-0.69')	1097.28 (-0.85')	1089.79 (0.13')
(2) 54" CSP	1097.42 (-0.89')	1097.06 (-1.07')	1089.82 (0.16')
(3) 9' x 9' Box Culverts	1096.43 (-1.88')	1096.11 (-2.02')	1089.95 (0.29')
(5) 9' x 9' Box Culverts	1094.88 (-3.43')	1094.50 (-3.63')	1090.09 (0.43')

The requirement for a permit from the Managers for certain uses of water or for certain works within the District is not intended to delay or inhibit development, rather the permits are needed so that the Managers are kept informed of planned projects. The Managers can advise, in some cases provide assistance and insure that development of the resources of the District is orderly and in accordance with the overall plan of the District.

MSTRWD permit is required if:

- Water is to be diverted from one watershed to another.
 - Water is to be drained to a legal ditch.
 - A ditch is to be repaired.
 - A marsh is to be drained.
 - A dike is to be constructed or altered.
 - A reservoir is to be drained or constructed.
- A bridge, culvert, or drain is to be installed or changed.
 - A natural waterway, lake, or marsh is to be changed.
- Construction is to be done near a waterway, lake, or marsh.
 - Drain tile is to be installed
 - A bridge is to be constructed or altered.
- The elevation of a public roadway is to be altered.

General Instructions

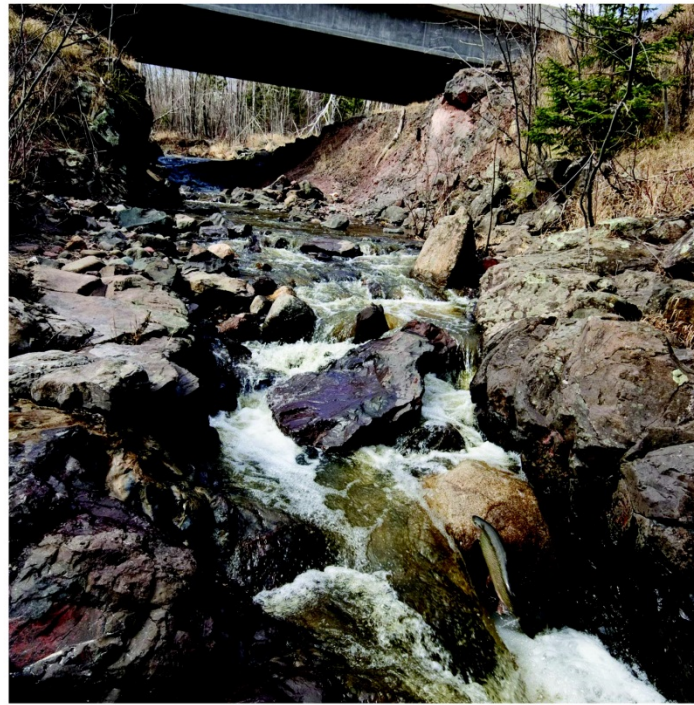
An application for a permit must be submitted by Wednesday prior to the meeting, by the owner or owners of the lands involved or their agent. If the applicant is a public corporation the application may be submitted by the person designated to oversee the activity for which a permit is requested.

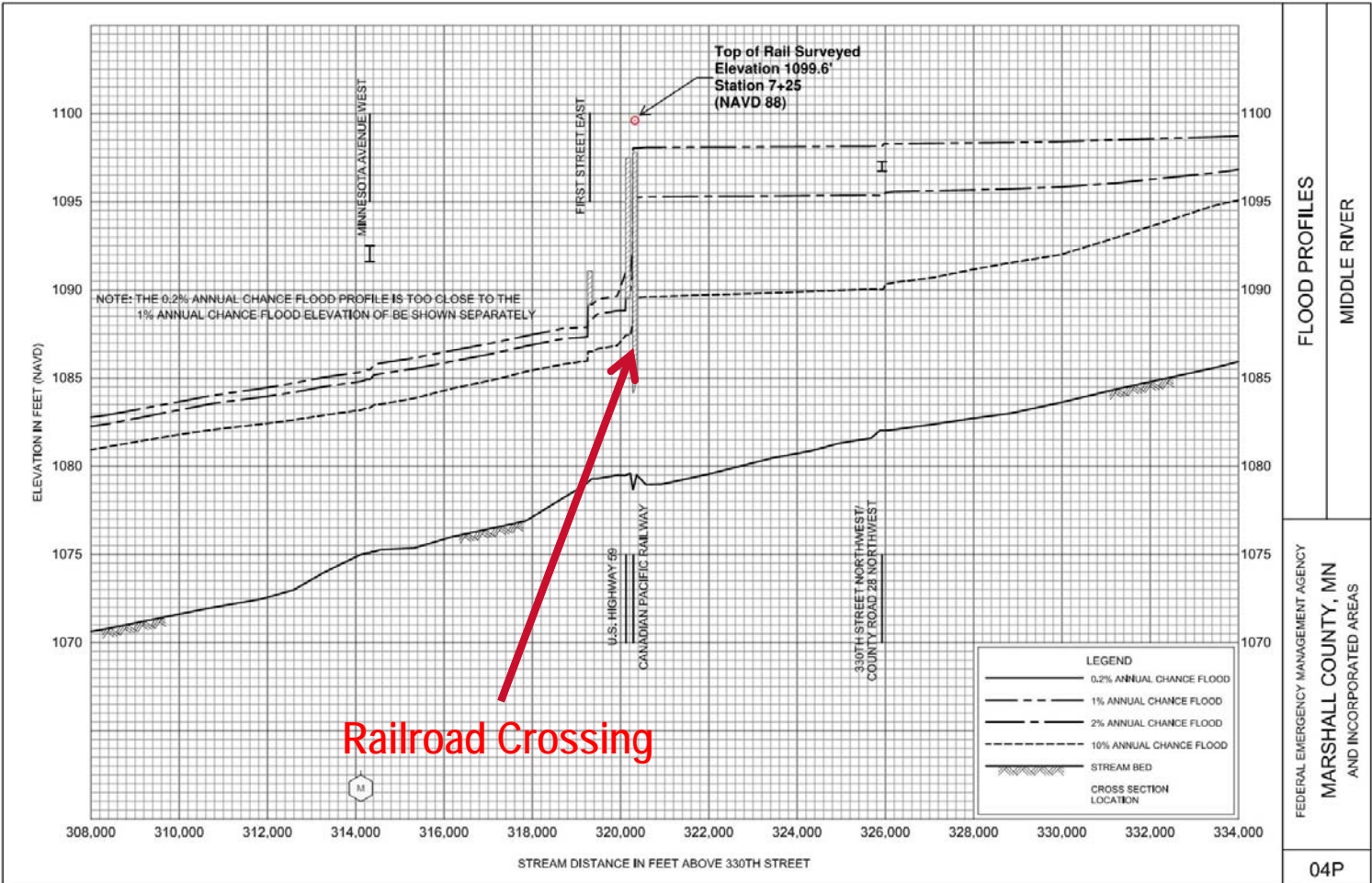
- Applications submitted by a property owner on behalf of a lessee must be countersigned by the lessee.
 - Applications shall be filed with the Secretary or Administrator for the District.
- A plan should accompany the application; if a plan lacks important information the Managers may request the applicant to furnish whatever additional information they deem appropriate.
- That all permit requests shall be submitted to the District on forms provided. District Staff will conduct appropriate investigation of the request, including site investigation, Engineer review & recommendations, and contacts of affected individuals and agencies as deemed necessary to provide a recommendation to approve or deny. The frequency design of the affected ditch and district policies that apply shall be noted by District staff, as well as anticipated effect of the request. All permit requests shall come before the Board at a scheduled meeting for further review, discussion, and appropriate action. The following exceptions shall apply: That the District Administrator is authorized to approve the following permits prior to the next regular scheduled board meeting:
 - Temporary emergency repairs requested by a Government Agency (township, city or state) when public safety is a factor;
 - Replacement of culverts with similar diameter and or elevation and location;
 - Lengthening of in-place culverts
 - Requests from other governmental agencies (township, city and state) that include hydraulic analysis performed by a registered Engineer.

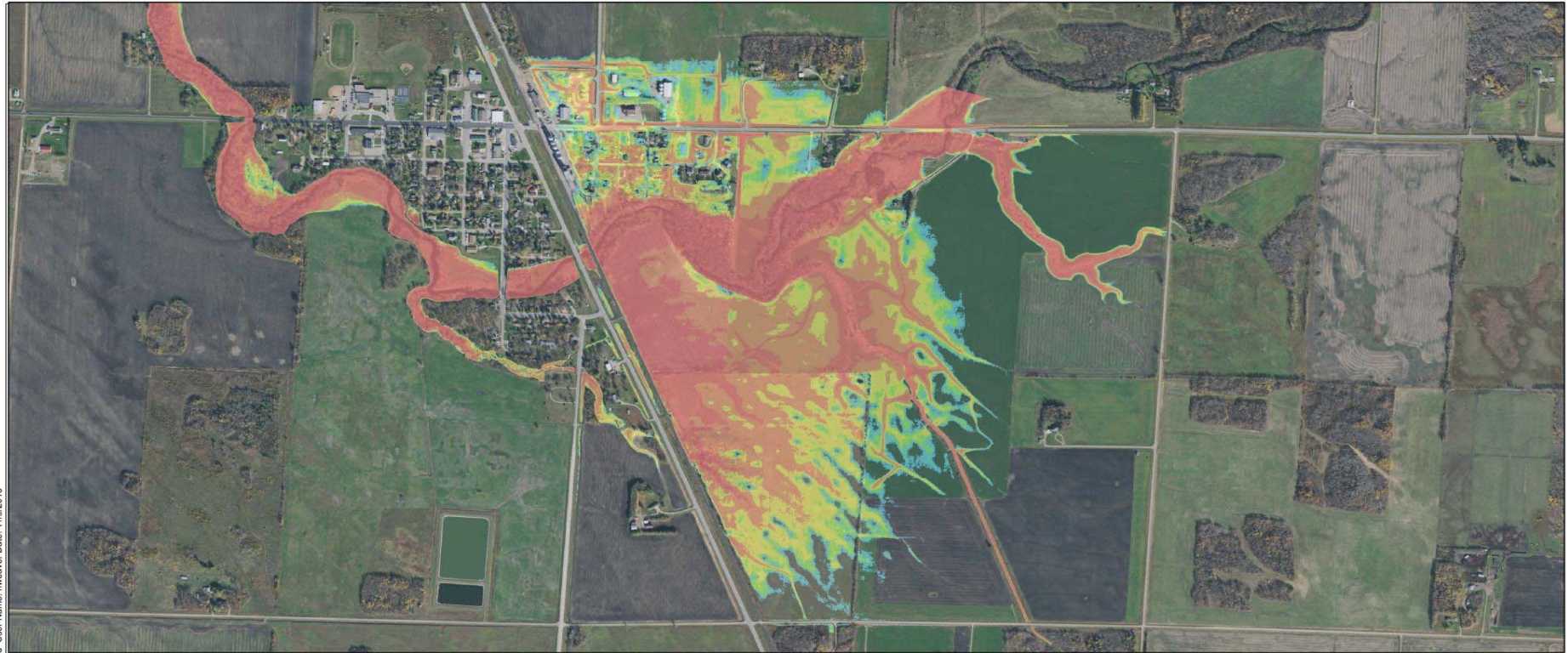
Adequate time for review of the permits shall be not less than 3 working days prior to the regular scheduled board meeting. Permits that are received, that do not have sufficient time for the District Staff or the Engineer to review shall be addressed at the next scheduled meeting.

Chapter 2. Hydraulic and Hydrologic Recommendations

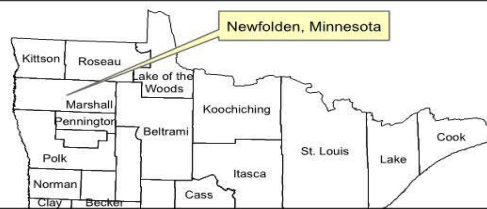
The following pages contain several detailed illustrations, notes and guidance of Best Practice options for Hydraulic and Hydrologic design of structures impacting Public Waters. Each site will have to be evaluated to ensure that replacement of an existing structure does not result in an increase of flood potential to upstream or downstream properties. Additional information is also provided to improve or repair stream stability and local habitat.



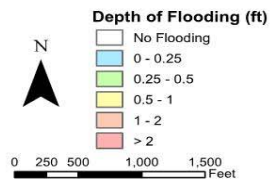




SITE LOCATOR



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

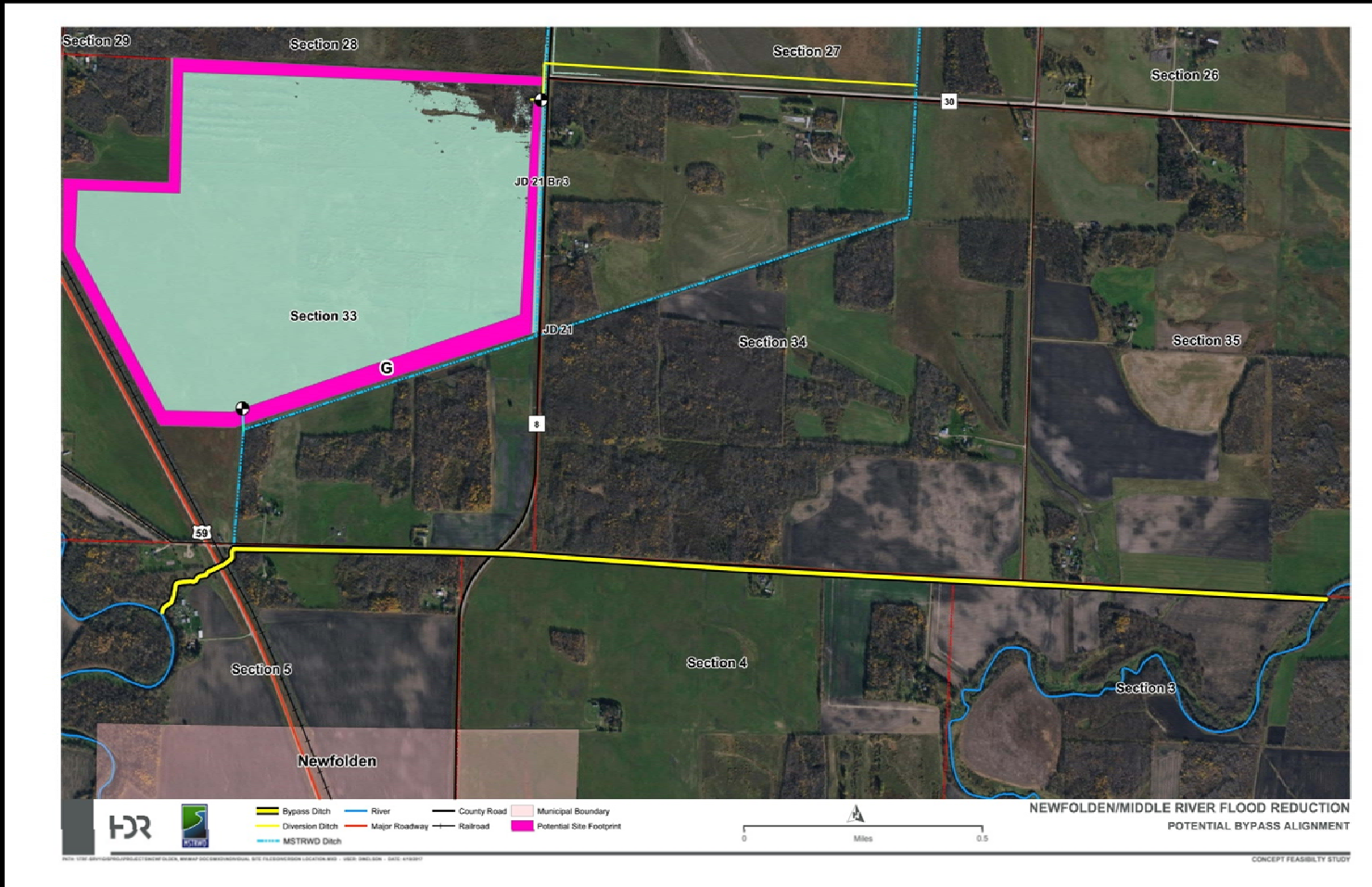


Risk Mapping, Assessment, and Planning (Risk MAP)

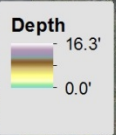
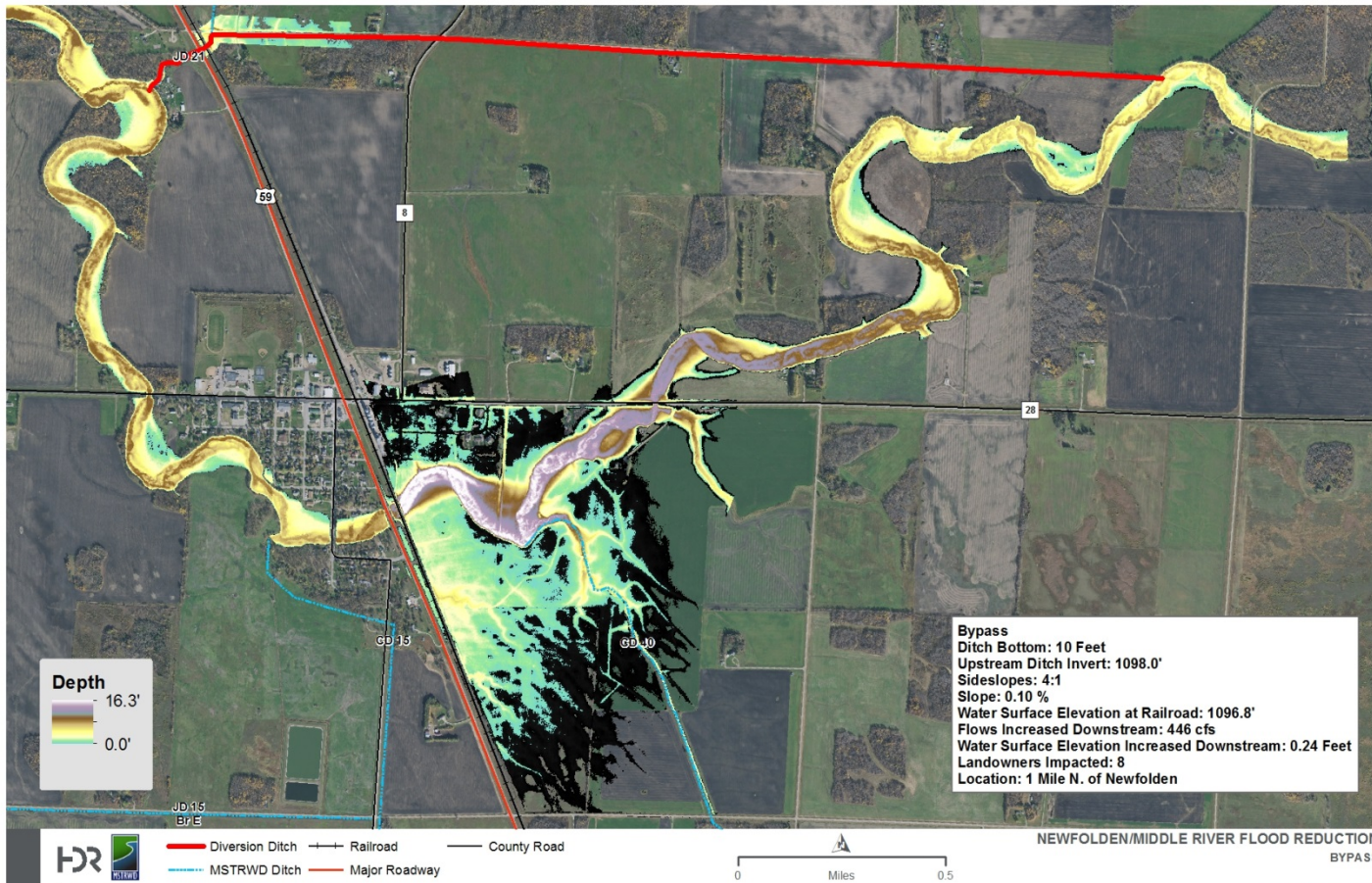
About this map:
This map shows the depth of flooding during the 1-percent-annual-chance (100-year) flood event. The depths were created using 2-foot LiDAR data for the City of Marshall.

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

Potential Bypass Alignment



Potential Bypass Inundation Map



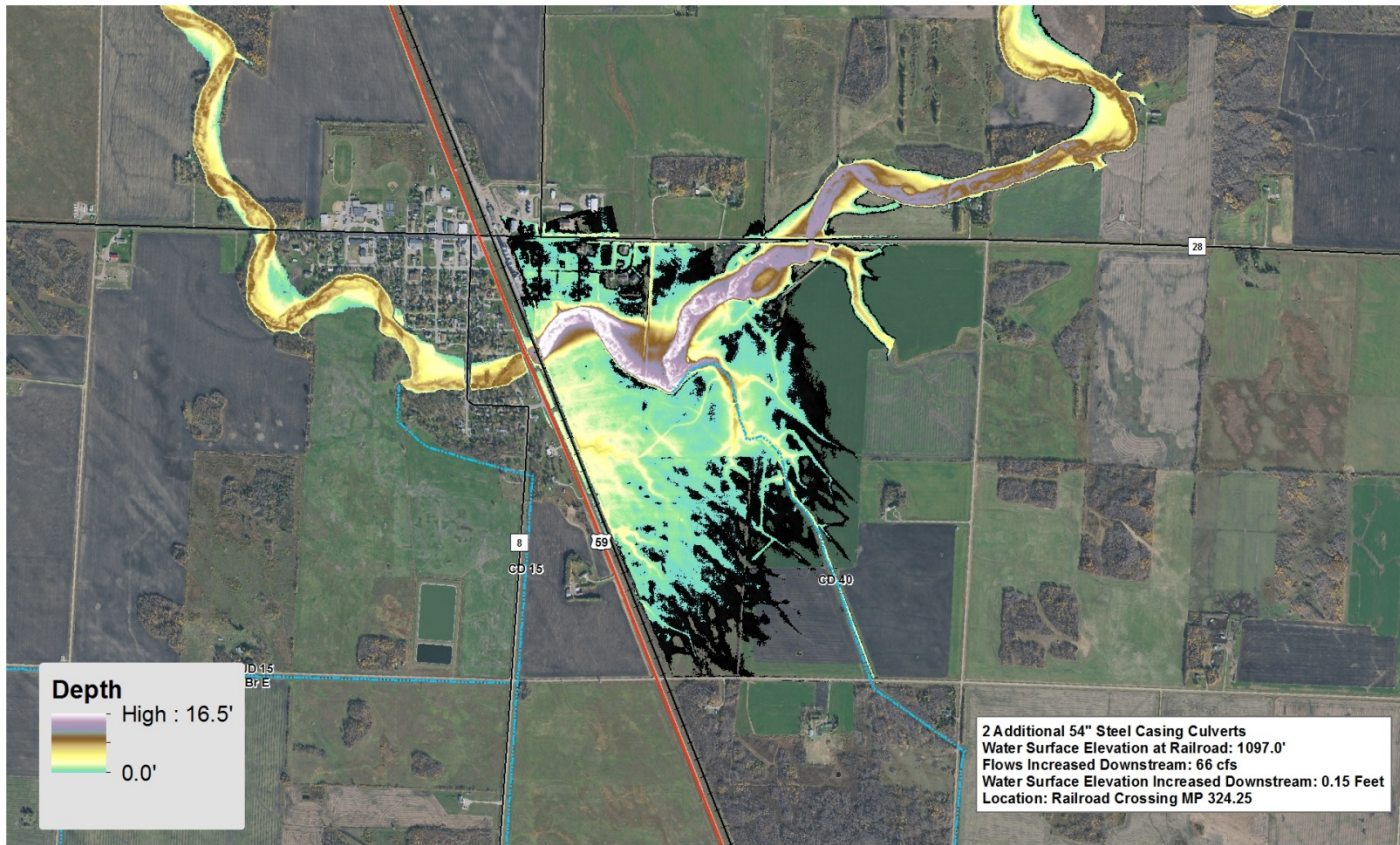
Bypass
 Ditch Bottom: 10 Feet
 Upstream Ditch Invert: 1098.0'
 Sideslopes: 4:1
 Slope: 0.10 %
 Water Surface Elevation at Railroad: 1096.8'
 Flows Increased Downstream: 446 cfs
 Water Surface Elevation Increased Downstream: 0.24 Feet
 Landowners Impacted: 8
 Location: 1 Mile N. of Newfolden

- Diversion Ditch
- Railroad
- County Road
- MSTRWD Ditch
- Major Roadway

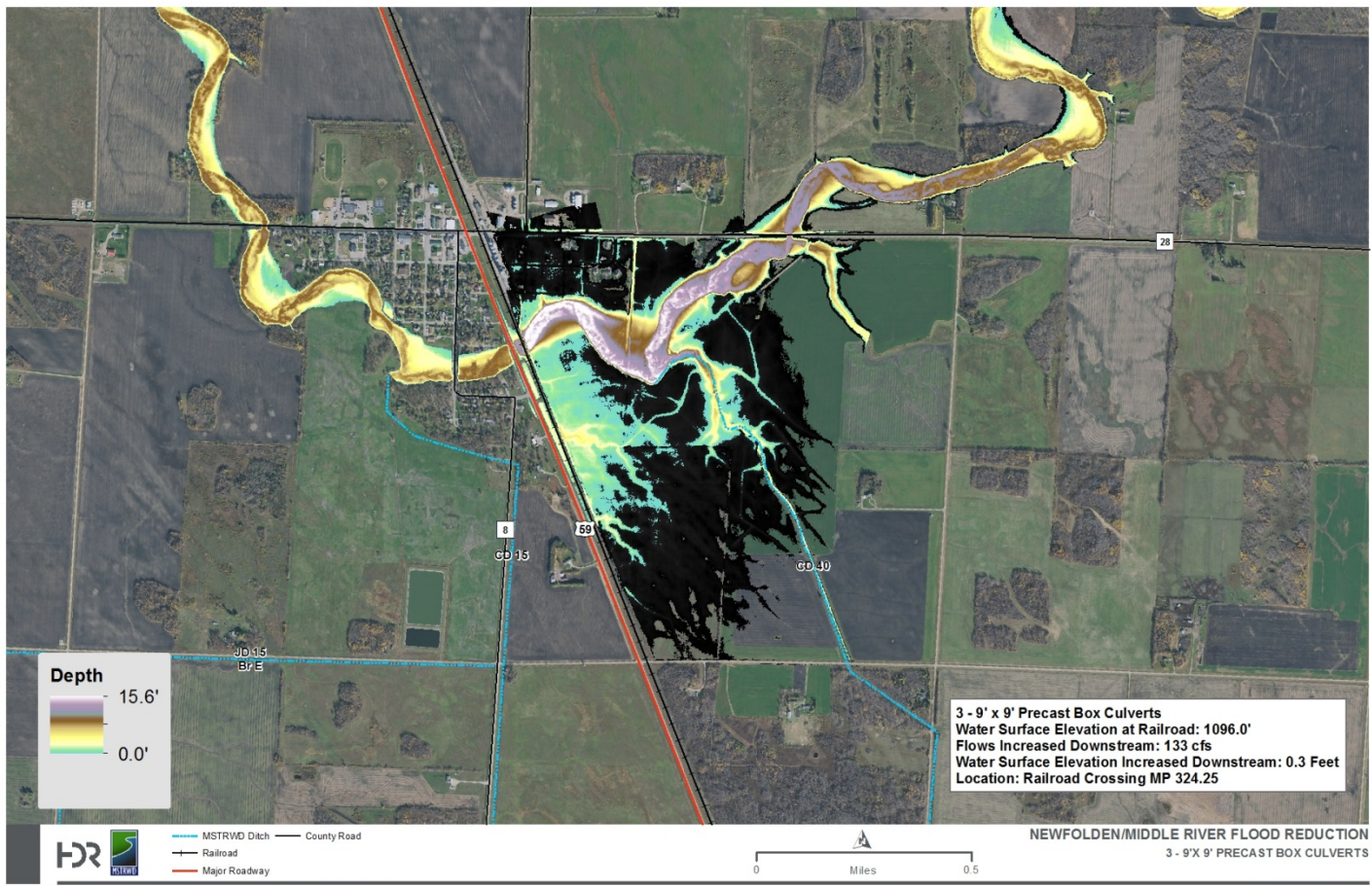


NEWFOLDEN/MIDDLE RIVER FLOOD REDUCTION
 BYPASS

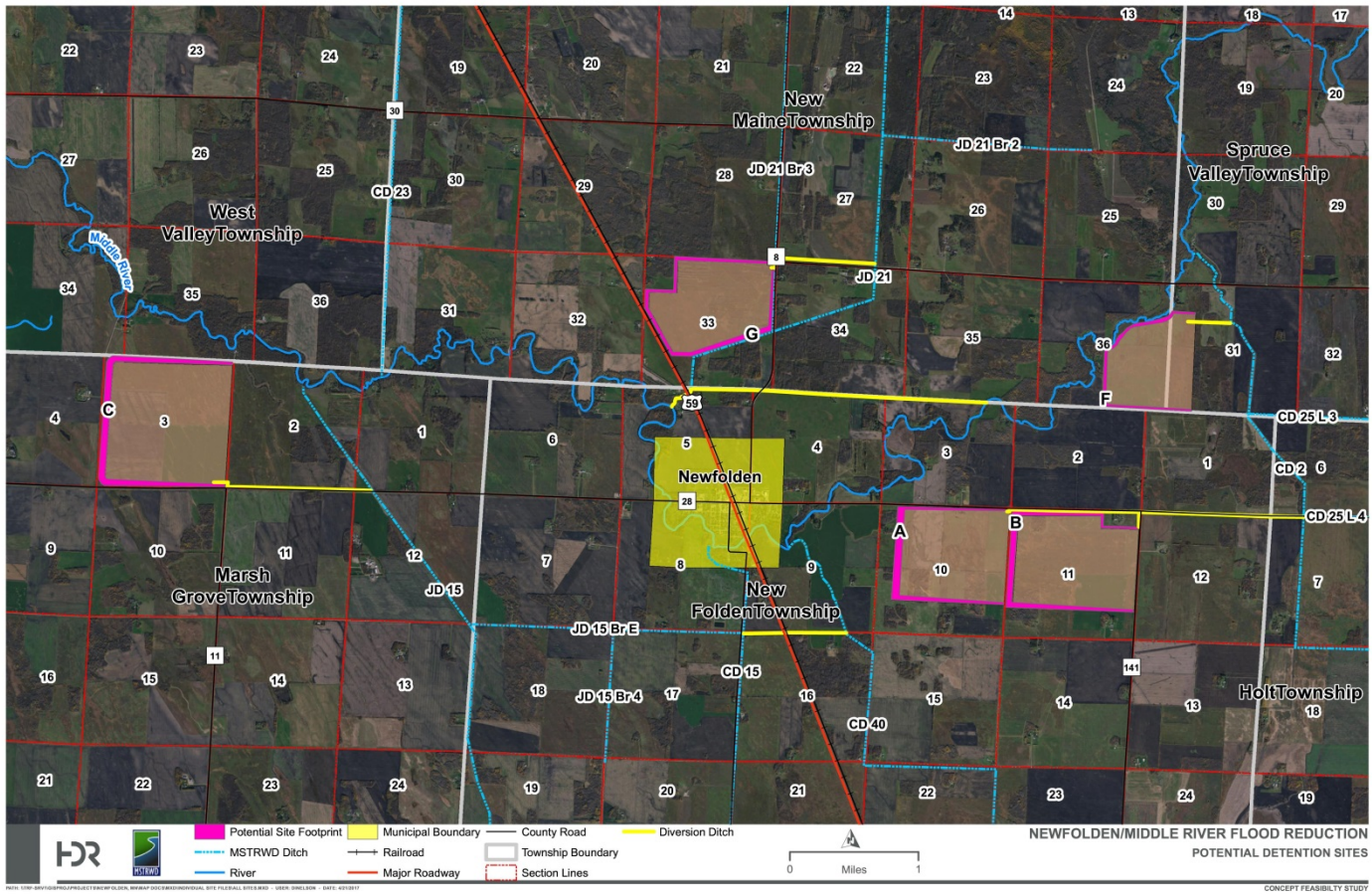
Potential 2 Additional 54" Steel Casing Culverts Inundation Map



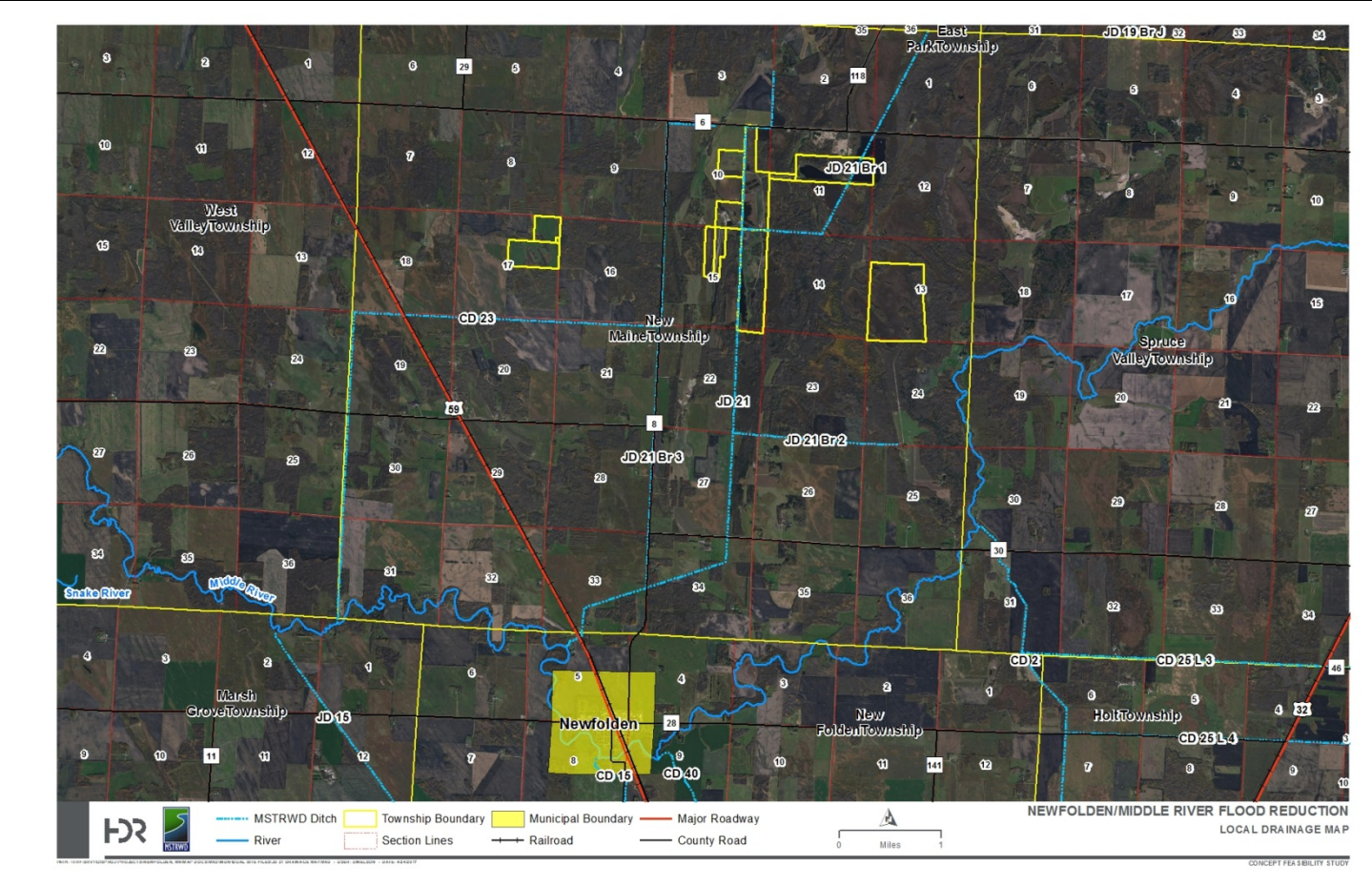
Potential 3 – 9' x 9' Box Culverts Inundation Map



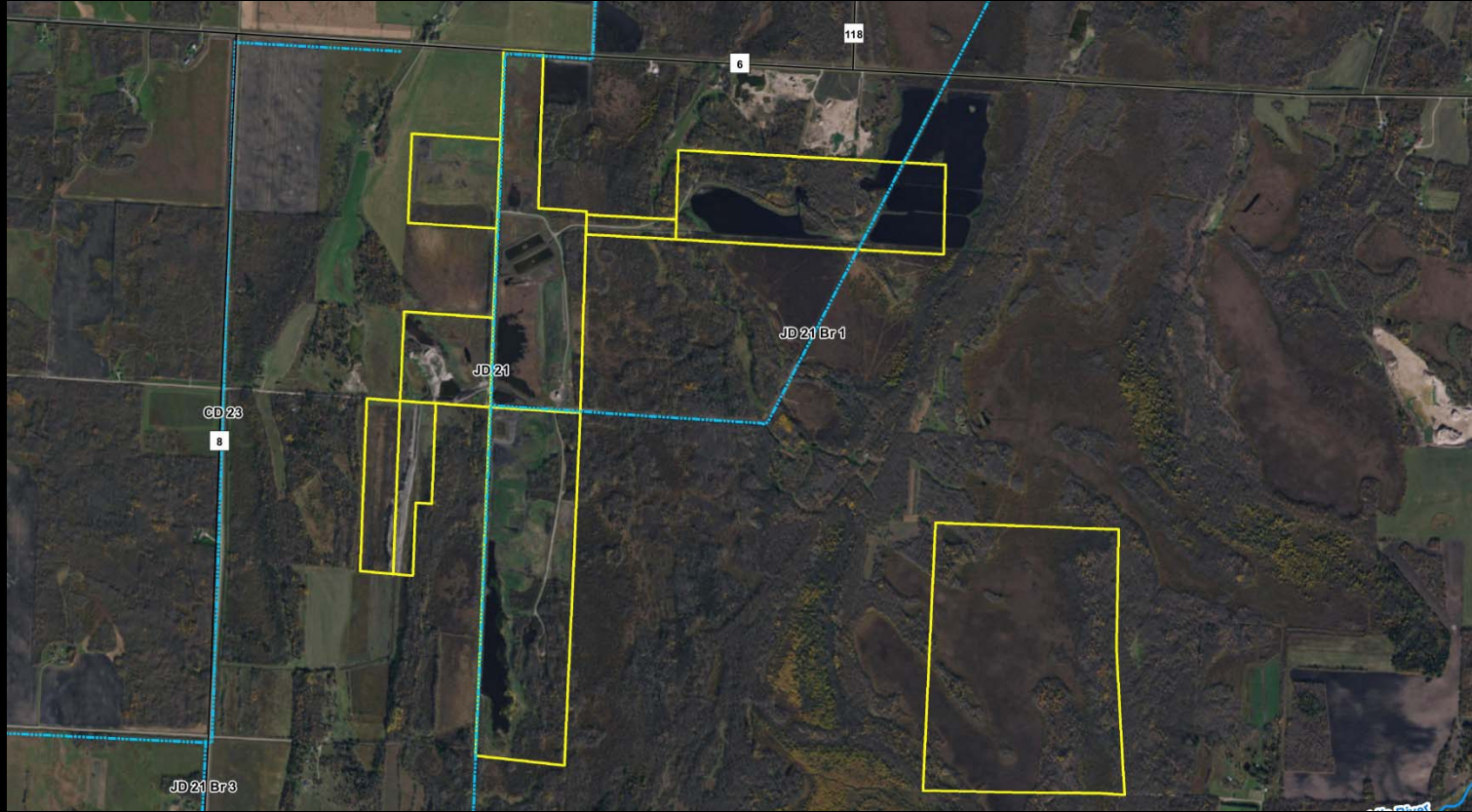
Potential Retention Locations



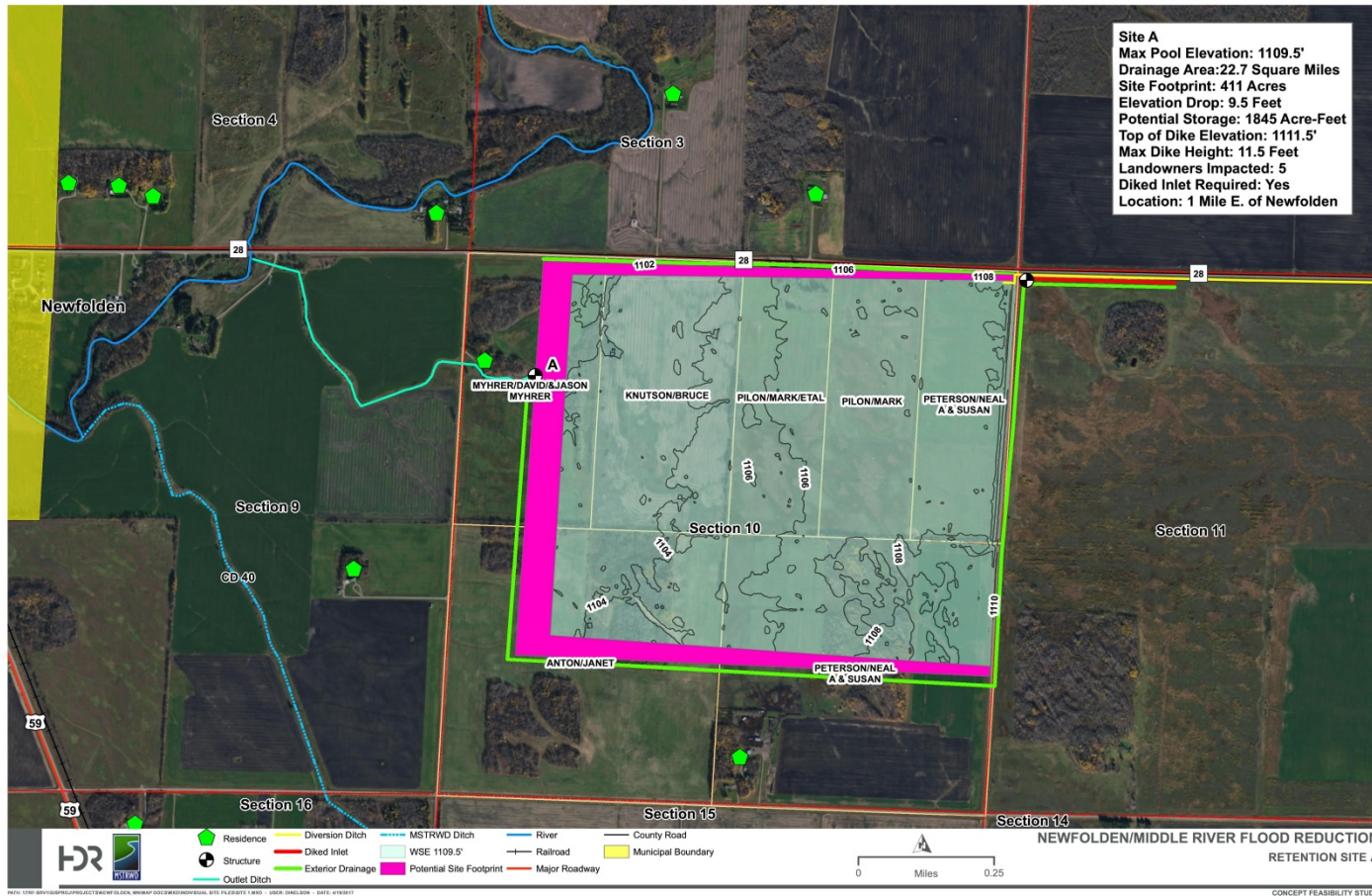
JD 21 Drainage Area



Kevin Pierce Parcels

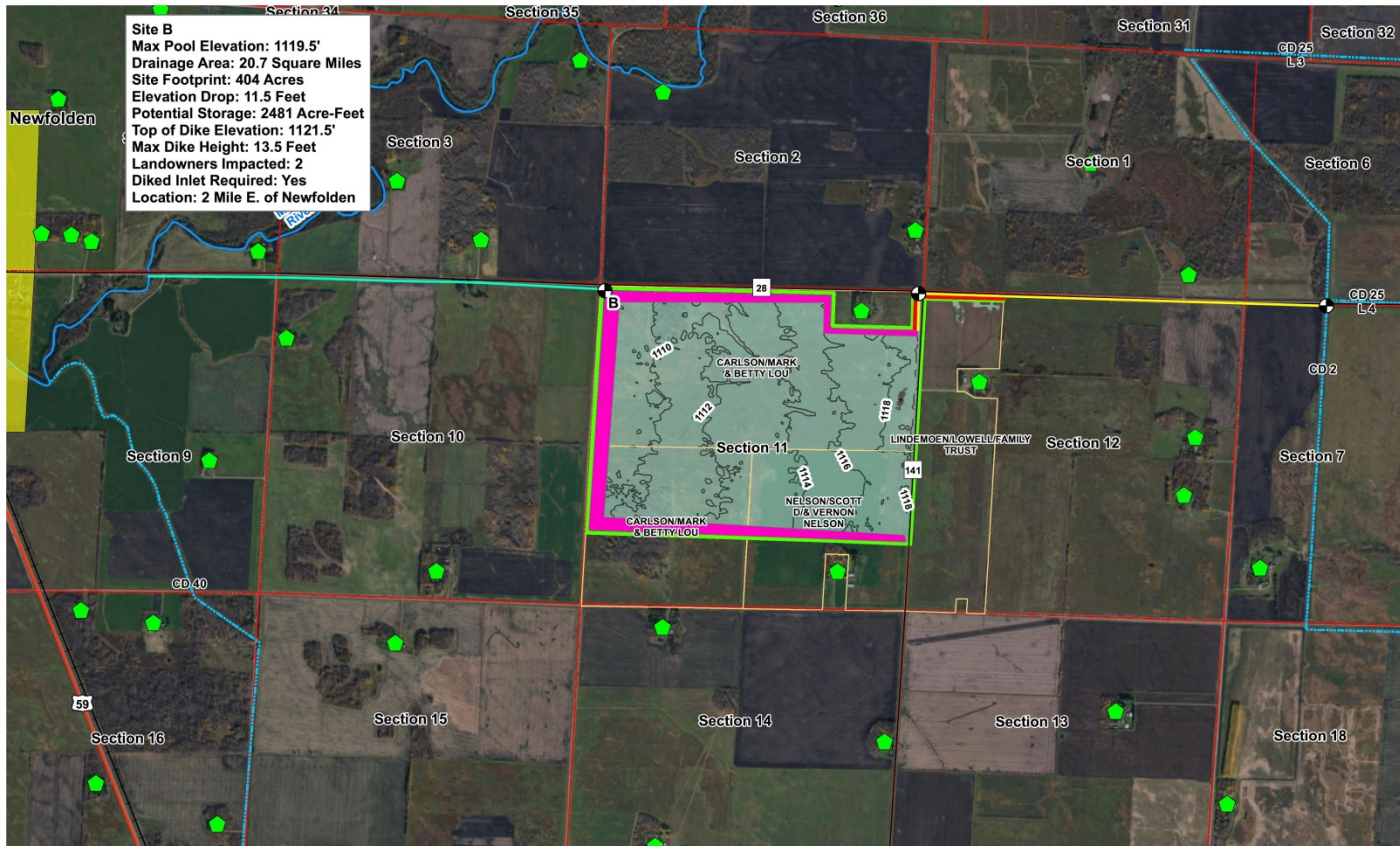


Site A



Site B

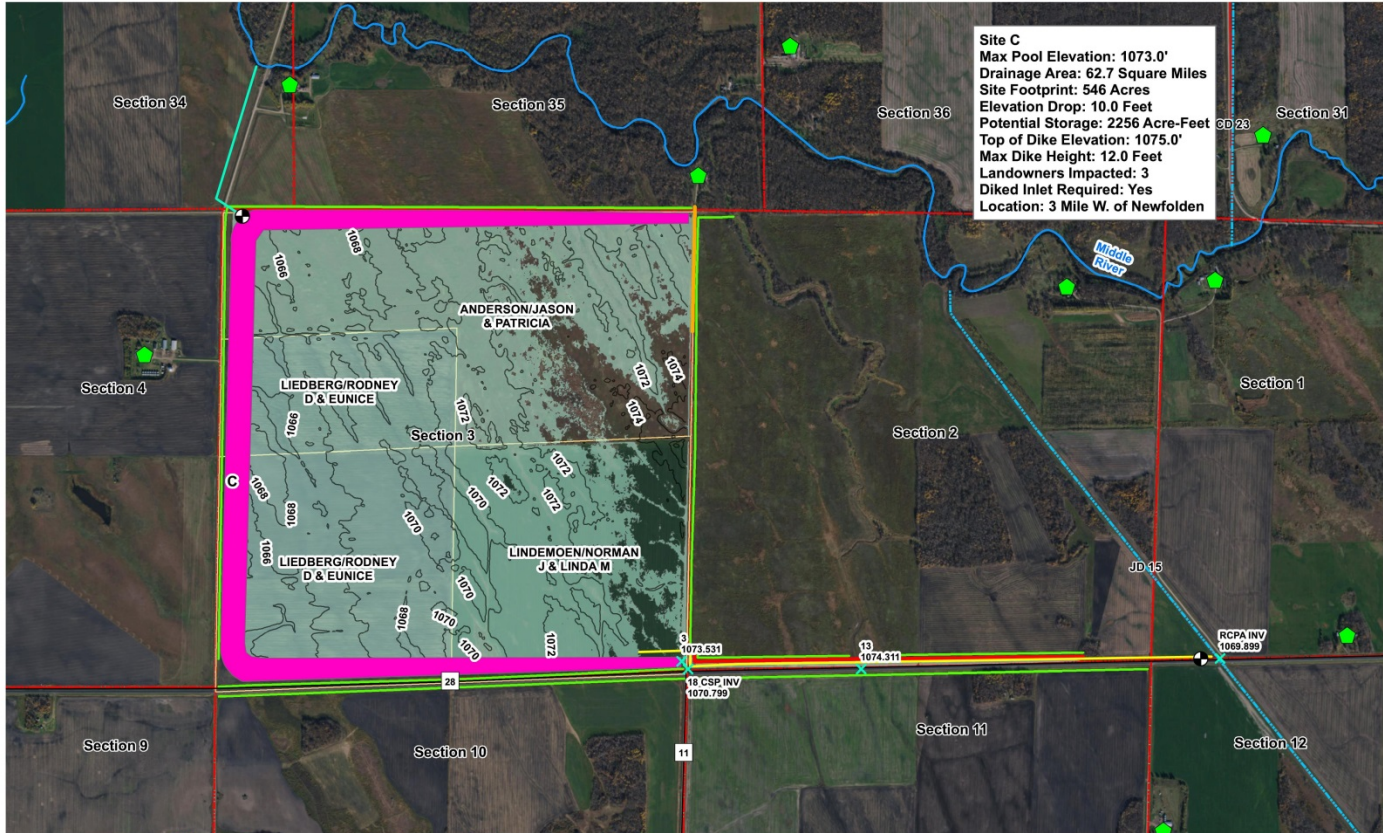
Site B
 Max Pool Elevation: 1119.5'
 Drainage Area: 20.7 Square Miles
 Site Footprint: 404 Acres
 Elevation Drop: 11.5 Feet
 Potential Storage: 2481 Acre-Feet
 Top of Dike Elevation: 1121.5'
 Max Dike Height: 13.5 Feet
 Landowners Impacted: 2
 Diked Inlet Required: Yes
 Location: 2 Mile E. of Newfolden



NEWFOLDEN/MIDDLE RIVER FLOOD REDUCTION RETENTION SITE B

CONCEPT FEASIBILITY STUDY

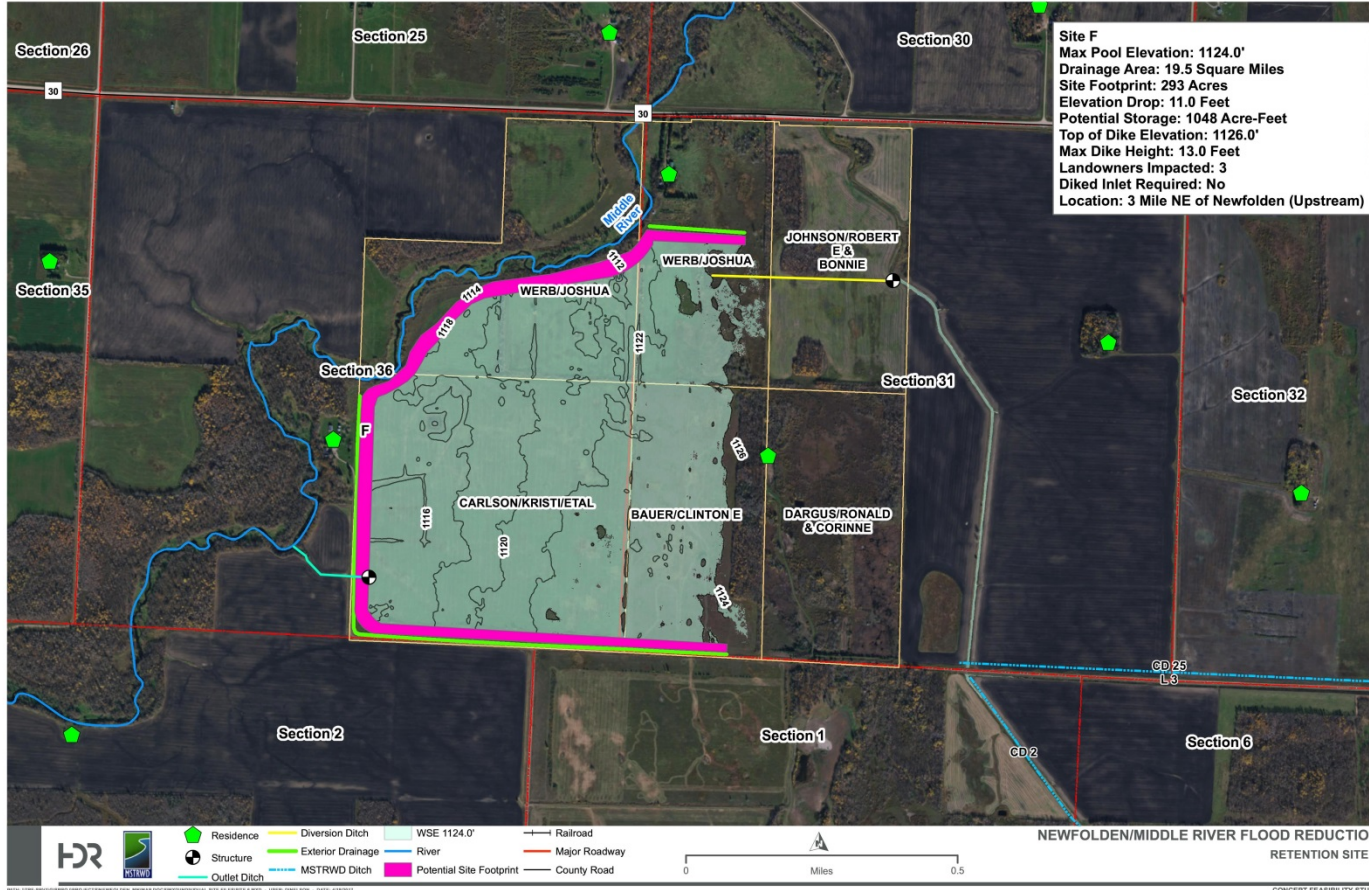
Site C



Site C
 Max Pool Elevation: 1073.0'
 Drainage Area: 62.7 Square Miles
 Site Footprint: 546 Acres
 Elevation Drop: 10.0 Feet
 Potential Storage: 2256 Acre-Feet
 Top of Dike Elevation: 1075.0'
 Max Dike Height: 12.0 Feet
 Landowners Impacted: 3
 Diked Inlet Required: Yes
 Location: 3 Mile W. of Newfolden

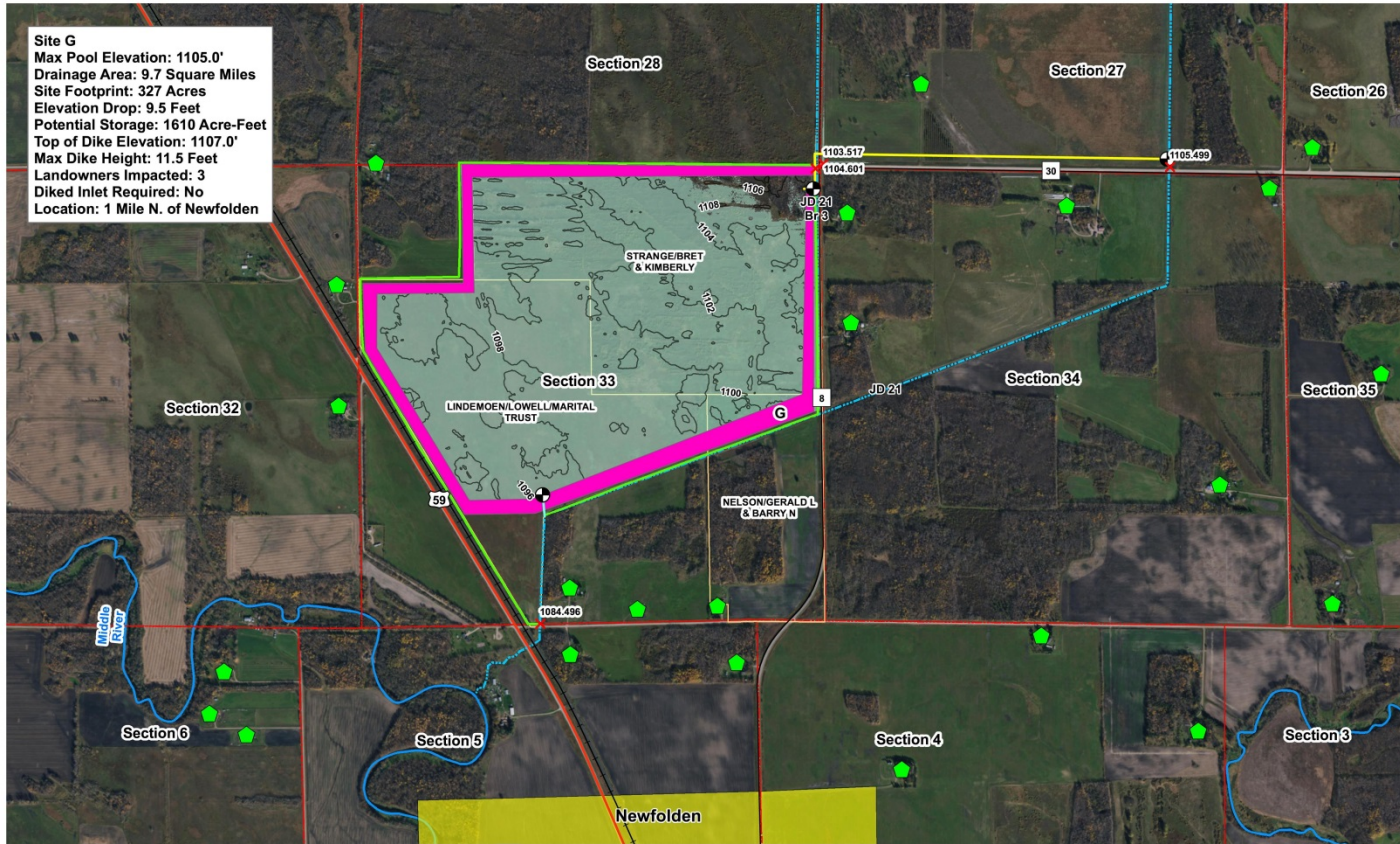
NEWFOLDEN/MIDDLE RIVER FLOOD REDUCTION
 RETENTION SITE C
 0 1 Miles 0.5
 CONCEPT FEASIBILITY STUDY

Site F



Site G

Site G
 Max Pool Elevation: 1105.0'
 Drainage Area: 9.7 Square Miles
 Site Footprint: 327 Acres
 Elevation Drop: 9.5 Feet
 Potential Storage: 1610 Acre-Feet
 Top of Dike Elevation: 1107.0'
 Max Dike Height: 11.5 Feet
 Landowners Impacted: 3
 Diked Inlet Required: No
 Location: 1 Mile N. of Newfolden



		Residence	Diversion Ditch	Major Roadway	WSE 1105.0'	River
Structure	Potential Site Footprint	County Road	MSTRWD Ditch	Survey Point	Outlet Ditch	
Railroad	Exterior Drainage	Municipal Boundary				

NEWFOLDEN/MIDDLE RIVER FLOOD REDUCTION
 RETENTION SITE G
 0 0.45 Miles
 CONCEPT FEASIBILITY STUDY

Newfolden / Middle River Project Team Meeting #6

- FEMA: May 16, 2017
 - Initial FEMA modeling with LIDAR
 - Public comment (12/2/14, 7/14/16)
 - Revised mapping with DNR
 - Flood Insurance Study (FIS; 10/20/16)
 - New data and future potential revisions
 - Questions about FEMA procedures and flood insurance

Newfolden / Middle River Project Team Meeting #6

- DNR: May 18, 2017
 - Conditional Letter of Map Revision (CLOMR) or
 - Submit better surveying data (LOMR) or
 - Letter of Map Amendment (LOMA)

- Targets for reduction in Base Flood Elevation (BFE)?
 - Construction in the floodway

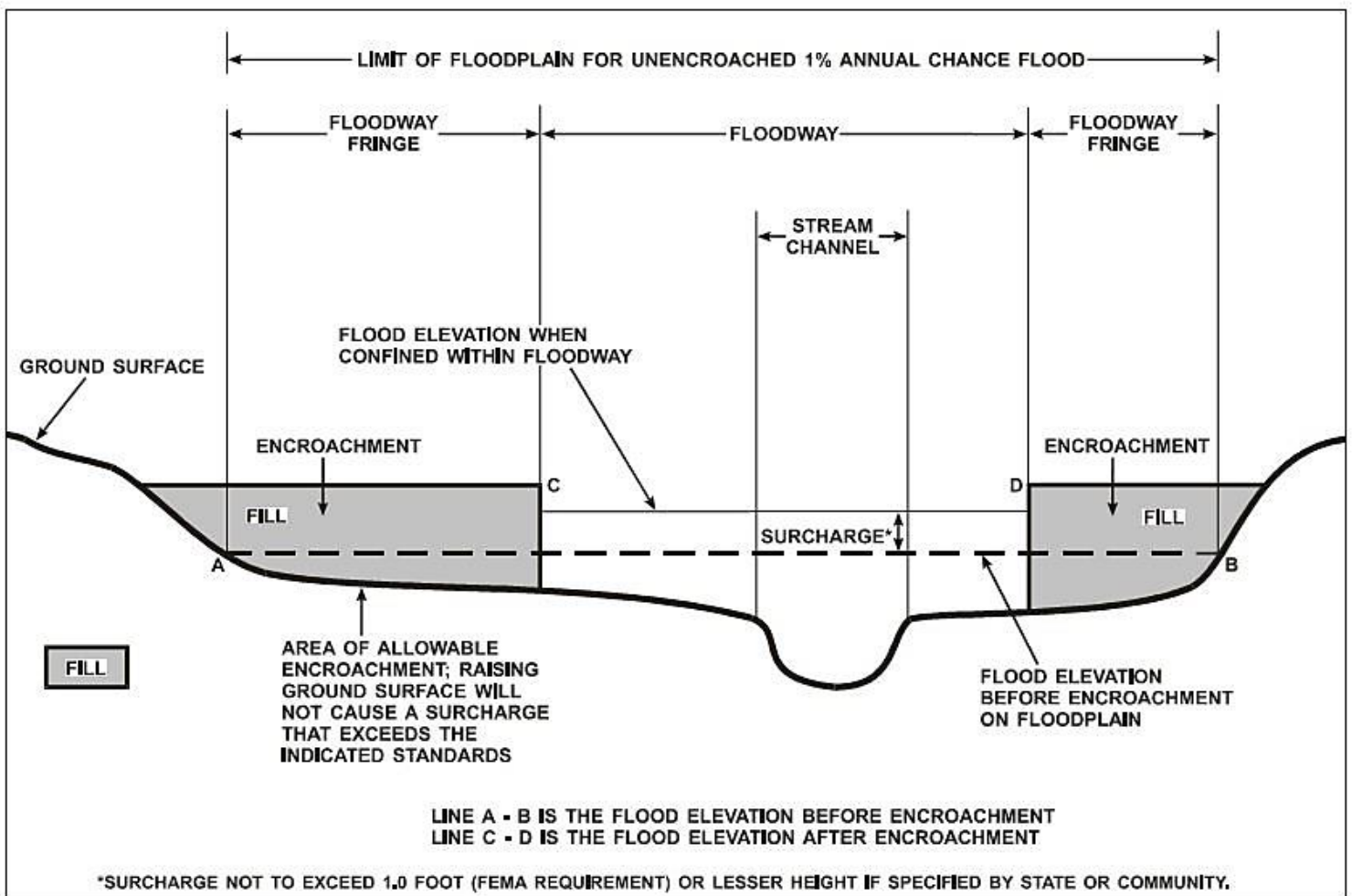
- Railroad: Meeting May 25, 2017

- Landowners: Ongoing

FEMA / MNDNR MEETING

- FEMA appeal not acted upon, BFE may be 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



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

Timeline

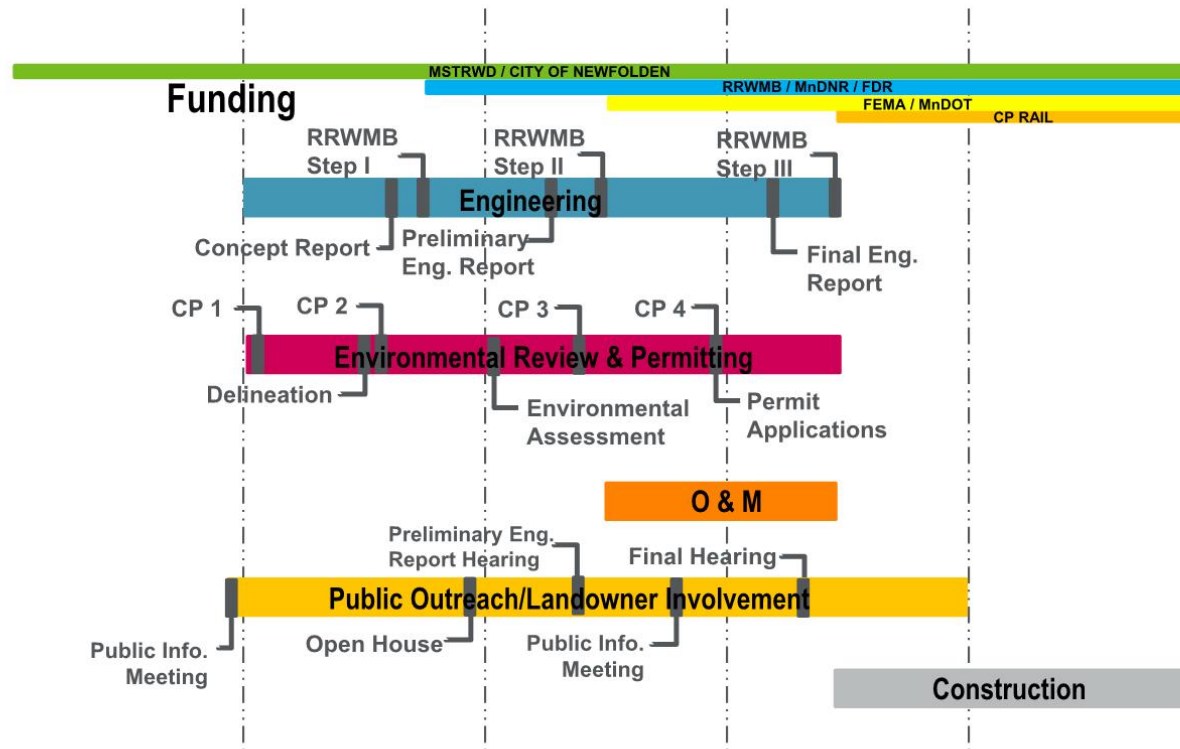
2016

2017

2018

2019

2020



PROJECT DEVELOPMENT AND NEXT STEPS

- Analyze & screen alternatives
- Continue landowner discussions
- Reach out to potential project partners & discuss project with the railroad



HDR