



Iowa CTP Real Time Technical Assistance

City of Oelwein, Fayette County, IA

01 November 2021

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Background

The City of Oelwein, Iowa, has experienced repeated and significant flooding along Dry Run Creek upstream of the railroad crossing, downstream of 2nd Avenue SW, and especially from the railroad crossing to 3rd Avenue NE (see Appendix A). The City has expressed an interest in mitigation measures that would reduce or eliminate the flooding in this reach. The Iowa DNR, as a FEMA Cooperating Technical Partner (CTP), has offered to develop high level mitigation solution(s) through Real Time Technical Assistance (RTTA).

Problem Statement

Development of three or more high level mitigation solutions that reduce or eliminate the flooding along Dry Run Creek upstream of the railroad crossing to 3rd Avenue NE. In addition, the solutions should work to avoid or minimize flooding from Dry Run Creek in the West Charles Street underpass.

Technical Approach

The major contributing factor to flooding along Dry Run Creek is the culvert under the railroad embankment that cannot handle the flow from the now urbanized areas upstream.

In discussions with the City of Oelwein, the following mitigation measures were put forth as possible solutions:

- Removal of 1st Avenue SW bridge
- Removal of parking deck North of W. Charles Street
- Reconfiguration and replacement of W. Charles Street bridge
- Storage in Wings Park
- Storage upstream in watershed

However, during our analysis we found that these measures taken cumulatively did not provide the desired reduction in floodplain extents upstream of the railroad culvert. The following additional measures were also taken into consideration:

- Deepening, widening, and concrete lining of Dry Run Creek from 2nd Ave SW to 3rd St NW.
- Deepening, widening, and concrete lining of Dry Run Creek from 4th St SW to the railroad culvert.
- Addition of flood wall (i.e., levee) along the south bank (i.e., left bank) of Dry Run Creek immediately upstream of the railroad culvert to prevent flows extending to properties to the south¹.
- Addition of flood wall (i.e., levee) along the north bank (i.e., right bank) of Dry Run Creek immediately upstream of the railroad culvert to prevent flows northward to the West Charles Street underpass¹.

The models and GIS shapefiles used in this analysis are provided for City of Oelwein use.

¹ The terrain between the Dry Run Creek Culvert and the West Charles Street underpass is flat and the levee is needed to keep the flow in the Dry Run Creek channel.

Summary of Alternatives

The various mitigation measures (see Figures in Appendix B) considered in the various alternatives are listed below.

Feature	Option											
	1	2	3	4	5	6	7	8	9	10	11	
Increased railroad culvert size	✓											
Removal of 1st Ave SW Bridge		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Removal of parking deck North of W. Charles Street		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Reconfiguration & replacement of W. Charles Street Bridge		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Storage in Wings Park			✓									
Storage reservoirs upstream of Outer Rd				✓		✓	✓	✓	✓	✓		
Lined rectangular channel, upstream of railroad					✓	✓						
Deepened & Lined rectangular channel, upstream of railroad							✓	✓	✓	✓	✓	✓
Deepened & Lined trapezoid channel, downstream of railroad									✓	✓	✓	
Small flood wall on left side of channel upstream of railroad								✓				
Small flood wall on right side of channel upstream of railroad								✓		✓		
Recommended	X	X	X	~	X	~	~	✓	✓	✓	✓	X

Resulting Flood Extents from Recommended Alternatives

The figures in the Appendix display the flood extents for the 1% annual chance flood for Options 8, 9 and 10. Additionally, the reduction in flows resulting from the scenarios with storage basins can be found below.

River Station	Option		
	Effective Flows (cfs)	Flows with Wings Storage (cfs)	Flows with Upstream Storage (cfs)
15074.01	1041	1041	620
13944.2	2195	2195	1206
10931.86	3165	3098	1987
5165.161	3328	3260	2194

Conclusions

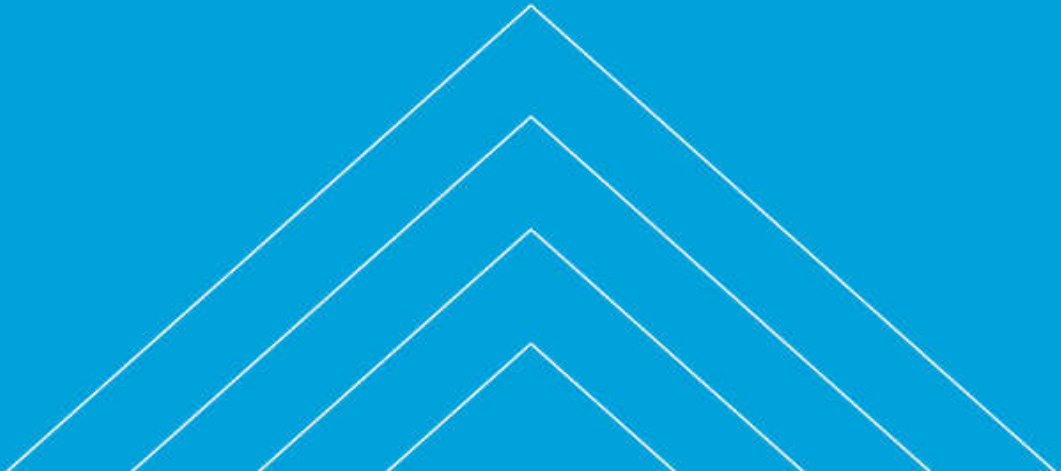
Urbanization in Oelwein upstream of the railroad culvert has resulted in increased runoff and exposed properties to flooding during frequent and infrequent flood events. Given the limitation of not being able to replace the railroad culvert, high level planning alternatives have been developed that address the flood hazard.

It is worth noting that the modeling used to develop these results are intended for a high-level planning discussion as opposed to design and construction. Additional detailed analyses to inform design decisions will be needed.

Furthermore, given the potential community acceptance of shallow flooding the identified measures may be further refined. For example, if a flood depth of 1.5 ft is acceptable then the levees identified for Options 8 and 10 may not be required.

Appendix A

(Source: City of Oelwein, Iowa)





PARKS / CEMETERY / AQUATICS / CAMPGROUND / TRAILS

Park and Recreation

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2016

CITY



WINGS



WINGS



WINGS



CITY



CITY



CITY



REDGATE





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Park and Recreation

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2017

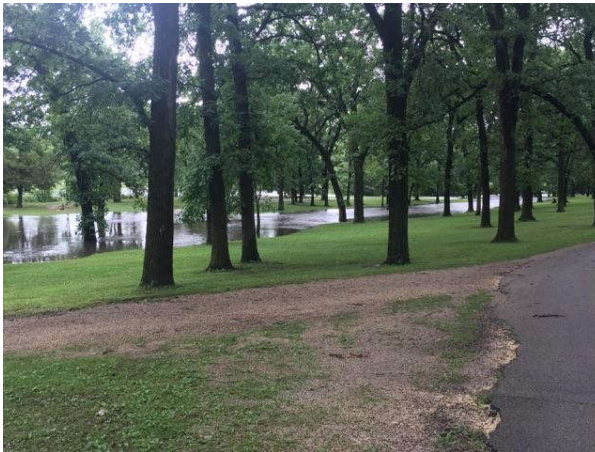
CITY



CITY



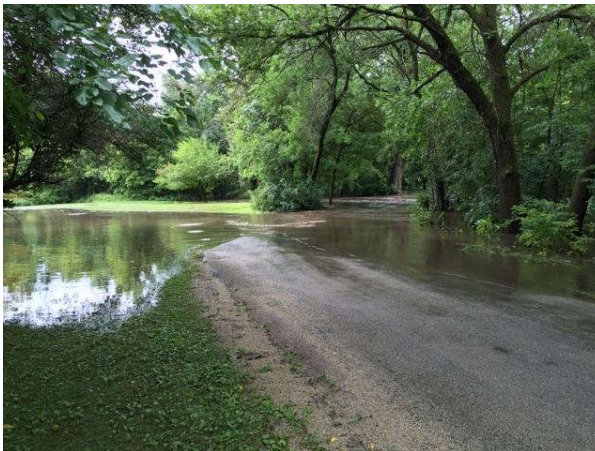
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DAM



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PLATT PARK - 1 INCH OF RAIN IN AN HOUR





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2018

FLOODING AT CITY PARK



FLOODING AT CITY PARK



CITY PARK FLOODING



CITY





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2019

WOODLAWN SPRING FLOODING



2020 + TORNADO

Diamond 1 – storm damage



City Park bridge



Diamond 1 fencing



City Park road



City Park road



Platt Park





1st Ave SW 10 block



2nd Ave SW to South Lot



150 to Chrysler Park

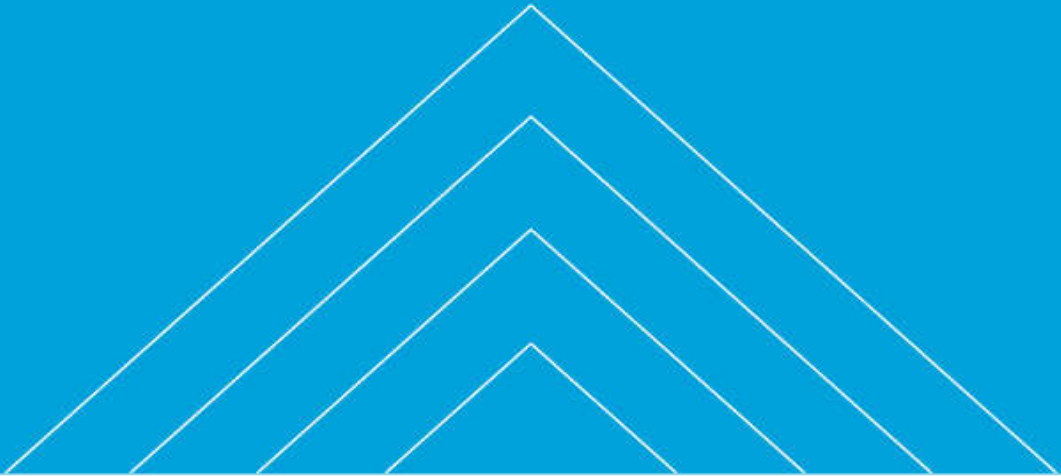


Viaduct

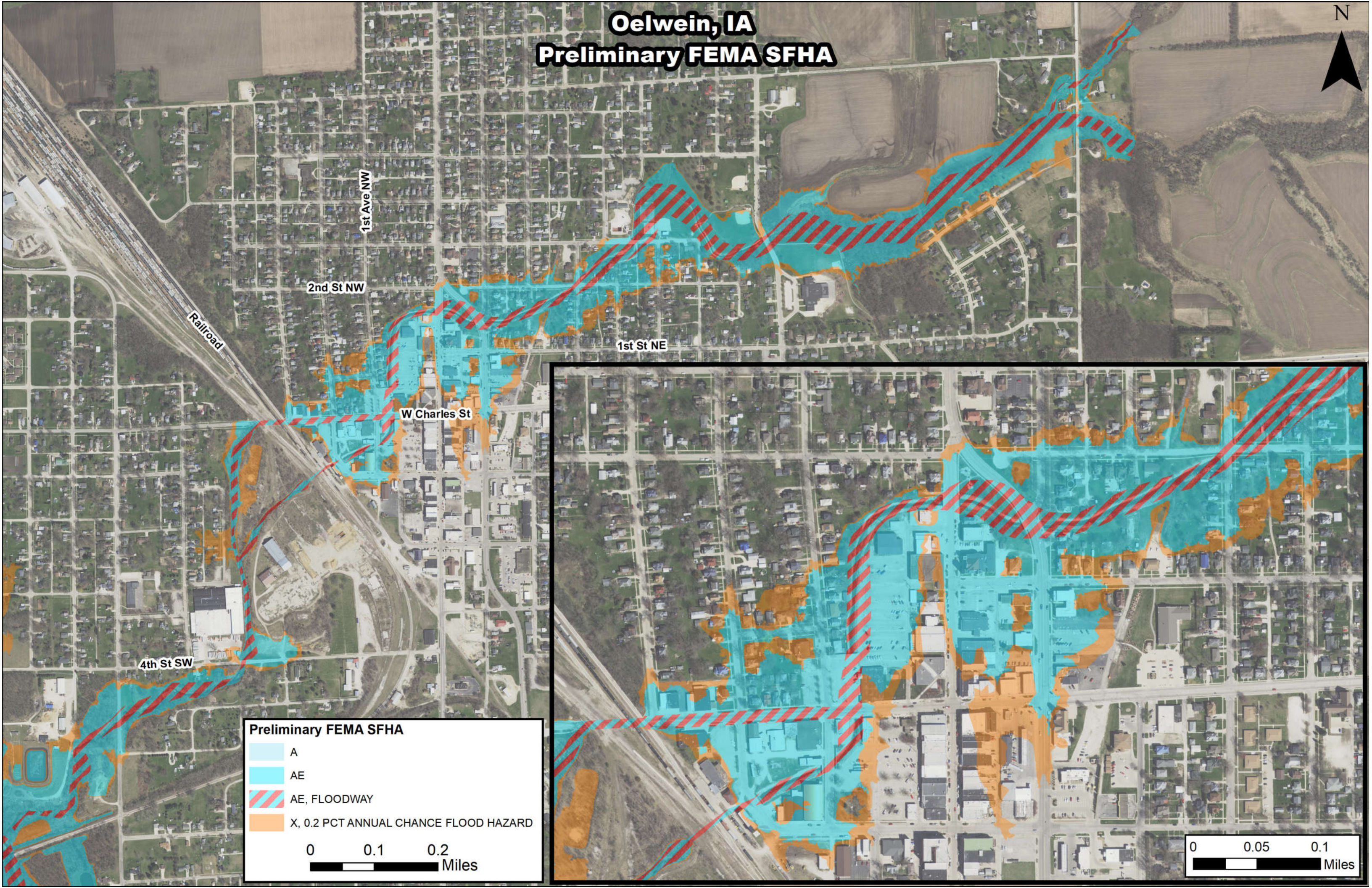




Appendix B



Oelwein, IA Preliminary FEMA SFHA



Preliminary FEMA SFHA

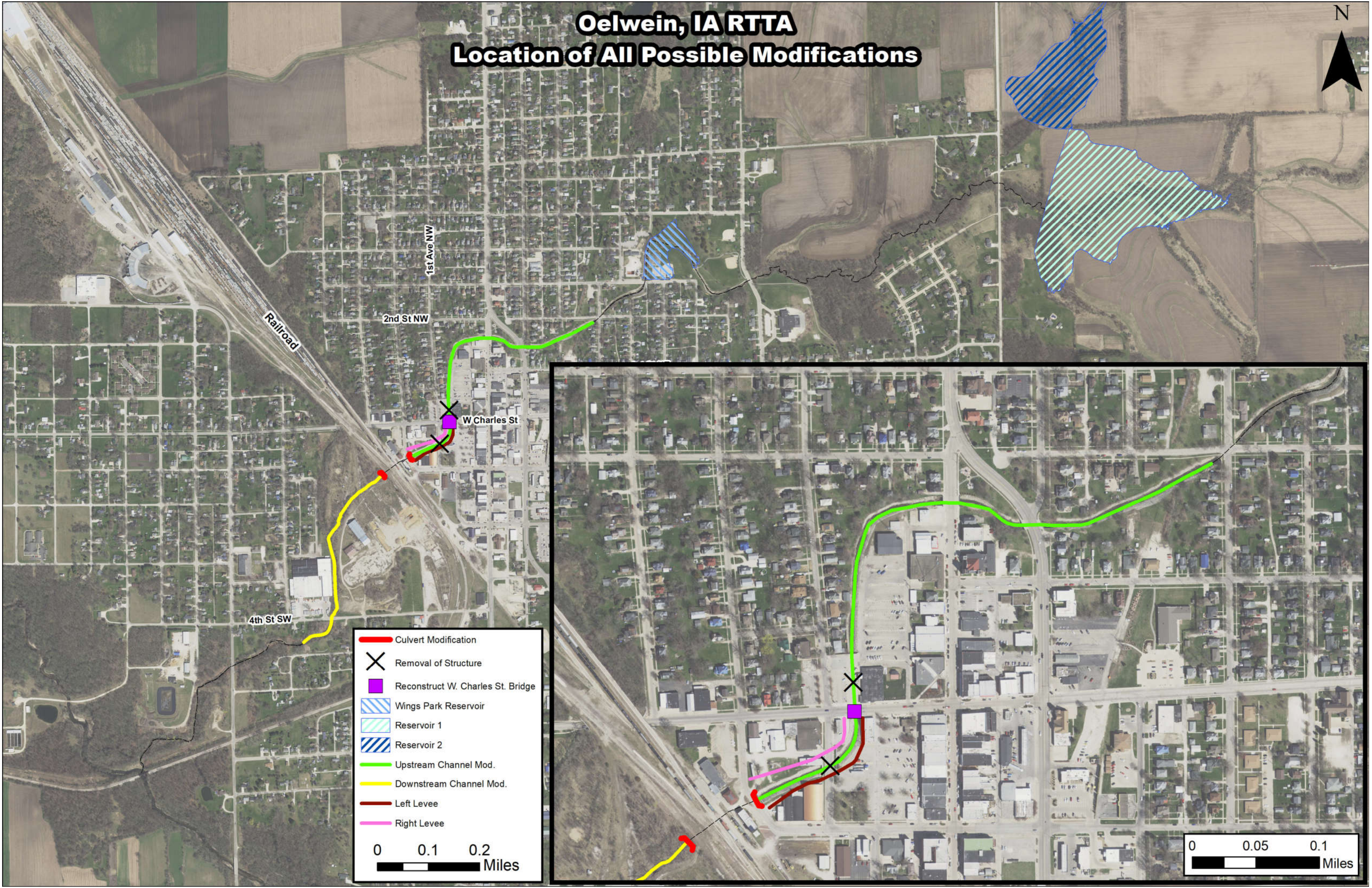
- A
- AE
- AE, FLOODWAY
- X, 0.2 PCT ANNUAL CHANCE FLOOD HAZARD

0 0.1 0.2
Miles

0 0.05 0.1
Miles

Oelwein, IA RTTA

Location of All Possible Modifications

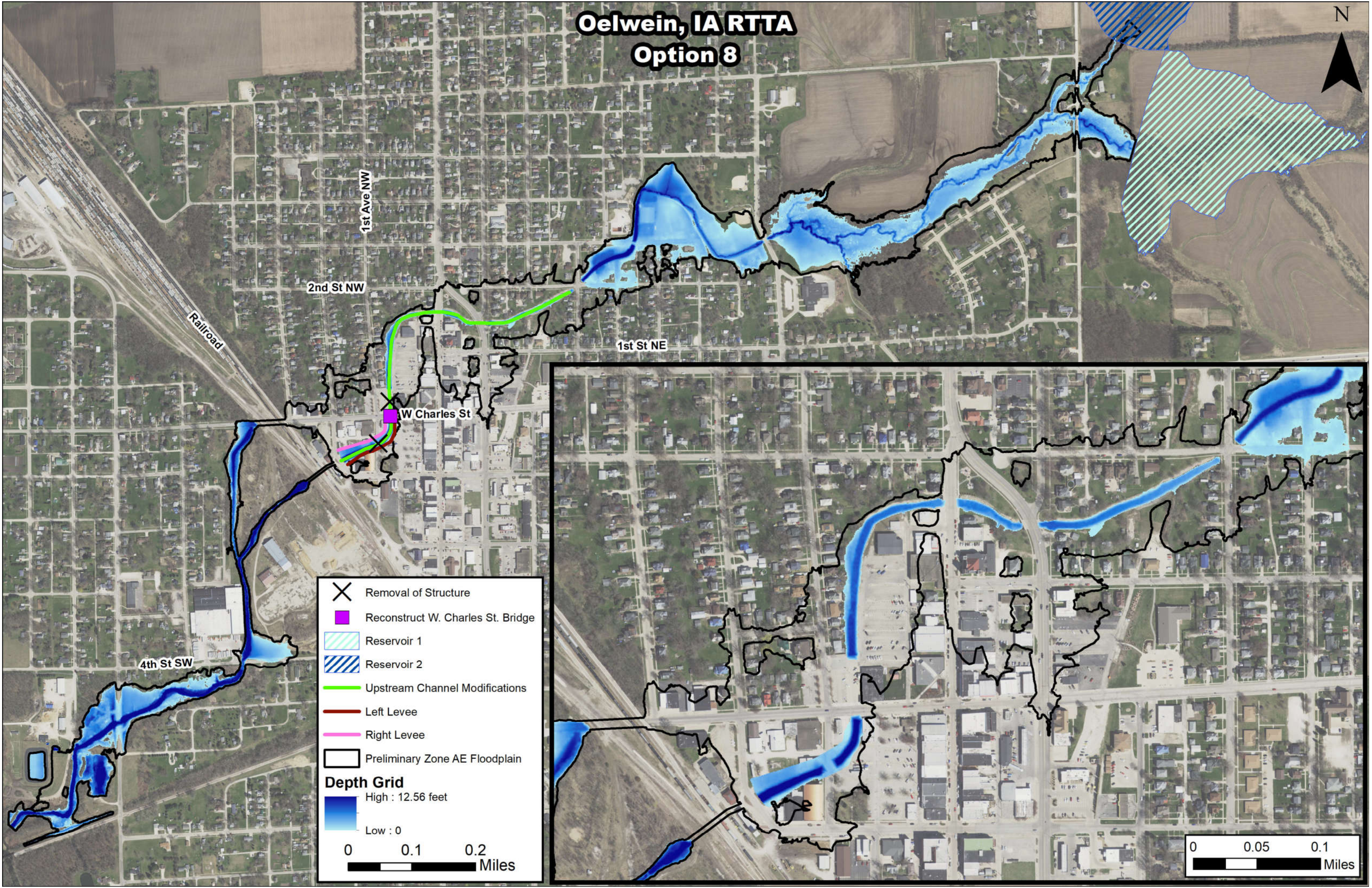


	Culvert Modification
	Removal of Structure
	Reconstruct W. Charles St. Bridge
	Wings Park Reservoir
	Reservoir 1
	Reservoir 2
	Upstream Channel Mod.
	Downstream Channel Mod.
	Left Levee
	Right Levee

0 0.1 0.2 Miles

0 0.05 0.1 Miles

Oelwein, IA RTTA Option 8



Legend

- X Removal of Structure
- Reconstruct W. Charles St. Bridge
- ▨ Reservoir 1
- ▨ Reservoir 2
- Upstream Channel Modifications
- Left Levee
- Right Levee
- ▭ Preliminary Zone AE Floodplain

Depth Grid

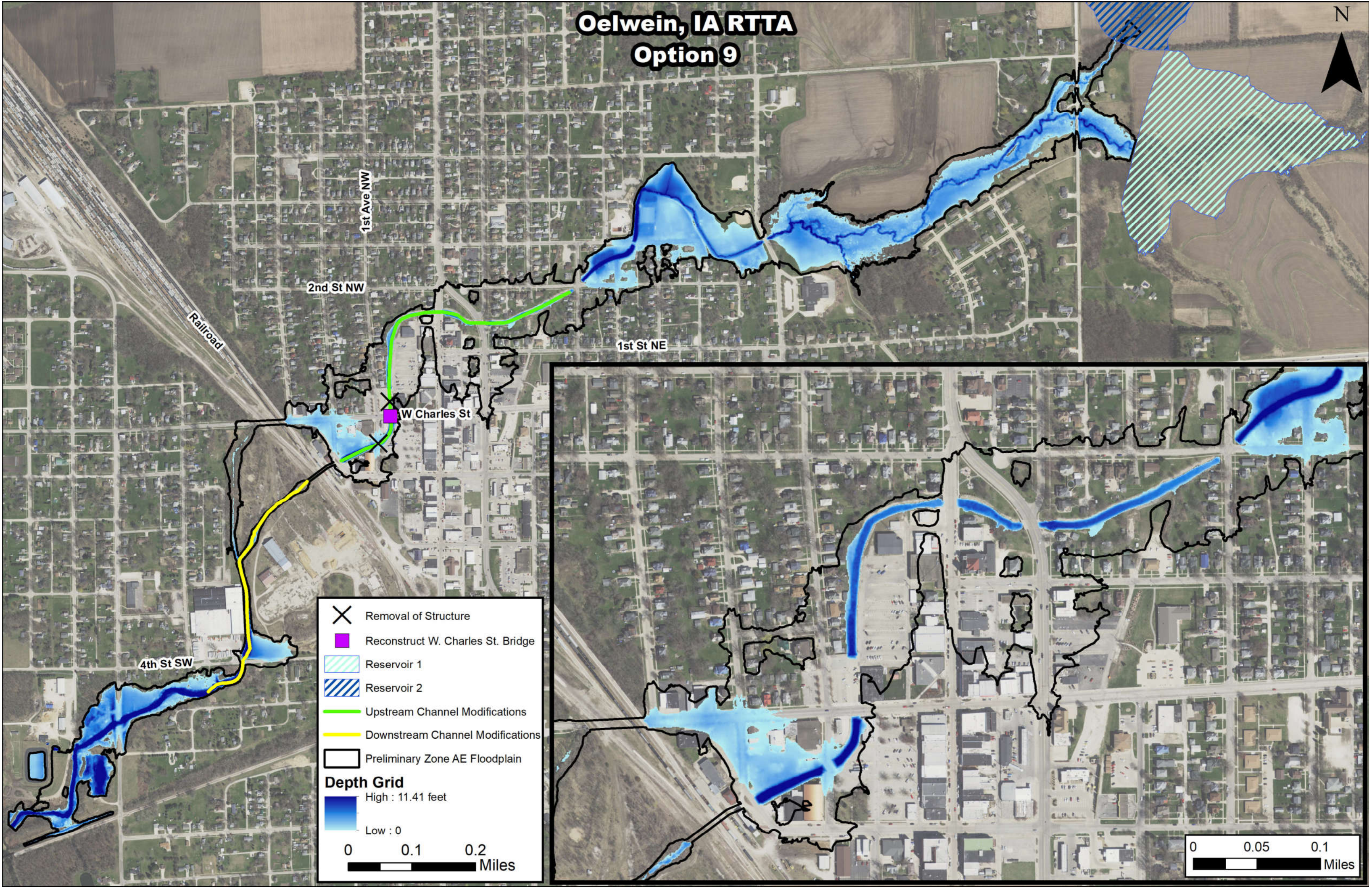
High : 12.56 feet

Low : 0

0 0.1 0.2 Miles

0 0.05 0.1 Miles

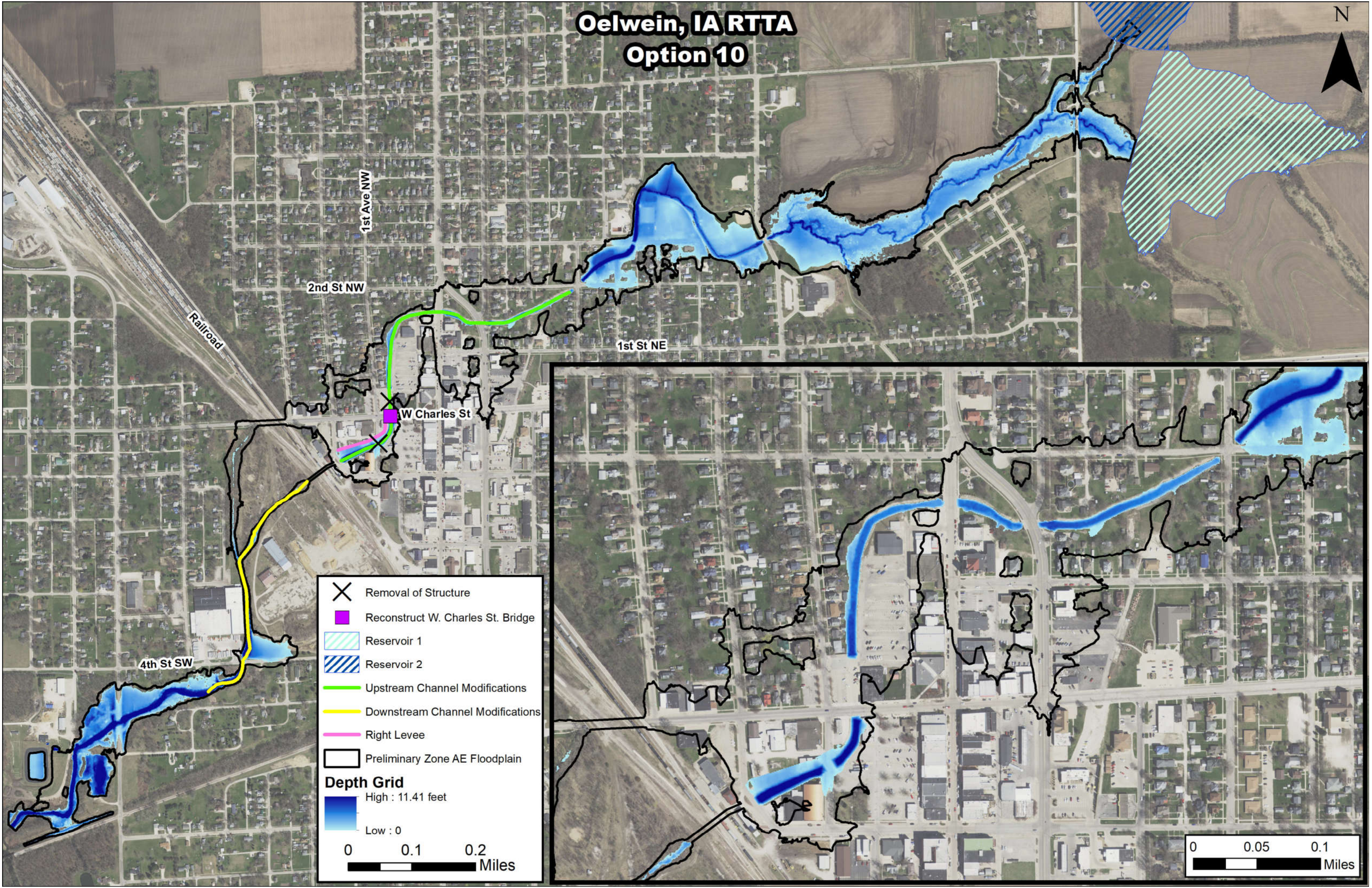
Oelwein, IA RTTA Option 9



X	Removal of Structure	
■	Reconstruct W. Charles St. Bridge	
▨	Reservoir 1	
▩	Reservoir 2	
—	Upstream Channel Modifications	
—	Downstream Channel Modifications	
□	Preliminary Zone AE Floodplain	
Depth Grid		
■	High : 11.41 feet	
■	Low : 0	
0	0.1	0.2
Miles		

0	0.05	0.1
Miles		

Oelwein, IA RTTA Option 10



	Removal of Structure
	Reconstruct W. Charles St. Bridge
	Reservoir 1
	Reservoir 2
	Upstream Channel Modifications
	Downstream Channel Modifications
	Right Levee
	Preliminary Zone AE Floodplain
Depth Grid	
	High : 11.41 feet
	Low : 0
0 0.1 0.2 Miles	

0	0.05	0.1
Miles		