City of Dyersville

Appendix A:
Building Resilient Infrastructure in Communities (BRIC) Scoping Study

FEMA Building Resilient Infrastructure and Communities (BRIC) Scoping Study for the City of Dyersville

City of Dyersville, Iowa

November 22, 2024

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IV. ACRONYMS/ABBREVIATIONS

AC	Acres
BANCS	Bank Assessment for Non-Point Source Consequences of Sediment
BCA	Benefit Cost Analysis
BCR	Benefit Cost Ratio
BEHI	Bank Erosion Hazard Index
BRIC	Building Resilient Infrastructure and Communities
CFS	Cubic Feet per Second (ft^3 /s)
DEM	Digital Elevation Model
FEMA	Federal Emergency Management Agency
FFE	Finished Floor Elevation (as measured at a structure's front door)
FIRM	Flood Insurance Rate Maps
FIS	Flood Insurance Study
FT	Feet
GIS	Geographic Information System
HEC	Hydrologic Engineering Center
HEC-RAS	Hydrologic Engineering Center River Analysis System
IDNR	Iowa Department of Natural Resources
IFIS	Iowa Flood Information System
IPaC	Information for Planning and Consultation
IRRT	Iowa River Restoration Toolbox
KM	Kilometers
LF	Linear Feet
LiDAR	Light Detection and Ranging
NBS	Near Bank Stress
NCD	Natural Channel Design
NFHL	National Flood Hazard Layer
NFIP	National Flood Insurance Program
NFMR	North Fork Maquoketa River
NFMR	North Fork Maquoketa River
NLCD	National Landcover Dataset
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resource Conservation Services
NWI	National Wetland Inventory
NWS	National Weather Service
OSA	Office of the State Archaeologist
PIN	Parcel Identification Number
SQ MI	Square Miles (mi^2)
SSURGO	Soil Survey Geographic Database
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Service
WSEL	Water Surface Elevation

1 EXECUTIVE SUMMARY

1.1 BACKGROUND AND SCOPE

The City of Dyersville contends with regular flooding of the downtown area from the North Fork Maquoketa River (NFMR), a non-meandered stream flowing through the center of the City. The NFMR receives flow from Hewitt Creek at the north end of town, and Bear Creek flows through the southwest portion of town before intersecting with NFMR. All three of these rivers affect flooding in Dyersville, with the NFMR being the primary contributor. These floods impact properties even during lower-severity storm events, such as a 25-year or more frequent events, and the flooding impacts both public and private properties.

Dyersville was awarded a Building Resilient Infrastructure and Communities (BRIC) Project Scoping Grant for the purpose of developing a scoping study for flood mitigation. The goal of this study is multifaceted and comprehensive in its approach to (1) develop and model existing conditions and proposed mitigation alternatives, (2) develop a conceptual cost/benefit opinion using FEMA's BCA Toolkit and conventional engineering project estimation, (3) provide guidance on preferred nature-base solutions and mitigation practices using conceptualized study results, and (4) outline feasible funding opportunities to finance preferred nature-based solutions and mitigation practices proposed after conceptual study results. This report summarizes the results of the Scoping Study and provides recommendations on how to move forward, including alternative funding opportunities.

The City has expressed great interest in the use of nature-based solutions to help combat flooding within their community. Floodplain, stream, and wetland restoration can be readily incorporated into the proposed alternatives by increasing areas of detention upstream and increasing channel conveyance within the City. Compared with traditional gray infrastructure, which typically serves the single purpose for which it was designed, nature-based solutions offer additional community and ecosystem service benefits.

1.2 PROPOSED ALTERNATIVES

Developing the proposed alternatives was an iterative approach. Feedback from the City, public outreach events, and initial data collection refined the list of potential flood mitigation alternatives. Ultimately, twelve alternatives were considered in this study:

NF-01 (Upstream Flood Detention)
NF-02 (Floodplain Excavation East of 2nd Street)
NF-03 (2nd Street Bridge Modification)
NF-04 (Floodplain Excavation West of 2nd Street)
NF-05 (Lower 1st Street Road Profile)
NF-06 (Floodplain Excavation at Westside Park)
NF-07 (Berm Removal and Floodplain Excavation at Westside Park)
NF-08 (Levee and Pump at Candy Cane Park)
NF-09 (Floodplain Excavation South of Candy Cane Park)
NF-10 (Floodplain Excavation South of Highway 20)
NF-11 (Floodplain Excavation South of Railroad)
NF-12 (Property Acquisition/Relocation)

These alternatives aim to provide flood detention upstream of the City and to increase floodwater conveyance through the City. Both of these objectives are primarily achieved via floodplain excavation on available land. Stream, floodplain, and riparian habitat restoration is proposed in conjunction with the excavation to provide additional ecological benefits.

To further develop the proposed alternatives, a conceptual design was created for each identified practice. The primary cost element in most of the proposed alternatives is excavation and hauling of material, followed by stream restoration, riparian habitat establishment, and mobilization. The conceptual designs used aerial imagery, elevation data, and assumed dimensions to quantify the design elements. Unit costs were assigned to the quantities to develop conceptual cost estimates. These design quantities and costs provide a high-level idea of what each project entails and were used to analyze the feasibility of each practice.

1.3 ALTERNATIVES ANALYSIS

A hydraulic analysis was completed for each of the proposed alternatives. First, an existing conditions model was developed and refined using data from a variety of sources. Then, separate scenarios were created for the proposed alternatives to model the impact produced by each individual practice. The changes were modeled by adjusting the discharge rates, editing the cross-sectional geometry, and revising the structure properties. The proposed models were then run individually to generate new floodplain boundaries and correlated water surface elevations. These results were compared with the existing conditions model to determine the change in flood depth at impacted structures.

The results from the hydraulic modeling – along with structure properties, design data, and cost information – were entered into the BCA Toolkit to calculate the proposed benefit compared to the estimated cost of a natural disaster mitigation project. The BCA Toolkit uses the input data to quantify the structural, social, and ecological benefits of each proposed practice. The sum of the benefits is divided by the estimated cost to calculate the benefit-cost ratio (BCR) of each proposed alternative. To be eligible for BRIC funding, a proposed project must be assessed using the BCA Toolkit, and the BCR must be greater than 1.0.

Using the results from the hydraulic analysis and BCA Toolkit, the alternatives were compared against the following criteria to determine the recommended projects:

- Structural impact
- Ecosystem Services Benefits
- Benefit Cost Ratio
- City Input

1.4 RECOMMENDATIONS

To be eligible for BRIC funding, a proposed project must show structural benefit and have a BCR above 1.0. Not only do projects NF-07, NF-09, NF-10, and NF-12 have a BCR above 1.0, but they are beneficial according to all the analysis considerations. It is recommended the City pursue BRIC funding for implementation of these four projects.

Projects NF-01, NF-02, and NF-04 are favorable because their BCR is greater than 1.0. These practices show high ecological and social value; however, preliminary modeling indicates they do not generate a structural impact. Because of their significant environmental impact, it is recommended the City pursue these three projects using alternate funding sources.

Projects NF-06 and NF-11 do not meet the BCR threshold. Although their impact is limited, these practices still provide streambank stabilization and social benefit. While not a priority, it is recommended the City also pursue these two projects utilizing different funding sources. Constructing these alternatives in conjunction with other projects has the potential to reduce the construction costs compared to if the projects are constructed individually.

To continue toward project implementation, the City should prioritize and determine which projects to pursue, engage the community and solicit feedback, determine funding sources, and seek engineering design services.

2 INTRODUCTION

2.1 PROJECT BACKGROUND

Dyersville is a community that is all too familiar with floods. The North Fork Maquoketa River (NFMR), fed to the northeast by Hewitt Creek, passes through the heart of downtown Dyersville. Flooding from the NFMR impacts the downtown commercial district, residential structures, community businesses, school buildings, churches, farm fields, two city parks, and the City's wastewater treatment facility.

Within the City, much of the river is highly urbanized, passing beneath six bridges before flowing out of the study area south of the Highway 20 overpass. These bridges include four (4) motor vehicle, one (1) Canadian National Railway, and one (1) pedestrian bridge. The bridges, especially the Canadian National Railway bridge and the Beltline Road bridge, are controlling features along the NFMR because of their built-up embankments and restricted flow openings.

Bear Creek also flows into the city, entering from the northwest and converging with the NFMR just south of Candy Cane Park. Generally, this creek is less urbanized and primarily surrounded by agricultural fields. Most structures to the south of the creek are located on a bluff, protected from floodwaters, and structures north of the creek generally coincide with the NFMR floodplain. During this study, the NFMR was determined to be the primary driver of flood impacts and is therefore the focus of the report. See Figure 1 for map of the project study area and **Appendix A,** Figure A1 for a map of contributing watersheds.

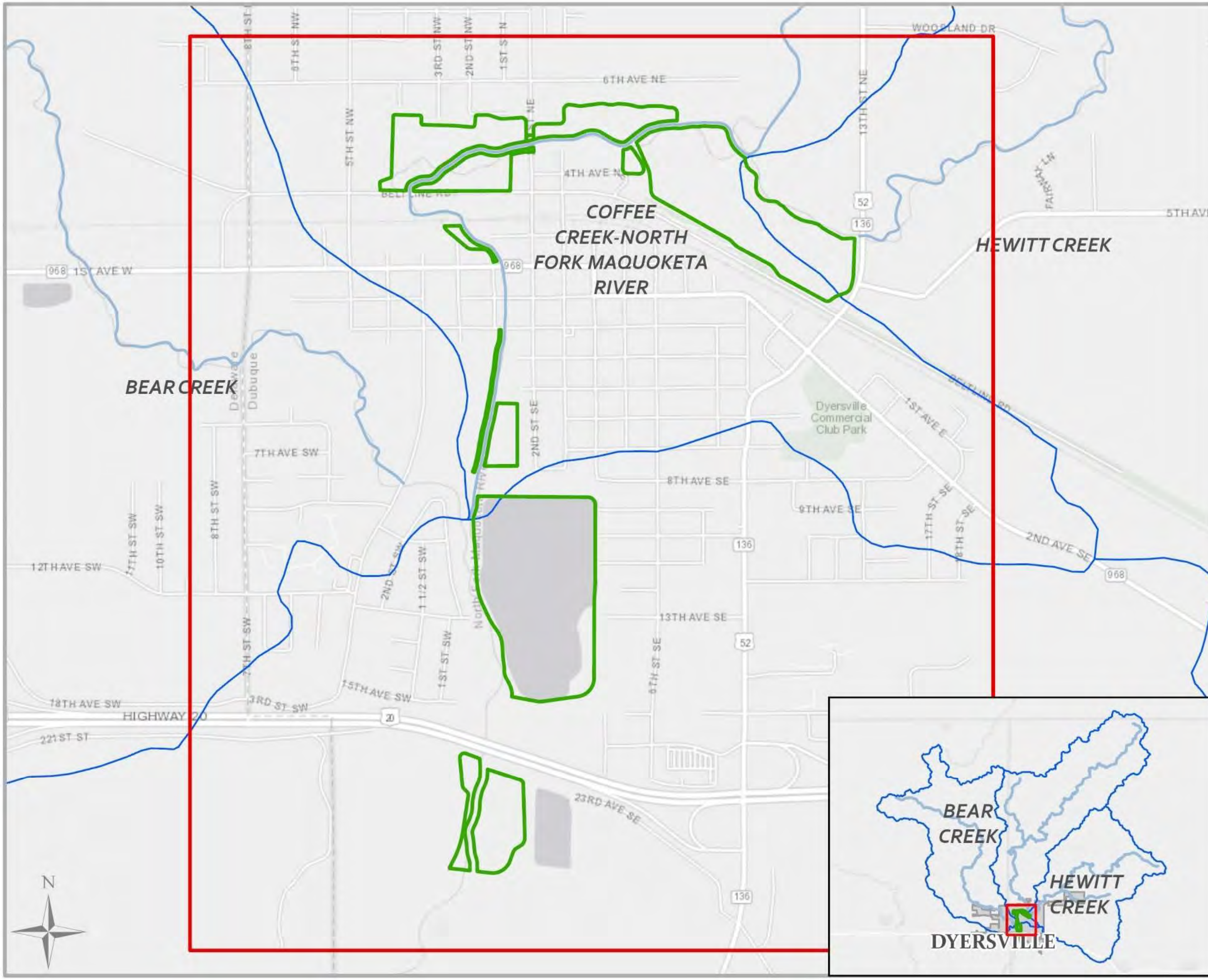
Existing gray infrastructure alone has proven inadequate to solve flooding issues in Dyersville. Within the last decade, City leadership has advocated for the use of nature-based solutions to help combat flooding while also improving the quality of life for residents in and around the community. In fact, the City has recently undertaken two projects of this nature, including the Bear Creek Restoration and the Field of Dreams Stormwater Wetland #1. The Bear Creek project helped restore over 5 acres of riparian buffer and 1,400 linear feet of stream directly adjacent to Westside Park. The stormwater wetland project helps treat urban runoff prior to discharging into the NFMR. The City values the additional benefits provided by green infrastructure solutions.

2.2 SCOPE AND GOALS OF STUDY

This study assesses flooding from the NFMR within the City of Dyersville. Although protecting public and private properties from flooding is the primary goal, this study also aims to quantify other social and ecosystem services that can be implemented in tandem with flood reduction efforts.

The goal of reducing flooding impacts on homes, businesses, and municipal infrastructure within the City of Dyersville can be achieved by lowering the water surface elevation during high flow events. In addition to reviewing the existing flood effects, this study proposes several potential flood mitigation alternatives and assesses their ability to impact the flood elevation. This report summarizes the alternatives considered, details the modeling and analysis process, presents conceptual designs and costs for feasible alternatives, utilizes the FEMA BCA toolkit, and discusses potential funding sources for the recommended alternatives.

Figure 1
Study Area



DESCRIPTION

Green Infrastructure Flood Mitigation
Project Scoping Study
City of Dyersville
Dyersville, IA

Map Creator: Jade Allen, Katie Goff

Service Layer Credits: Iowa DNR, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA, Esri, HERE, Garmin, USGS, EPA, NPS
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Date Exported: 11/20/2024
Y:\Projects\Watershed\DYS_23010\GIS\Dyersville_BCA\BCA\

Legend

- Study Area Potential Projects
- HUC12 Watersheds
- Stream Centerlines

0 500 1,000 2,000
Feet

2.3 HISTORIC FLOODING EVENTS

The NFMR is a perennial river that has experienced localized flooding during high rain and high flow events. Publicly available data catalogues the flooding events, which are often brought on by prolonged, heavy storms or rain-on-snow events in the spring and summer months. The downtown area between the Canadian National Railway bridge and 3rd Ave SE and between the City's Westside and Candy Cane parks are the most heavily impacted.

The FEMA Special Flood Hazard Area shows a total of 301 buildings affected by the 100-year flood. Of those 301 buildings, 234 buildings are directly impacted while an additional 67 buildings are indirectly impacted by restricted access due to high water cutting off access routes. These directly impacted buildings include residential buildings, businesses, Basilica of St. Francis Xavier, National Farm Toy Museum, Beckman Catholic School, St. Francis Xavier School, Textile Brewing Company, Westside Park, and Candy Cane Park. Buildings that are indirectly impacted include residential housing, businesses, MercyOne Dyersville Medical Center, Dyersville Elementary School, and Dyersville Fire Department.

As of the writing of this report, data collection at Dyersville is limited because the nearest rain gage only recently began delivering data on April 3rd, 2021. The following rainfall totals come from the gage installed on the southern edge of Dyersville near the Highway 20 overpass.

June 23, 2024
Approximately 2.10" of rainfall was recorded.

August 9, 2021
Approximately 2.07" of rainfall was recorded.

November 4-5, 2022
Approximately 1.95" of rainfall was recorded. The National Weather Service reported a large swath of heavy rainfall that stretched from Ottumwa to Dubuque with totals ranging between 1-4" of rain. (https://www.weather.gov/dvn/summary_110522)

The geographically nearest rain gage with data recorded from February 1, 1951, to present day is at the Dubuque Regional Airport. To provide a broader overview of local storm data, information on the largest storms from the past twenty-five years are listed below. Table 1 notes the highest daily precipitation totals collected from the Dubuque Regional Airport rain gage.

July 27-28, 2011
Approximately 10.74" of rainfall was recorded. The National Weather Service reported this rain event was the heaviest along the Highway 20 corridor between Dyersville and Dubuque. This rainfall was record-breaking with the most rainfall ever on a single day in Dubuque according to the National Weather Service. (https://www.weather.gov/dvn/072711_dubuqueflashflood)

August 21-22, 2002
Approximately 8.96" of rainfall was recorded.

July 22-23, 2010
Approximately 7.43" of rainfall was recorded. The National Weather Service reported heavy rains of 8-12 inches fell over three days along the Highway 20 corridor between Waterloo and Dubuque causing the dam at Lake Delhi to fail. (https://www.weather.gov/dvn/07232010_extremerainfall_hwy20corridor)

June 3-4, 2002
Approximately 6.42" of rainfall was recorded. The USGS compiled a report in 2004 detailing severe flooding in the Maquoketa River Basin. At the time, this was the largest known flood in the North Fork Maquoketa River Basin. Flood of June 4-5, 2002, in the Maquoketa River Basin, East-Central Iowa (usgs.gov)

In a precipitation driven stream stream-system, storm events often occur overnight. In addition, some weather systems may produce storms that continue for several consecutive days. Therefore, these longer events are not accounted for in daily total, so multiple successive days must be evaluated to assess the larger precipitation impact.

Table 1: Top 10 Daily Rain Gage data from Dubuque Regional Airport Rain Gage (USW00094908) from the NOAA Regional Climate Center 1951 – Present (2024)

Date	Daily Total Precipitation (in)	National Weather Service, Additional Information
September 14, 1967	8.85	
July 27, 2011	7.47	Most rainfall ever on July 27th in Dubuque. Heaviest rainfall from Dyersville to Dubuque.
July 1, 1961	6.28	
August 21, 2002	5.99	
November 2, 1961	4.79	
July 23, 2010	4.59	8-12" of rainfall from July 22-24 along and north of Highway 20 corridor from Waterloo to Dubuque. Record flooding causing Dehi Lake dam failure.
September 12, 1961 & May 6, 1960	4.37	
July 8, 1951	4.36	
July 5, 1993 & July 17, 1977	3.91	The Great Flood of 1993. (https://www.weather.gov/dvn/071993_greatflood)
June 13, 2000	3.84	

2.4 ADDITIONAL REFERENCES

The USGS completed a report about the Maquoketa River Basin flooding of June 4-5, 2002. This report provided flood history of the Maquoketa River Basin over decades, measured flow rates and calculated damages during numerous flood events[1].

FEMA Flood Insurance Study (FIS) (19061CV000C) dated August 10, 2021. This report provided additional flow rates to compare with the StreamStats flows used in the existing conditions model created for this study.

[1] *Eash, D.A., 2005, Flood of June 4-5, 2002, in the Maquoketa River Basin, east-central Iowa: U.S. Geological Survey Open-File Report 2004-1250, 29 p.*

3 DATA COLLECTION

3.1 DESKTOP SURVEY

Geographic information systems (GIS) and other publicly available, remote-based data sources were used throughout this project. The data used includes ortho-imagery, flood zone maps, National Wetland Inventory (NWI) maps, Web Soil Survey, LiDAR and topographic maps. Hydrologic and climatic data from the United States Geological Survey (USGS), National Weather Service (NWS) and the Iowa Flood Information System (IFIS) were also used to develop the hydrologic and hydraulic models used in this analysis.

3.2 PUBLIC OUTREACH

Qualitative data was collected for this scoping study through both in-person and digital methods. The purpose of public outreach was twofold: (1) to obtain oral accounts of flooding concerns in the community, and (2) to communicate the importance and impact of completed and proposed watershed improvement projects.

A project website was created for this scoping study. The website, www.onewatervision.com, provides information about the project and watershed improvements, showcasing project partners and awards won by the city. A unique email address was established for residents to communicate directly with the project team. The *Water Words s*urvey, designed for fun and engagement, aims to prompt residents to reflect on their relationship with water and was utilized at all the events detailed below.

The following events were conducted from May 2023 through August 2024 in support of the public outreach phase of this scoping study.

- The City of Dyersville was honored with the River Town of the Year award in 2023 by the Iowa Rivers Revival non-profit organization. The award is granted to communities in Iowa that demonstrate a commitment to regional and local watershed improvements. During the recognition event on May 31, 2023, about 75 attendees toured various project sites and a float down the NFMR. The day concluded with an after-party at Textile Brewing, which was attended by around 50 people.

- On September 17, 2023, the project team represented the City of Dyersville at an NRCS Conservation Day at Westside Park in Dyersville. Several information boards were displayed that highlighted existing and planned watershed improvement projects. Around 25 local individuals and families engaged in discussions with our team about conservation in the watershed.

- A formal public open house was held at the Social Center in Dyersville on June 13, 2024. This event's purpose was to raise awareness about the scoping study through conversations, visual displays of proposed watershed improvement concepts, and modeling boards. Guests were treated with free giveaways and children were engaged through water-themed crafts and a marble watershed game. Marketing efforts for the event included a press release on radio and in local publications including the Telegraph Herald and Dyersville Commercial, flyers distributed in about 20 establishments around town, and promotional materials shared at the Women in Soil Conference on June 8, 2024. Additionally, yard signs were posted along the trail, and a Facebook event was created. Email invitations were sent to approximately 20 contacts, including local officials and representatives from various organizations. The event attracted 51 attendees, and a locally owned restaurant provided catering.

- The final event associated with this project was participation at Dyersville's Downtown Market on August 31, 2024. The project team assembled a variety of informational posters regarding modeling efforts completed during the scoping study. Many residents expressed excitement about the city's improvements, noting similarities with changes seen in Dubuque. Comments about the float park highlighted its potential for community enjoyment, while some attendees appreciated the opportunity to learn more about the projects, especially those who could not attend the open house. In total, 66 residents were engaged at this outreach event.

Over 260 community members in total engaged with the scoping study from May 2023 through September 2024. While many Dyersville residents are unaware that watershed improvements have been completed, residents were glad to hear improvements are underway as the majority of people engaged have experienced some degree of flooding in their lifetime.

3.3 FIELD ASSESSMENT

Field assessment was undertaken after key locations were identified by Dyersville city leaders and agency staff. The assessment included portions of the NFMR, Hewitt Creek, and Bear Creek (Figure 2). The field survey included:

- Walk through, photo, and video survey of identified reaches
- Survey of selected bridges and culverts
- Natural channel design geomorphic classification at selected cross sections, including identification of bankfull
- Stream sediment sampling, including grab samples and pavement/sub-pavement and point bar sieve analysis
- Documentation of eroding banks using the Bank Erosion Hazard Index (BEHI) and Near Bank Stress (NBS) – this data was used to estimate the contributions of sediment in cubic-yards or tons, per year using in the Bank Assessment for Non-Point Source Consequences of Sediment (BANCS) model
- General identification of other drivers of stability or instability, including head-cuts, degradation, aggradation, man-made and naturally occurring grade control structures (i.e. beaver dams), log jams, constrictions, and other potential blockages

Included in **Appendix B** is a copy of the Stream Channel Classification Form, results of the BANCS analysis, and a location map of where field work was completed. **Appendix C** is a Photo Log of select locations within the river corridor.

All references to “right bank” and “left bank” in this report refer to "river right" and "river left," meaning the orientation assumes that the observer is standing in the river looking downstream.

4 WATERSHED CHARACTERISTICS

4.1 STUDY SETTING

The City of Dyersville is located in northeastern Iowa, within eastern Delaware County and western Dubuque County, as shown in Figure A1. It is located within a rural area, surrounded by agricultural fields, and has a population of 4,477 as of the 2020 Census. Prominent structures within the City, either directly impacted by flooding or indirectly limited by restricted access during flood events, include:

- Basilica of St. Francis Xavier – directly impacted
- National Farm Toy Museum – directly impacted
- Beckman Catholic High School – directly impacted
- St Francis Xavier School – directly impacted
- Textile Brewing Company – directly impacted
- Westside Park – directly impacted
- Candy Cane Park – directly impacted
- MercyOne Dyersville Medical Center – limited access
- Dyersville Elementary School – limited access
- Dyersville Fire Department – limited access

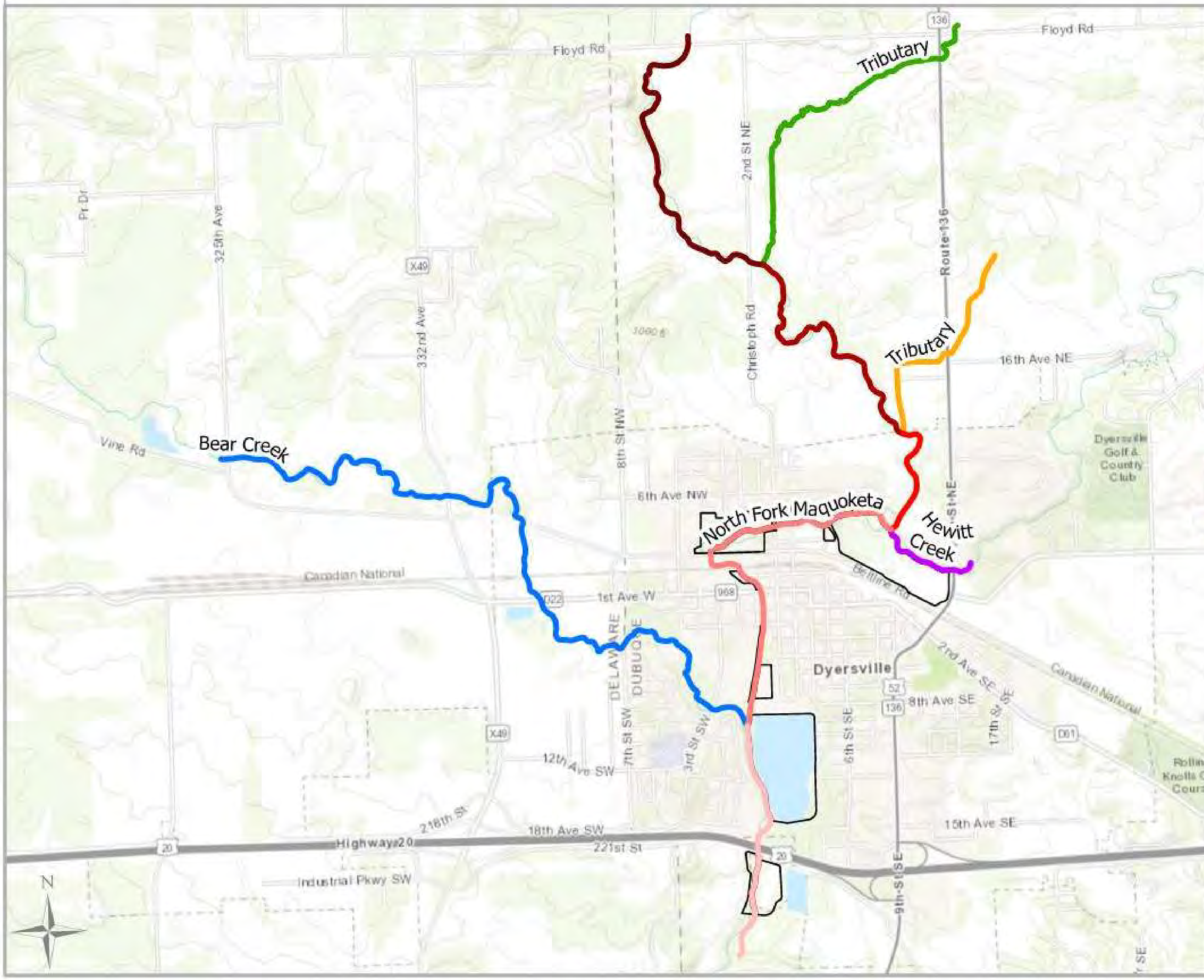
The studied watershed encompasses the Cities of Dyersville, New Vienna, and Luxemburg, as well as the surrounding agricultural land. Runoff from the agricultural land north of the city flows to Bear Creek in the western portion of the watershed, NFMR in the central area, and Hickory and Hewitt Creeks in the eastern section. Hickory Creek is a tributary to Hewitt Creek, and Hewitt Creek is a tributary to the NFMR. Hewitt Creek, Bear Creek, and NFMR all converge in Dyersville at the southern end of the study area. The downstream boundary of the study area is just south of where NFMR intersects Highway 20.

The overall drainage area for the study area is approximately 78,720 acres (123 sq. miles). Because of its size, the study area was broken into multiple reaches to more accurately model the river flows throughout the watershed. The reaches are listed from upstream to downstream in the following Table 2 and displayed in Figure 2. Note that the drainage areas along the North Fork are cumulative as the water flows downstream.

Table 2: River Reaches within the Dyersville BRIC Study Area

River Reach	Acres	Sq. Miles	Approximate Location
Reach NF5	25280	39.5	North Fork north of Floyd Road bridge
Reach t2	1561.6	2.44	Unnamed tributary east of Christoph Road bridge
Reach NF4	27200	42.5	North Fork south of Christoph Road bridge
Reach t1	313.6	0.49	Unnamed tributary west of Highway 52
Reach NF3	27712	43.3	North Fork north of Hewitt Creek confluence
Reach H1	22848	35.7	Hewitt Creek confluence
Reach NF2	51264	80.1	North Fork north of Bear Creek confluence
Reach B1	24128	37.7	Bear Creek confluence
Reach NF1	78720	123	North Fork end of study area (point south of Highway 20 Overpass)

Figure 2
Stream Reaches within the Study Area



DESCRIPTION

Green Infrastructure Flood Mitigation Project Scoping Study
City of Dyersville
Dyersville, IA

Map Creator: Katie Goff

Legend

- B1
- H1
- NF1
- NF2
- NF3
- NF4
- NF5
- t1
- t2
- Study Area Potential Projects

0 500 1,000 2,000
Feet

4.2 WATERSHED LAND USE

Land cover information for the watershed was obtained from the National Land Cover Database (NLCD). Outside of the developed city areas, which make up approximately 7% of the watershed, the study area is primarily agricultural land. Some patches of wooded areas are also present along the creeks. Approximately 83% of the watershed is cultivated crops, and an additional 5% is pasture. The following Table 3 shows the breakdown of land cover within the watershed. Figure 3 illustrates this breakdown.

Table 3: Breakdown of Land Cover within the Dyersville BRIC Study Area

Type	NLCD Color	NLCD Code	Area (km^2)	Area (ac)	Area (mi^2)	Coverage (%)
Open Water		11	0.32	79.07	0.12	0.1
Perennial Ice/Snow		12	0	0.00	0.00	0
Developed, Open Space		21	6.89	1702.55	2.66	2.18
Developed, Low Intensity		22	9.87	2438.93	3.81	3.13
Developed, Medium Intensity		23	5.16	1275.06	1.99	1.64
Developed, High Intensity		24	1.02	252.05	0.39	0.32
Barren Land (Rock/Sand/Clay)		31	1.22	301.47	0.47	0.39
Deciduous Forest		41	6.15	1519.70	2.37	1.95
Evergreen Forest		42	0.12	29.65	0.05	0.04
Mixed Forest		43	1.24	306.41	0.48	0.39
Shrub/Scrub		52	0.01	2.47	0.00	0
Grassland/Herbaceous		71	4.89	1208.34	1.89	1.55
Pasture/Hay		81	16.24	4012.99	6.27	5.15
Cultivated Crops		82	261.98	64736.57	101.15	83.04
Woody Wetlands		90	0.23	56.83	0.09	0.07
Emergent Herbaceous Wetlands		95	0.15	37.07	0.06	0.05
Total			315.47	77959.16	121.81	100

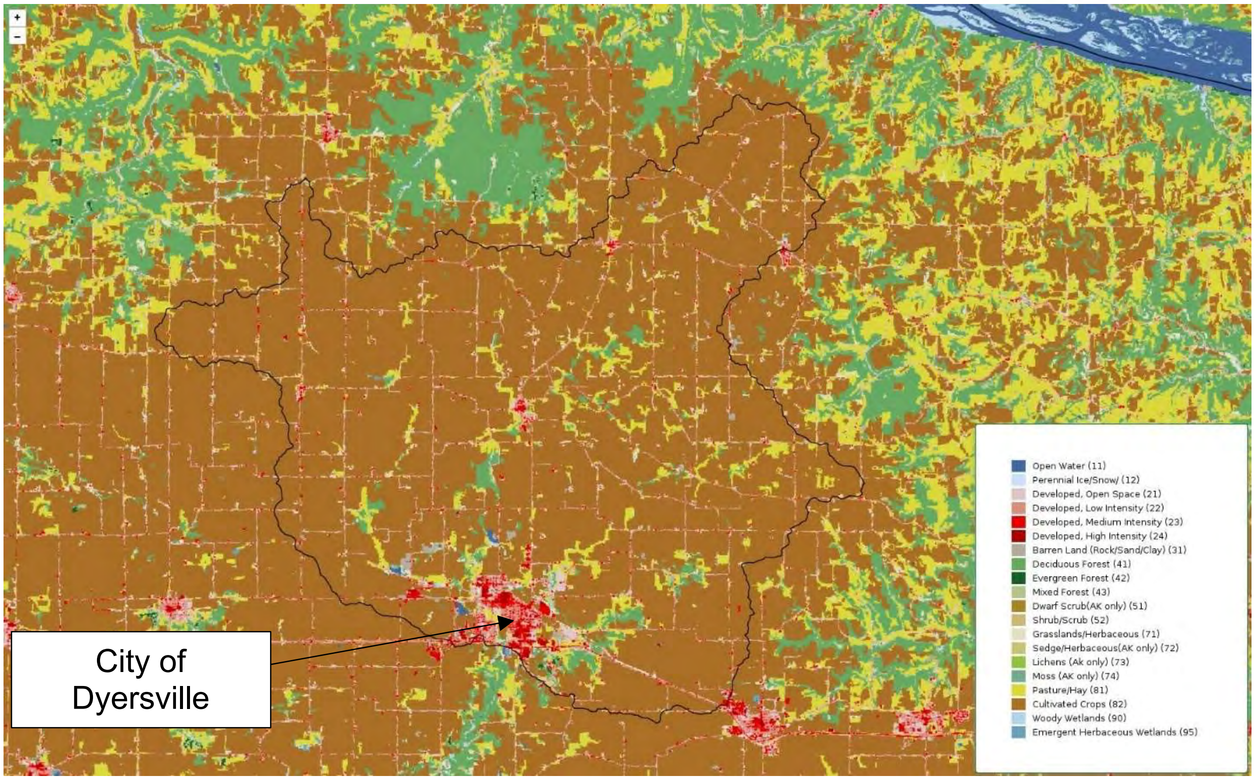


Figure 3: Map of Land Cover within the Dyersville BRIC Study Area

The study area is comprised of many soil types, ranging from clay loam to loamy sand, although it is predominately silt loam. The hydrologic soil groups range from A to D; hydrologic soil group C is the most prominent in the study area. See Figure A2 for detailed USDA-NRCS soil data from Web Soil Survey.

4.3 ENVIRONMENTAL CONDITIONS

4.3.1 Stream Assessment

A stream assessment was completed in October and November of 2023 to evaluate current stream conditions, drivers of stream instability, and potential for stream and floodplain restoration as part of a nature-based solution to flooding. While certain practice locations, such as NF-09 and NF-10 were not included in the original stream survey, the stream assessment serves to evaluate general stream conditions within the local watershed. Assessed areas include (**Appendix B,** Figure B1):

- Hewitt Creek
  - (HC1) - Near the Field of Dreams: northeast of Dyersville East Rd and Lansing Rd
  - (HC2) - Within Dyersville: east of 13th St NE to the confluence of Hewitt Creek and the NFMR

- North Fork Maquoketa River
  - (NFMR1) - Within Dyersville: east of 13th St NE and Woodland drive, downstream to the confluence with Hewitt Creek
  - (NFMR2) - Below the confluence with Hewitt Creek, downstream to the confluence with Bear Creek

- Bear Creek
  - (BC1) - From 1st Ave West downstream to the confluence with the NFMR

In stream and floodplain restoration, the determination of bankfull is of particular importance. In a stable stream system, bankfull is the channel stage (or discharge) at which a stream begins to overtop its banks onto the surrounding floodplain. It is often analogous with effective flow, which is the flow rate in a river that transports the largest volume of sediment over time. Because sediment erosion and deposition ultimately drive the channel form and structure, effective flow is also known as “channel forming flow.” Effective and bankfull flows typically have a recurrence interval of about 1 to 2 years, though typically approximately 1.5 years. For the purposes of this report, bankfull flow and effective flow are equivalent.

In a disturbed or degraded system, bankfull stage is often below the top of the channel banks due to stream incision. In such a system, bankfull determination can be challenging, and a variety of methods can be employed to determine what bankfull would be in a stable system. StreamStats and the Iowa Regional Curve use linear regression analysis at multiple sites to relate drainage area to bankfull-channel width, depth, cross-sectional area, and discharge. In the table below, StreamStats utilized the Southern Driftless physiographic region, except for HC1 where this region’s data was not available. HC1 is based on the Central Lowland physiographic region. The Iowa Regional curves utilized regression curves for non-urban (<10% impervious cover) cover types for the drainage area[2]. These methods serve as a good starting point; however, due to variability between stream systems, determination of bankfull using field indicators is the most accurate and reliable method. Table 4 compares the stream characteristics from these different sources.

Table 4: Comparison of Stream Characteristics from StreamStats, Iowa Regional Curve, and Field Survey

Location		StreamStats				Iowa Regional Curve				Field Indicated			
Reach	Drainage Area (mi^2)	Width (ft)	Depth (ft)	Area (ft^2)	Discharge (ft^3/s)	Width (ft)	Depth (ft)	Area (ft^2)	Discharge (ft^3/s)	Width (ft)	Depth (ft)	Area (ft^2)	Discharge (ft^3/s)
BC 1	37.7	63.1	3.33	202	822	42.1	2.81	118.3	418	42.08	2.49	104.81	444
HC 1	4.31	22.2	2.37	40.8	*	15.7	1.46	22.9	66.6	14.55	1.67	24.27	81
HC 2	35.7	62.4	3.29	197	797	41.0	2.77	113.6	399	48.21	2.41	115.99	418
NFMR 1	80.1	74.5	3.93	281	1240	59.2	3.54	166.4	790	49.75	3.76	187.86	776
NFMR 2	122	81.7	4.32	339	1570	71.7	4.02	288.2	1129	118.52	2.63	131.44	1094

*Data unavailable

The in-field stream assessment was completed using methodology consistent with NCD and the Iowa River Restoration Toolbox (IRRT). Generally, streams can be categorized as B-type and, less often, E- or C-type channels. Given the broad historic alluvial floodplain in which Dyersville resides, C-channels would be most common or expected in the geographic context. Stable C-channels exhibit a well-developed floodplain and moderate to high sinuosity that influences the bedform into a riffle/pool morphology. Well-developed point-bars are common features at the inside of a meander bend.

B-type channels are sometimes a stable stream-form; however, in this context, B-channels are indicative of streambed degradation (vertical instability) and subsequent channel widening as a response to incision. These channels are moderately entrenched, with less floodplain connection than a C-channel. See Table 5 for a summary of each assessed stream reach and **Appendix D** for the full Iowa River Restoration Toolbox assessment.

[2] Tanner D. Bonham, *Hydraulic Geometry Relationships and the Development of Bankfull Regional Curves for Iowa Streams* (Master’s thesis, Iowa State University, Major: Environmental Science, Program of Study Committee: Peter L. Moore, Thomas M. Isenhart, and Kristie J. Franz, 2022.

Table 5: Summary of Geomorphic Characteristics of Assessed Streams and Functionality

	BC1		HC1		HC2		NFMR1		NFMR2	
Metric	Existing Condition	Design Condition	Existing Condition	Design Condition	Existing Condition	Design Condition	Existing Condition	Design Condition	Existing Condition	Design Condition
Bank Height Ratio	1.57	1.00	1.23	1.00	2.61	1.00	1.80	1	1.20	1.00
Entrenchment Ratio	1.93	1.93	4.74	4.74	1.80	10.00	2.39	2.39	1.38	5.00
Bankfull Cross Sectional Area	104.80	104.80	24.30	24.30	116.20	116.20	188.1	188.1	392.00	392.00
Bankfull Discharge Design	443.00	443.00	81.00	81.00	418.00	418.00	776	776	1094.00	1094.00
Regional Curves - Bankfull Cross Sectional Area	117.44	117.44	23.10	23.10	112.74	112.74	206.62	206.62	283.25	283.25
Regional Curves - Bankfull Discharge	419.33	419.33	67.27	67.27	400.48	400.48	792.01	792.01	1129.58	1129.58
Bankfull Velocity	4.23	4.23	3.33	3.33	3.60	3.60	4.13	4.13	2.79	2.79
Schumm Channel Evolution Stage (Select from drop-down list)	Stage V	Stage VI	Stage III	Stage VI	Stage IV	Stage VI	Stage IV	Stage VI	Stage V	Stage VI
Dominant Bank Erosion Hazard Index (BEHI) Rating (Select from drop-down list)	High	Low	Moderate	Low	Very High	Low	Moderate	Low	High	Low
Minimum Buffer Width (Measured from Outside Edge of Belt Width)	Perennial Vegetation throughout Belt Width	Perennial Vegetation >50 feet beyond Belt Width	Perennial Vegetation 0 to 50 feet beyond Belt Width	Perennial Vegetation >50 feet beyond Belt Width	Perennial Vegetation 0 to 50 feet beyond Belt Width	Perennial Vegetation >50 feet beyond Belt Width	Perennial Vegetation throughout Belt Width	Perennial Vegetation >50 feet beyond Belt Width	Perennial Vegetation throughout Belt Width	Perennial Vegetation >50 feet beyond Belt Width
Bankfull Width	42.08	42.08	14.55	17.00	48.20	48.20	49.75	60.00	146.80	100.00
Radius of Curvature	37.00	140.00	435.00	435.00	52.00	150.00	142.00	180.00	78.00	300.00
Meander Width Ratio	10.46	10.46	1.72	1.47	3.84	3.84	7.94	6.58	1.77	2.60
Pool to Pool Spacing Ratio	4.80	4.80	23.40	6.00	4.20	4.20	10.30	6.00	2.90	2.90
Pool Maximum Depth Ratio	2.21	2.21	1.80	1.80	2.49	2.49	1.72	1.72	1.60	1.60
Width to Depth Ratio	16.90	16.90	8.71	11.89	20.00	19.99	13.16	19.14	54.98	25.51
Water Surface Slope (%)	0.1900	0.1900	0.6000	0.4000	0.2100	0.2100	0.1800	0.1800	0.1980	0.1980
Bankfull Max Average Depth	3.73	3.73	2.84	2.84	4.09	4.09	4.86	4.86	5.33	5.33
Stream Type	B4c	B4c	E5	E5	B4c	C4	C4	C4	F5	C5
Channel Length	3894.00	3894.00	1386.00	1386.00	1612.00	1612.00	1382.00	1382.00	5032.00	5032.00
Channel Bed Material	Gravel (2 mm - 64 mm)	Gravel (2 mm - 64 mm)	Gravel (2 mm - 64 mm)	Gravel (2 mm - 64 mm)	Gravel (2 mm - 64 mm)	Gravel (2 mm - 64 mm)	Gravel (2 mm - 64 mm)	Gravel (2 mm - 64 mm)	Sand (0.062 mm - <2 mm)	Sand (0.062 mm - <2 mm)
Is this stream a single channel or multiple thread channel	Single Thread	Single Thread	Single Thread	Single Thread	Single Thread	Single Thread	Single Thread	Single Thread	Single Thread	Single Thread
Presence of Levees	No	No	No	No	No	No	No	No	No	No

Functional	This parameter is "functional"; no adjustment is necessary
FUNCTIONAL - AT RISK	This parameter is "Functional - At Risk"; should change this parameter by design to achieve a "Functional" performance standard
NON-FUNCTIONAL	This parameter is "Non-Functional"; should change this parameter by design to achieve a "Functional" or "Functional At-Risk performance

Generally, the assessed streams show signs of channel incision and bed degradation. In many areas, the channel banks are as high as ten feet from the streambed. Assuming a bankfull depth of 3 to 4 feet, this indicates the channel bed is now 6 to 7 feet lower than historic conditions. As the channel tries to reach a dynamic equilibrium, this incision causes bank erosion and a subsequent oversupply of sediment farther downstream. Streambank erosion is a major contributor to nutrients, particularly phosphorus (P). Excess P can speed up the process of eutrophication, leading to dangerous algal blooms and fish kills. Sediment contributions were estimated using the BANCS model, which uses the BEHI, NBS, bank height, and length of eroding bank to estimate erosion in tons per year. Approximately 47% of the assessed reach lengths exhibited a streambank with a BEHI of moderate, high, very high, or extreme. These eroding streambanks contribute an estimated total of 854 tons of sediment per year into the stream system. See Table 6 for a summary of the BANCS analysis and **Appendix B** for the RiverMorph BEHI Summary Report. A range of estimates of the total P load associated with the eroding sediments was calculated for each assessed reach based on research from *Total Phosphorus Loads in Iowa Rivers and Estimation of Stream Bank Phosphorus Contribution.*[3] See Figure 4 below for the graph of the range of values per reach.

Table 6: Summary of BANCS Analysis for Assessed Stream Banks

Reach	Assessed Reach Length (ft)	Reach Length with BEHI of moderate or worse (ft)	Percent of Eroding Banks	Total Loss of Sediment per foot of Reach (tons/yr)	Total Loss of Sediment (tons/yr)	Total Loss of Sediment (cu yds/yr)	
BC1	3894		2767	71%	0.0742	289.078	222.368
HC1	Not Assessed						
HC2	1612		530	33%	0.1530	246.593	189.687
NFMR1	1382		141	10%	0.0535	73.980	56.908
NFMR2	5032		2117	42%	0.0486	244.62	188.169

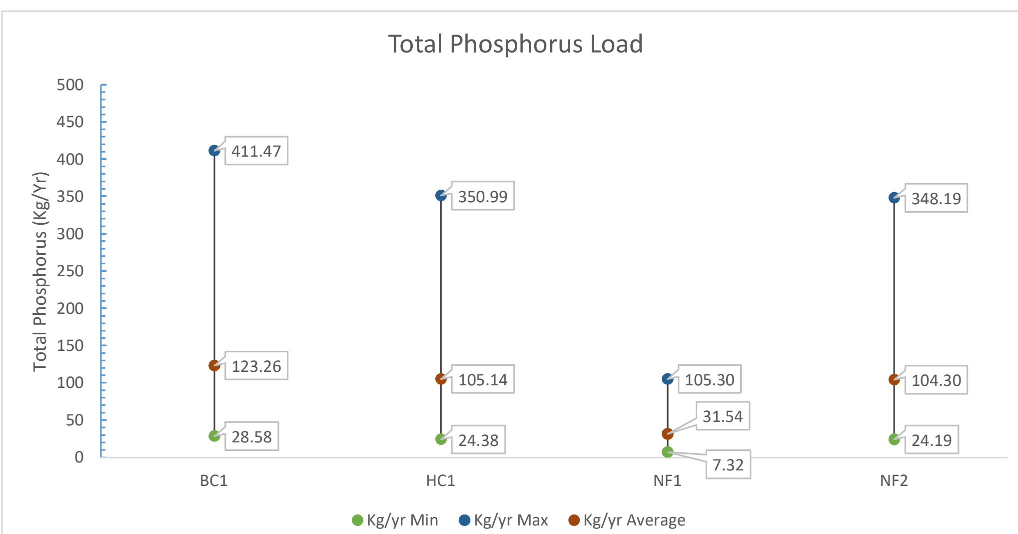


Figure 4: Estimated Total P Contribution from Assessed Eroding Streambanks

[3] Schilling, K., Wolter, C., & Isenhart, T. (2017). Total Phosphorus Loads in Iowa Rivers and Estimation of Stream Bank Phosphorus Contribution. Retrieved from Iowa Nutrient Research Center: https://www.cals.iastate.edu/inrc/projects/2017/total-phosphorus-loads-iowa-rivers-andestimation-stream-bank-phosphorus-contribution

4.3.2 Wetlands

The NWI was reviewed to identify wetlands within the watershed at a large scale (Figure A3). The NFMR watershed at Dyersville contains a variety of wetland types, including freshwater emergent, forested wetland, shrub-scrub wetland, and riverine wetland, as well as ponds. Many of these wetlands are associated with the streams, rivers, and headwaters of the watershed, forming in valleys and depressions within relatively broad and flat floodplains. Ponds are predominantly man-made for water retention and agricultural uses.

Because the NWI is mapped based on remote data sources, a wetland delineation will be required in any areas of proposed practices or where wetland impacts may be anticipated.

4.3.3 Threatened/Endangered Species

The IDNR Natural Areas Inventory was accessed to obtain county-wide records of state threatened, endangered, or special concern species. A total of 25 endangered, 50 threatened, and 54 special concern species are found within Delaware and Dubuque Counties (**Appendix E**). These species include five birds, six fish, ten freshwater mussels, two insects, four mammal species, three reptiles, five snails, and ninety-four plants. Because records include the entire county, many of these species are associated with the Mississippi River (e.g. *Ellipsaria lineolata*) or the unique algific-talus slopes found in the karst topography of the Paleozoic plateau further to the north and east (e.g. *Discus macclintocki*). Therefore, some species may not necessarily be found within the watershed or in close proximity to Dyersville.

The USFWS IPaC lists a total of ten federally-threatened, -endangered, or -candidate species for the NFMR watershed at Dyersville (**Appendix F).** These species include:

- Northern long-eared bat (*Myotis septentrionalis*) - Endangered
- Tricolored bat (*Perimyotis subflavus*) – Proposed Endangered
- Whooping crane (*Grus americana*) – Experimental population, non-essential
- Higgins eye mussel (*Lampsilis higginsii*) – Endangered
- Salamander mussel (*Simpsonaias ambigua*) – Proposed Endangered
- Sheepnose mussel (*Plethobasus cyphyus*) – Endangered
- Monarch butterfly (*Danaus plexippus*) – Candidate
- Western regal fritillary (*Argynnis idalia occidentalis*) – Proposed Threatened
- Eastern prairie fringed orchid (*Platanthera leucophaea*) – Threatened
- Northern wild monkshood (*Aconitum noveboracense*) – Threatened

No critical habitat has been designated for any species listed above within the watershed.

Opportunities for habitat enhancement for some of these species may exist when restoring rivers and floodplains, constructing wetlands, or otherwise improving water quality through green infrastructure improvements. For example, many mussel species require clean substrate and would benefit from capture of sediment from eroding streambanks and sheet flow from agricultural fields.

4.3.4 Cultural Resources

Site records were obtained by I-Sites Pro through the OSA to determine the presence of previously recorded archaeological sites, previous survey areas, notable locations, previously recorded architectural properties, National Register-listed sites and districts, and documented historic Native American locations. Currently available records indicate no archaeological resources located within the proposed practice areas. Six archaeological resources have been reported within one mile of the review area, including both historic Euro-American and prehistoric sites. If suitable practices are required to meet the goals of this funding, further consultation with the OSA should be undertaken to determine the need for additional cultural resources investigations.

4.3.5 FEMA Mapping and Flood Zones

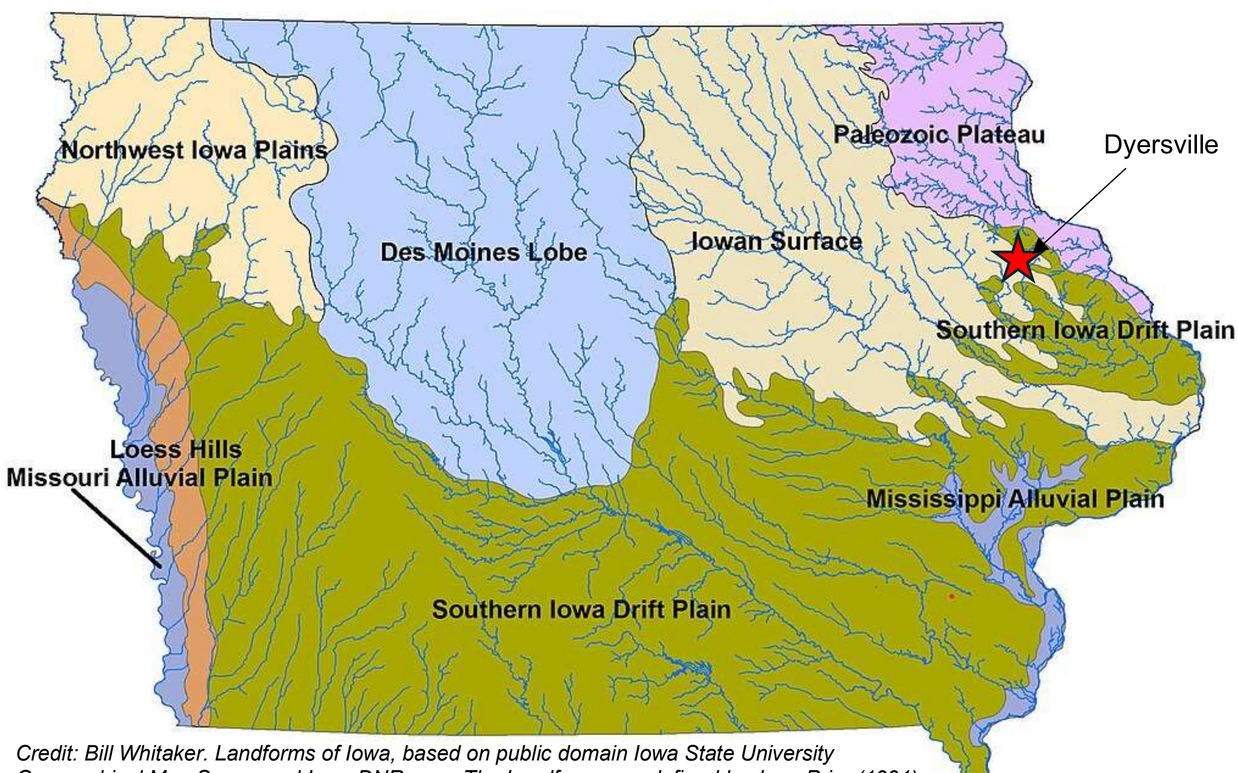
Significant portions of the City of Dyersville are within the 100-year floodplain, mapped as Zone AE. These areas include portions of the downtown, industrial and residential areas adjacent to Beltline Road, and residential areas east of Candy Cane Park. Regulatory floodway is also mapped with constructions at bridges and culverts and wider areas of floodway in more open, less developed areas (Figure A4).

4.4 GEOMORPHOLOGY

The City of Dyersville is located in northeastern Iowa within the Iowan Surface and Southern Iowa Drift Plain, although much of the contributing watershed lies within the Paleozoic Plateau. The Iowan Surface is characterized by gently rolling hills with long slopes and relatively low relief, while the Southern Iowa Drift Plain is defined by steeper hills, ravines, and is generally more rugged. In both landforms, drainage networks are defined with generally low-gradient streams. Soils were formed under prairie conditions and are generally fertile and high in organic content, with a loamy texture. Sporadic patches of loess can also be found within these landforms. Glacial erratics are common within the Iowan Surface, often encountered by farmers, and can be seen piled in corners of farm fields or along fence lines.

In contrast, the Paleozoic Plateau is defined by an abundance of steep-sloped rocky outcroppings of Paleozoic-age sedimentary bedrock, deep and narrow valleys, and fast-flowing streams. The limestone bedrock forms a karst topography prone to sinkholes, caves, underground drainage systems, and springs. Soils were formed under a mixture of forest and prairie cover with a more clay-rich B horizon.

The rolling hills near Dyersville are heavily used for agriculture, and the region's geomorphology has been influenced by farming practices. Within the watershed, terracing and other land management techniques are used to prevent soil erosion on the slopes of the hills, particularly because the karst features and loose, loess-rich soils can be vulnerable to erosion.



Credit: Bill Whitaker. Landforms of Iowa, based on public domain Iowa State University Geographical Map Server and Iowa DNR map. The Landforms are defined by Jean Prior (1991), ultimately based on Samuel Calvin's (1904) Drift Sheets of Iowa map.

Figure 5: Landforms of Iowa

4.5 HYDROLOGY

The City of Dyersville is defined by its rivers, including the NFMR, Bear Creek, and Hewitt Creek. The headwaters of the NFMR are located approximately 12 miles northeast of Dyersville, and the river generally flows southwest, entering Dyersville city limits from the north approximately 1,000 feet west of Highway 52. Hewitt Creek discharges into the North Fork of the Maquoketa River just south of Dyersville's northern city limit. NFMR continues flowing through central Dyersville and downtown before Bear Creek discharges into it from the west near Westside Park. The NFMR then extends south-southeast of Highway 20 and outside city limits. The NFMR flows south from the study area approximately 35 miles to its mouth at the Maquoketa River, at the City of Maquoketa. For the purposes of this study, the total drainage area, or watershed, is defined at a point on the NFMR just downstream of Highway 20. This study watershed is 78,720 acres (123 mi^2). Figure A1 shows the contributing watersheds to the project study area.

The steep topography of the Paleozoic Plateau in the upper watershed leads to the relatively flat stream valley where Dyersville is situated. This has serious implications for flooding within the City: water within the upper watershed flows readily into well-defined channels, leading to very flashy streams within the City. The intensity, duration, and exact location of a rainfall event determine if flooding will occur on Bear Creek, the NFMR, or both. Both of these rivers affect flooding in Dyersville, with the North Fork being the primary contributor and accounting for 69% (85.3 mi^2) of the total watershed area. Bear Creek contributes approximately 31% (37.7 mi^2) of the total watershed area. In terms of hydrology, watershed area can be used as a rough approximation for contributions of total flow into the larger system.

Flow rates used for this study used a combination of rates determined in previous FIS studies, as well as rates from StreamStats. For more information on selected rates, refer to Section 5.

4.6 INFRASTRUCTURE

The NFMR passes under six bridges within the City limits before flowing out of the study area south of the Highway 20 overpass. These bridges include four (4) motor vehicle, one (1) Canadian National Railway, and one (1) pedestrian bridge. The Canadian National Railway bridge and the Beltline Road bridge, respectively, are controlling features along the NFMR. These two bridges control the flow through the NFMR valley because they are built up higher than the surrounding ground and effectively restrict floodwaters during high flow events. These restrictive factors were considered in the modeling and proposed improvement determinations.

Bear Creek flows beneath four bridges within the City limits, including two (2) motor vehicle (one of which is strictly used to access a private residence) one (1) Canadian National Railway, and one (1) pedestrian bridge.

The rivers pass by the City's downtown area, residential structures, community businesses, school buildings, churches, farm fields, two city parks, and the City's wastewater treatment facility. The City's most recent major flood impact was in 2010 and is documented earlier in this report.

Dyersville has stormwater infrastructure that serves much of its business and residential areas. However, this analysis focused on flood impacts from riverine flooding. Stormwater infrastructure was not considered in the modeling.

5 HYDRAULIC AND HYDROLOGIC ANALYSIS

5.1 DATA SOURCES

5.1.1 Assessor Data

Detailed assessment information from the Delaware and Dubuque County assessor's offices was used for each building evaluated in the FEMA BCA toolkit. This data includes the Building Identified (PIN); Street Address; City, State, Zip Code, County; Structure Type; Building Type (Residential); Building Use (Non-residential); Building has Basement (Residential); First Floor Area (Non-Residential/Critical Facility – sq ft.); and Size of Building (sq ft.).

5.1.2 FIS Data

The current effective FIS for NFMR, document 19061CV000C, dated August 10, 2021, indicates Hewitt Creek, Bear Creek, and NFMR as flooding sources for the City of Dyersville. The NFMR is also noted as a source of Principal Flood Problems. The FIS study shows comparable flow rates as the StreamStats flow rates. This study uses StreamStats flow rates because more flow rate data is available (more frequent recurrence intervals), and the data is more location-specific to the evaluated reaches. This 2021 FIS report is focused primarily on flood statistics; it did not specify reasons the river floods or suggest actions to remediate the flooding.

5.1.3 GIS Data

GIS data was used extensively in preparation of the field assessment, hydraulic modeling, and evaluation of infrastructure used in the BCA analysis. Publically available data sources include:

- Historic and recent air photography (1930's through 2023)
- Topographic maps (USGS 24K and 2019 LiDAR)
- IDNR Stream Centerlines
- Iowa Landform Regions
- SSRUGO Soils
- NWI geodatabase
- Utilities within the City of Dyersville
- National Hydrography Dataset
- FEMA Flood Insurance Rate Maps
- Landcover

Derived products include:

- Building footprints
- Watershed boundaries
- Curve Number

5.1.4 LiDAR Data

2019 LiDAR data from the USGS was downloaded and utilized in HEC-RAS. LiDAR provides relatively accurate elevations across a large geographic area, in this case 1-meter DEM for the entire watershed. Though accuracy may be limited in areas of dense vegetation, the benefits of scale outweigh any limitation, especially when combined and validated with traditional survey techniques. Evaluated areas within the City of Dyersville are generally either paved, mowed, or bare agricultural field (at the time the data was collected), suggesting high confidence in the data accuracy.

5.1.5 StreamStats Data

StreamStats is a web-based tool provided by the USGS designed to aid in hydrologic and flood modeling by allowing users to quickly obtain streamflow statistics and basin characteristics for specific locations. It leverages a GIS interface to delineate watersheds, compute basin parameters, and provide streamflow estimates, making it especially useful for flood risk analysis and management. Key functions of StreamStats used in this analysis include:

- Watershed Delineation: A distinct watershed was delineated for each stream reach analyzed in the HEC-RAS model.
- Streamflow Statistics: Stream gauge data is limited within the assessed reaches and drainage areas, and StreamStats uses regional regression equations to predict flow values for ungauged locations based on similar watershed characteristics. Using these regression equations, peak flow estimates for various return intervals (e.g., 10-year, 50-year floods) were generated for each drainage area and used in the HEC-RAS model.
- Bankfull Statistics: StreamStats uses regional regression equations to indicate a stable channel geometry (width, depth, cross-sectional area) and discharge. This channel geometry was referenced to inform proposed alternatives, such as depth of floodplain excavation.

Flow rates for the existing model were gathered online from USGS StreamStats and compared to existing FIS flows from comparable areas. Both the flow rates from StreamStats and FIS were similar. The StreamStats flows were used for modeling because there was more flow rate data available, and the numbers showed a more conservative flow rate for the study. StreamStats data included the 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year storm flows; FIS data only provided the 10-, 50-, 100-, and 500-year storm flows.

5.1.6 Topographic Survey Data

This study compiled data from Origin Design, IDNR, site topographic survey, and recent LiDAR data from the USGS repository (2019). The original model from Origin Design focused on the area around the pedestrian bridge north of the Bear Creek confluence into the NFMR. The data from the Iowa Department of Natural Resources included a 2D HEC-RAS model of the City of Dyersville. The site topographic survey pinpointed choke points along the North Fork, specifically around bridges within the City limits, while the LiDAR data was used to provide the most accurate representation of current conditions in the area of interest.

The City also provided access to an online GIS map called Street Smart. Street Smart, by Cyclomedia, is an interactive web map created with high accuracy survey equipment mounted to a vehicle. Through Street Smart, the user can navigate the streets of the city and collect elevation data from a desktop survey. The FFE for each building, which was used in the flood impact analysis, was determined using the street optical survey data. The FFE was then compared to the flood elevations to create a GIS dataset of building footprints impacted by flooding up to the 25-yr storm event.

5.2 MODELING SOFTWARE

The modeling software used for hydraulic analysis was HEC-RAS v6.5. The project team also utilized Autodesk Civil3D 2024, HEC-HMS v4.11, RiverMorph v5.2, and Esri's ArcGIS Pro v3.3.2 software for additional analysis and data processing.

5.3 MODELING APPROACH

5.3.1 Model Geometry

The HEC-RAS existing conditions model was developed using LiDAR data and refined using survey data. A topographic survey was conducted along the NFMR at the 2nd Street NE bridge, Beltline Road bridge, and the Canadian National Railway bridge. The topographic survey in these locations was used to verify elevations along bridge and road profiles as well as the riverbed elevations since LiDAR data cannot accurately capture riverbed elevations. 2019 LiDAR data was used to create the surface of the model, while the topographic survey elevations were used to edit the riverbed and floodplain elevations and accurately model bridge deck and road centerline elevations. Additionally, the project team used survey data provided by the City to determine FFE of the structures impacted by the various storm events.

The Eocene project team also conducted a stream assessment and utilized the Iowa River Toolbox and RiverMorph to systematically analyze the NFMR. The data collected during the stream assessment was used to further refine the model geometry.

5.3.2 Model Flows

Flows for NFMR, Hewitt Creek, Bear Creek, and two unnamed tributaries were all gathered from USGS StreamStats and corroborated with the available FIS data in the study area.

5.3.3 Model Plans

Existing and proposed plans were run using a subcritical flow regime with a steady flow analysis. A model plan was created for each individual proposed alternative to analyze the potential impact each proposed practice may have on the inundation boundary and WSEL.

5.4 MODELING RESULTS

5.4.1 Existing Conditions

Using the available data, the existing conditions model was created and georeferenced to represent the current flood conditions in Dyersville. The NFMR flows from the northeast to the south through the City of Dyersville to the end of the study area immediately south of the Highway 20 overpass. Influent flows from Bear Creek and Hewitt Creek were included at their respective junctions with NFMR. Eight bridges span the NFMR within the study area, all of which were included in the model as structures. Six of these bridges convey the North Fork Maquoketa through the Dyersville city limits upstream of the Highway 20 overpass. None of the bridges overtop during an event; however, these structures present an obstruction to flow. The controlling structures are the Beltline Road bridge as well as the Canadian National Railroad bridge.

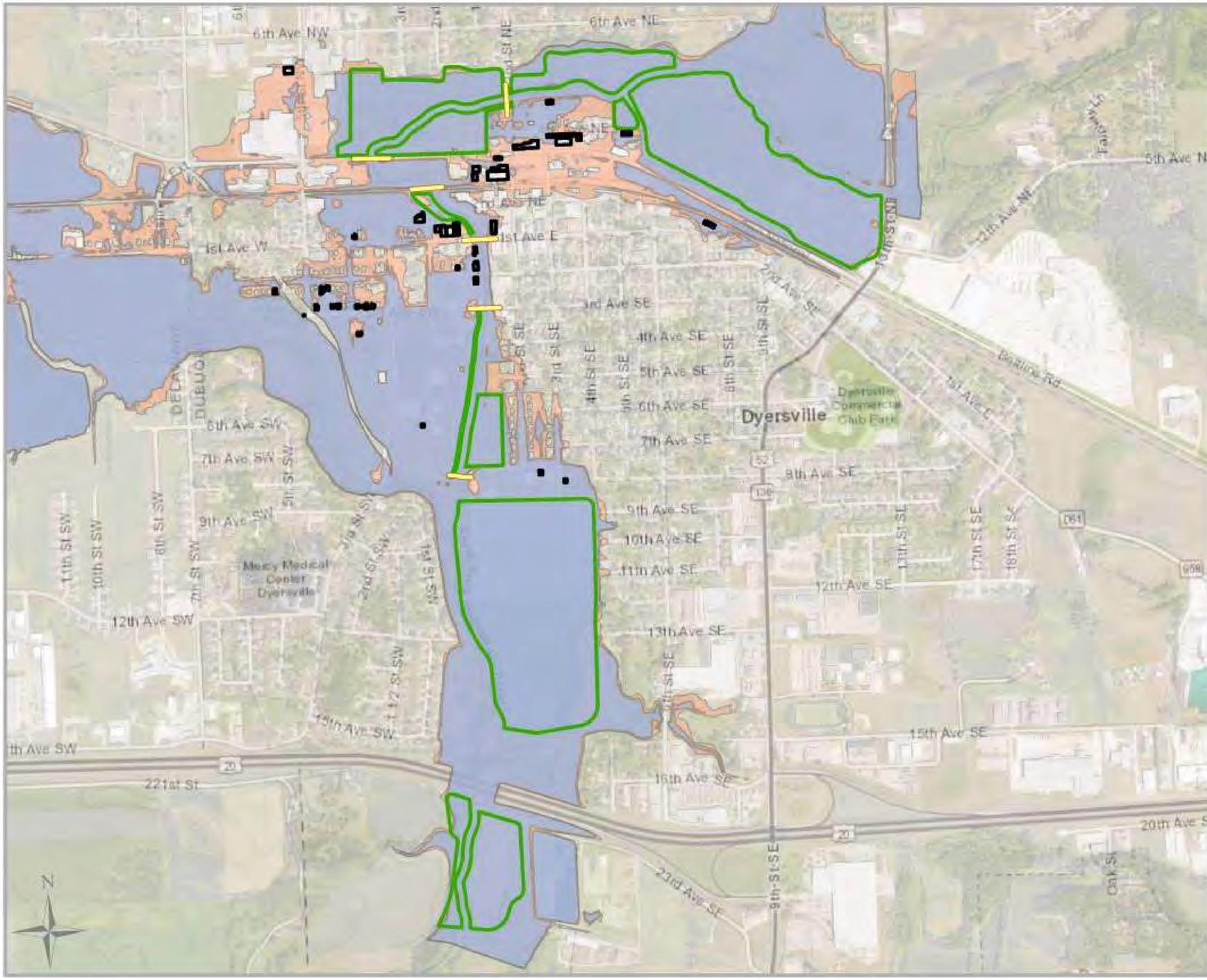
The existing conditions model generated flood footprints that appear consistent with the FEMA Flood Hazard inundation boundaries. The flood footprints generated by this study are generally slightly smaller than the FEMA footprints. Table 7 lists the number of structures within the flood areas of the modeled storm events and notes the difference between the model and the mapped FEMA Special Flood Hazard Area. These flood footprints are the only means of comparison between FEMA's data and our modeled HEC-RAS data; however, flood footprints are not as accurately represented in the model as water surface elevations. Further analysis of each structural flood impact was based on the finished first floor elevation from a location at the front door to determine if a structure was affected by a flood event. See Figure 6 for the modeled 25- and 100-year events.

Table 7: Number of Structures within the FEMA Special Flood Hazard Area and within the HEC-RAS Modeled Areas for the 5-, 10-, 25-, 100-Year Events.

Event Size	Number of Structures within Floodplain	
	FEMA Special Flood Hazard Area (as of 05/17/2021)	Eocene and Origin Updated HEC-RAS Modeling
5-yr	*Not mapped*	6
10-yr	*Not mapped*	11
25-yr	*Not mapped*	41
100-yr	234	179

Figure 6

Modeled 25-Year and 100-Year Floodplain and Existing Structures



DESCRIPTION

Green Infrastructure Flood Mitigation Project Scoping Study
City of Dyersville
Dyersville, IA

Map Creator: Katie Goff

Service Layer Credits: Iowa DNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA, USDA NAIP, Iowa State University GIS Facility
Coordinate System: NAD 1983 StatePlane Iowa North FIPS 1401 Feet

Legend

- Study Area Potential Projects
- Modeled 100-year Flood Area
- Modeled 25-year Flood Area
- Bridges
- Buildings Impacted by 100-year Flood

Building structures highlighted that are impacted by the 100-year flood are impacted at the finished first-floor elevation during the modeled 100-year flood recurrence interval.

0 325 650 1,300 Feet

5.4.2 Proposed Alternatives

Not all the proposed alternatives were modeled for this study. Instead, the potential alternatives were narrowed down based on feedback from the City, potential for impact, and preliminary calculations, and only the more feasible options were considered further.

Separate plans were created for the proposed alternatives to model the changes for each individual practice. The modeled changes included upstream detention, floodplain excavation, structure modification, and berm removal. Detention was conceptually modeled in Autodesk Storm and Sanitary Analysis to determine approximate storage volumes and flow rate changes, and the calculated values were plugged into the proposed HEC-RAS model. Floodplain excavation and berm removal were modeled by editing the cross-sectional geometry within the proposed models. Similarly, structure modifications were modeled by revising the structures and associated cross sections in the proposed model. The proposed models were then run individually to generate new floodplain boundaries and correlated water surface elevations. These results were compared with the existing model to determine how many structures were removed from the flood footprint and the change in flood depth at the structure location. Refer to Section 7 for more information on model results.

6 FEMA BCA TOOLKIT

The FEMA BCA Toolkit is an open-source extension for Microsoft Excel. This tool is used to calculate the proposed benefit compared to the engineer's estimated construction cost of a natural disaster mitigation project. It rates each project and provides a Benefit Cost Rating (BCR), which is the benefit of the proposed project divided by the cost. To be considered a feasible project, the BCR must be above the threshold of 1.0. If a project's BCR score is less than 1.0, its benefit does not outweigh the cost. To secure BRIC funding, the analysis is required to utilize the BCA Toolkit to assess a proposed project's feasibility; however, alternative funding opportunities are outlined in Section 9 to provide the City with additional options if they find a project to be favorable even if it does not exceed the BCR threshold.

The BCA Toolkit requires a large amount input data, including elevation data, structure information, design data, and estimated costs. The following sections outline the process and inputs required for the BCA Toolkit. The BCA Toolkit uses the input data to quantify the structural, social, and ecological benefits of each proposed practice. Although the structural benefits are more easily quantifiable, the ecological benefits prove to be a significant factor in determining the benefit of a given practice.

6.1 BCA PROCESS

The BCA analysis focused on structures with finished first floor elevations within the 5-, 10-, 25-, and 100-year recurrence intervals. An Excel spreadsheet was utilized to collect structure data from multiple sources and assemble the preliminary BCA information. The spreadsheet was initially populated with the GIS dataset of buildings impacted by flooding from a 25-year storm event. Using the data sources described in Section 5, the structure properties were compiled in the spreadsheet in preparation for use in the BCA Toolkit.

The hydraulic modeling further refined which structures would be assessed using the BCA Toolkit. If the modeling showed a structure was removed from one of the four major recurrence intervals, that structure's data was added to the BCA Toolkit for the associated alternative. Additionally, WSEL profile graphs were created for the existing conditions scenario and for each proposed practice to compare the finished floor elevation with the proposed WSEL. The profile graphs are compiled in Appendix G. This comparison of existing vs proposed elevations revealed if additional structures should be included in the BCA analysis.

A conceptual design was created for each proposed alternative to generate quantities and estimated costs. The estimated costs were also required as inputs in the BCA Toolkit.

Once the input data was collected, it was plugged into the BCA Toolkit for each proposed alternative.

6.2 BCA INPUT PARAMETERS

See Appendix G for a complete list of BCA inputs used in this analysis. In general, the BCA default values were found to be reasonable. Inputs requiring more in-depth analysis are described below.

6.2.1 WSEL and Discharge Before and After Mitigation

The BCA Toolkit requires water surface elevations (WSELs) and discharge (CFS) at each property for four (4) different storm events. For this analysis, the 5-year, 10-year, 25-year and 100-year storms were used in the BCA Toolkit. Values for the WSEL and discharge are required for the both the "before mitigation" and "after mitigation" scenarios for each property. For Property Acquisition projects, WSEL and discharge are not required for the "after mitigation" condition, as the structure no longer exists.

The WSEL at each analyzed property was taken from the Street Smart GIS map provided by the City. The project team used FEMA's high hazard zones to narrow the scope and determine which structures of interest should be analyzed. Finished floor elevations (FFE) were determined using Street Smart, then plotted on a chart in relation to the river centerline station.

6.2.2 Understanding the Toolkit

The BCA Toolkit analyzes the cost compared to the benefits, and it sums the structural, social, and ecological benefits. In order to accurately quantify the ecosystems benefit for the entirety of a single practice that impacted more than one structure, the ecosystems benefit information was applied to the first structure of each practice. For the subsequent structures in that practice, the ecosystems benefit information was left blank. Similarly, instead of having the project cost evenly split amongst each structure in a practice with multiple structures, the entire cost of the project was applied to the first structure in the practice. This method ensures costs and benefits were not double counted. The project team consulted with Jim Marwedel from the Iowa Department of Homeland Security and Emergency Management and Dakota Duran of the FEMA BCA Helpline to discuss the methodology; email correspondence dated 11/19/2024 confirms it is acceptable.

6.2.3 Ecosystem Service Benefits

The City of Dyersville has advocated for flood mitigation projects that also provide ecosystem services. Stream and floodplain restoration through floodplain excavation and nature-based stream stabilization have tremendous potential to both lower the WSEL and provide riparian buffer benefits. Practices NF-01, NFR-02, NF-04, NF-07, NF-09, and NF-10 involve excavation of the overbank channel to the approximate bankfull depth. All these excavated areas would be designated in part or in whole as Riparian for the following reasons:

- Before mitigation, these areas exhibit stream incision (BHR of 1.2 or greater), bank erosion (BEHI of moderate or worse throughout reach), or other degradation. After mitigation, the areas will be designed to flood during a bankfull event (BHR between 1-1.2), or approximately the 1.5-year recurrence interval. Streambanks will be stabilized through a combination of soft and hard stabilization practices as appropriate.
- Floodplain excavation and stream restoration will increase flood storage capacity on the newly created floodplain.
- Riparian areas will exhibit distinctly different vegetation cover compared to adjacent areas. For example, riparian areas will be planted with species tolerant of frequent flooding compared to adjacent areas planted to corn or soybean.

The City has expressed interest in developing the area associated with NF-09 into a riparian wetland park or other accessible space to provide recreational and educational opportunities for its constituents. Riparian and Urban Open Green Space can readily be integrated with one another to provide ecosystem, social, and flood mitigation benefits. NF-01 is adjacent to a multi-use trail and may be suitable to host some park space, so a combination of Urban Open Greenspace and Riparian is likely appropriate. NF-06 qualifies as Urban Open Greenspace due to its relatively small footprint within an existing park landscape.

7 FLOOD MITIGATION ALTERNATIVES ANALYSIS

7.1 ANALYSIS APPROACH AND ASSUMPTIONS

Narrowing down the practices from the initial concepts to the feasible alternatives was an iterative approach. The original list focused on restoration, and it was created by reviewing City-owned and potentially acquirable land near the river. The initial concepts were shared with the community through various public outreach events, and the feedback informed further refinement of the proposed practices. The City provided additional input on the feasibility of practices based on public perception, conversations with property owners, and past experience implementing projects. The practices that were most accepted and appeared feasible were then modeled to determine if they would alleviate flooding.

Along with modeling, conceptual designs were created for each feasible practice. The conceptual designs are primarily based on aerial imagery, approximate surface elevations, and typical sections. Aerial imagery was used to determine site features such as available area, stream length along the practice, and existing land cover. Surface data was paired with assumed dimensions to calculate approximate excavation and earthwork quantities. Bid items were generated based on typical items for green infrastructure practices. The conceptual design was utilized in conjunction with the HEC-RAS modeling, and unit costs were assigned to the quantities to develop conceptual cost estimates.

The design and cost estimates were developed for analysis purposes only, and they will need to be refined during comprehensive design for any practice that is selected for construction. It is important to note that property acquisition costs were not included in the conceptual cost estimates, and inflation was not accounted for in the maintenance costs. Several assumptions were made to develop the conceptual cost estimates, described below.

7.1.1 Clearing and Grubbing

Clearing and grubbing costs depend on the site size and the amount of trees and brush present onsite. Each project area was categorized into high, moderate, or low clearing and grubbing effort and assigned a base price. Areas with heavy vegetation were given an additional cost of $15,000 per acre, which was added to the base cost.

7.1.2 Topsoil, Onsite

The conceptual design assumes the top 8 inches of topsoil is stripped, salvaged, stockpiled, and spread across the entire project site.

7.1.3 Excavation, Class 10, Excavation with Removal

The excavation and earthwork assumptions are especially conceptual, as the required grading will depend on site limitations that will be uncovered during survey and final design. To maximize the available space, it was assumed that all material excavated from the project sites would need to be hauled offsite. Including hauling with excavation significantly increases the bid price to account for the additional time, labor, transportation distance, potential road damage and associated repair, and coordination that occurs as material is removed from the site. The additional site will also require erosion control and restoration. A unit cost of $20 per cubic yard was assumed in an effort to encompass these considerations; however, it is important to note that the cost can vary depending on a variety of site-specific factors.

Most of the proposed practices involve floodplain excavation, and a significant volume of material will be excavated during construction. Because of the amount of excavation required for the proposed practices, determining a location to place the excavated material is an important consideration. The City will need to designate a location to stockpile or use the removed material and may need to coordinate with additional property owners. One potential use of the excavated material is to prepare sites for future development.

7.1.4 Temporary Traffic Control

The lump sum cost for temporary traffic control was determined based on the project site's accessibility, the surrounding roads and traffic, and its proximity to developed areas or major structures. Sites near heavily trafficked roads or pedestrian areas were assigned a higher cost due to the increased need for safety measures. Additionally, sites with multiple access points were assumed to have a higher cost to account for increased signage and construction/restoration of access driveways.

7.1.5 Conventional Seeding, Fertilizing, and Mulching, Type 5

The conceptual design assumes temporary seeding, fertilizing, and mulching will occur across the entire project site and haul area (if identified).

7.1.6 Conventional Seeding and Mulching, Native

The conceptual design assumes permanent seeding and mulching will occur across the entire project site and haul area (if identified). A specific seed mix has not been defined at this time, but the permanent seed mix will include native species intentionally selected to suit the project sites. Stockpile areas may not require native seed; however, to create a more conservative estimate, it was assumed that any identified stockpile areas would be restored along with the proposed practice.

7.1.7 SWPPP Preparation and Management

SWPPP preparation and management requirements will vary for each proposed practice. For the conceptual cost estimates, the SWPPP costs were scaled in coordination with the clearing and grubbing requirements, which consider the site size and existing conditions.

7.1.8 Temporary RECP, Type 3B

Temporary RECP was incorporated into the conceptual design for erosion control during construction. The conceptual design assumes two 8-foot-wide strips of RECP will be placed along the stream bank(s) for the length of the project area.

7.1.9 Wattle, Straw, 12-inch

Straw wattles were included in the conceptual design to address erosion during construction. Often, the quantity is estimated to establish a unit price, but the exact amount needed is determined during construction. The conceptual design quantity was generated by assuming two rows of wattle along the stream bank(s) for the length of the project area.

7.1.10 Rip Rap. Class B

Rip rap was incorporated into the conceptual design for stream bank reinforcement and other miscellaneous purposes. The conceptual design assumes rip rap will be placed on 25% of the stream length along the practice (per bank), and it will be approximately 10 feet wide by 2 feet deep. The calculated quantity was increased an additional 25% for contingency.

7.1.11 Silt Fence or Silt Fence Ditch Check

Silt fence was included in the conceptual design for erosion control during construction. The silt fence will need to be installed, maintained throughout construction, and removed upon establishment of vegetation. Often, the quantity is estimated to establish a unit price, but the exact amount needed is determined during construction. The conceptual design assumes silt fence will be installed around the perimeter of the project sites and haul site(s).

7.1.12 Stream Restoration and Riparian Establishment

Streambank and floodplain restoration are highly variable and site-specific in nature. Due to the preliminary nature of this report assigning specific practices and locations of restoration techniques would be premature. Instead, estimated costs were based on similar restoration projects that would likely employ comparable restoration techniques. Examples of possible restoration techniques and uses cases are listed below in Table 8. For the purposes of this cost analysis, “Stream Restoration” involves any work within the channel itself, up to the elevation of the bankfull floodplain, measured in terms of length of channel. “Riparian Establishment” refers to restoration work extending from the top of the bankfull stream channel and approximately within the bankfull floodplain. Riparian Establishment is quantified in terms of acres. For more information on stream restoration techniques, refer to **Appendix D:** Iowa River Restoration Toolbox.

Table 8: Potential Stream and Floodplain Restoration Techniques

Technique Class	Specific Technique	Suitable Application
Channel Design	Re-alignment	In practices where there is sufficient undeveloped floodplain available, stream re-alignment or re-meandering may be recommended to address primary drivers of stream instability. In many cases, previous stream channelization is the primary driver of incision causing subsequent bank erosion and excess sediment loads being deposited downstream.
Grade Control	W-Weir	Can serve to protect center bridge piers and increase sediment transport, reducing maintenance costs for regular cleanout beneath bridges.
	Rock and Log Riffle	More suitable on smaller river reaches, such as the NFMR or Hewitt Creek east of Dyersville. Provides grade control and excellent aquatic habitat.
	Rock Constructed Riffle	Provides grade control, sediment regulation, and helps define hydraulic control. Simple to construct.
Vegetation Restoration	Live Staking Live Fascines Brush Layering	Typically used in combination with other practices, such as toe wood, stone toe protection, or fabric encapsulated soil lifts. Live material establishes quickly, providing bank protection, roughness, and habitat complexity.
Toe Protection / Stabilization	Toe Wood	Utilizes on-site materials salvaged from clearing and grubbing activities. Provides bank protection and deep lateral pools, particularly when used at outside meander bends.
	Stone Toe Protection	Used to stabilize the toe of the streambank, especially in areas of higher velocity. Most applicable in areas where a well-defined channel boundary is needed, such as near roads, trails or other structures.
	Fabric Encapsulated Soil Lifts	Provide a very stable upper bank and a more natural appearance than stone toe protection alone. Useful in areas where a steeper bank slope (up to 2:1) is warranted.
Channel Definition Structure	Cut-Off Sills	Used in over-widened streams to define the low flow channel. Can help create a deeper low flow channel to allow for recreation (i.e. innertubes or kayaks) and helps facilitate sediment transport.
	Bendway Weirs	Helps control channel depth and divert energy away from a degrading bank at an outside meander curve. Useful for redefining a channel boundary in a high energy system.
	J-Hook Vane	Diverts flows away from a bank. Helpful in defining meander bends and reducing the need for bank armoring.
Floodplain Restoration	Oxbows / Meander Scars	Oxbows can be constructed in-situ or created when a former channel is abandoned during major stream realignment activities. Meander scars are similar to oxbows but are shallower and less well defined on the landscape. They represent a later stage in floodplain evolution where some amount of sediment has accumulated within a former oxbow. Both of these features have some capacity to store floodwater, can remove excess nitrogen, and provide high-quality habitat for fish and wildlife.
	Floodplain Assemblages	Large wood used in floodplain assemblages provides floodplain roughness, terrestrial habitat, and aquatic cover for fish during flood events.
	Native Vegetation Establishment and Tree Planting	Deep-rooted native vegetation is critical for long-term channel stability and bank cohesion. Properly selected species can withstand variable water tables and levels of inundation, while also creating pollinator nectar sources, and terrestrial habitat. Riparian trees provide floodplain roughness, shade (which can lower stream temperatures), nutrient cycling, and food sources for a wide variety of species.

7.1.13 Mobilization
Mobilization consists of a range of preparatory operations that include moving equipment, personnel, and materials to and from the project site; staging and site preparation; and other cost incurred before work begins on the project. This item encompasses a broad range of work and is difficult to define, so the cost is often estimated as a percent of the total construction cost. To create a more conservative estimate, the conceptual design assumes the cost for mobilization is approximately 10% of the construction cost.

7.1.14 Administration, Legal, and Engineering
These services were assumed to total 20% of the estimated construction cost.

7.1.15 Contingency and Undefined Design Items
To account for the unknown constraints, site conditions, and design specifics, a contingency was added to the conceptual cost estimates. The conceptual design assumes the contingencies and undefined design items will increase the estimated construction cost by an additional 20%.

7.2 PROPOSED ALTERNATIVES

Twelve proposed alternatives were considered in this study. The extent of consideration was based on City input, modeling results, constructability, and conceptual cost. The proposed practices were not designed in detail. Instead, the concept was developed enough to incorporate into the HEC-RAS model and determine high-level quantities and costs. All quantities and cost estimates included in the study are conceptual; these values will need to be revised if the alternative is selected for design and construction. Each alternative and its evaluation are described below.

7.2.1 NF-01 (Upstream Flood Detention)

Description

This alternative involves excavation and construction of flood storage in what is currently agricultural field on the south side of the confluence of Hewitt Creek and the NFMR. The purpose of this alternative is to add detention upstream to redirect floodwater before it reaches the City. The proposed flood storage includes extensive earth moving on private property and could also include stream realignment for additional ecological benefit.

City Input

The City has had dialogue with the property owners for several years and believe the project is feasible from an acquisition standpoint. The property owners are aware of the project and may be interested in selling the land.

Conceptual Design and Modeling

Approximately 45 acres of land are available for construction of this alternative, and a potential 20-acre haul site was identified just north of the proposed project site. Existing topographic data indicates the existing storage volume is approximately 14 million cubic feet. The conceptual design assumes excavation across the entire available area, with the lowest point of excavation a few feet above the existing thalweg in NFMR, at approximately bankfull stage. Autodesk Storm and Sanitary Analysis (SSA) was used to approximate hydrology with an unsteady method and an SCS Type II, 24-hour storm distribution. Table 9 summarizes the net change in storage volume and flow in the floodplain based on the high-level SSA modeling.

Table 9: Floodplain Impact from Proposed Upstream Detention

Storm Event	Existing Peak Flow from USGS StreamStats, combined Hewitt Creek and North Fork Flows	Approximate assumed net change in storage volume based on estimated excavation area	Net Flow downstream from Confluence after including additional storage volume	Difference in flow from existing to proposed	% Diff. in flows
	cfs	ft^3	cfs	cfs	%
5-Year	4300	10,080,000	4,215	-85	-2.0%
10-Year	6290	12,620,000	6,200	-90	-1.4%
25-Year	9310	13,000,000	9,215	-95	-1.0%

These flow changes were plugged into the HEC-RAS model to determine the hydrologic effect. The modeling indicated this alternative would lower the water surface elevation for each storm event; however, it would not lower the WSEL enough to remove a structure from the 5-, 10-, 25-, or 100-year events.

Conceptual Cost Information

This alternative covers a large area and proposes extensive excavation, which leads to a high construction cost. Excavating and hauling material is by far the primary cost associated with the construction of this alternative. Other major costs include mobilization, riparian establishment, stream restoration, seeding and erosion control, and engineering. Table 11 summarizes the conceptual costs for this alternative. Note, the cost estimates for this alternative also include restoration of the potential haul site.

Maintenance costs for this type of project primarily address vegetation establishment and management via adaptive management. These costs can include general maintenance, prescribed fire, mowing, tree establishment, and invasive species monitoring and management. Typically, maintenance is more intensive during the initial years of growth, and it becomes more self-sustaining as vegetation establishment progresses. The BCA requires an annual cost, so for this analysis, the anticipated maintenance costs were evenly distributed across the lifespan of the project. Annual maintenance costs for this project were assumed to be $20,000, which translates to an additional $386,990 for the 30-year lifespan of the project.

BCA Results

The existing conditions HEC-RAS model was modified to incorporate the proposed upstream detention, and the resulting WSEL and discharge rate were entered into the BCA tool following the methods described in Section 6. The total benefit for the impacted structures was not computed due to the minimal direct impact this practice had on structures as no structures were removed from the 5-, 10-, 25-, or 100-year recurrence intervals. Although this practice does not remove structures from the 5-, 10-, 25-, or 100-year storm events, there are still indirect structure benefits that can be computed with the BCA tool. This practice does lower the overall water surface elevation, meaning structures in this practice footprint will see flooding less frequently.

The proposed alternative would provide substantial ecosystem service benefits because it would convert agricultural land to rural open space and riparian. Converting the entire 65-acre project area to 40% urban green open space and 60% riparian results in an added annual ecosystem service benefit of $1,854,827.

Table 10: Benefit-Cost Analysis for NF-01 (Upstream Flood Detention)

Mitigation Title	Property Type	Ecosystem Services	Benefits (B)	Costs (C)	BCR (B/C)
Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa	COM2: Commercial – Wholesale Trade	40% Urban Green Open Space; 60% Riparian	$35,892,746	$18,842,990	1.90

Table 31 in Section 8 compares the cost-benefit information for all the proposed alternatives.

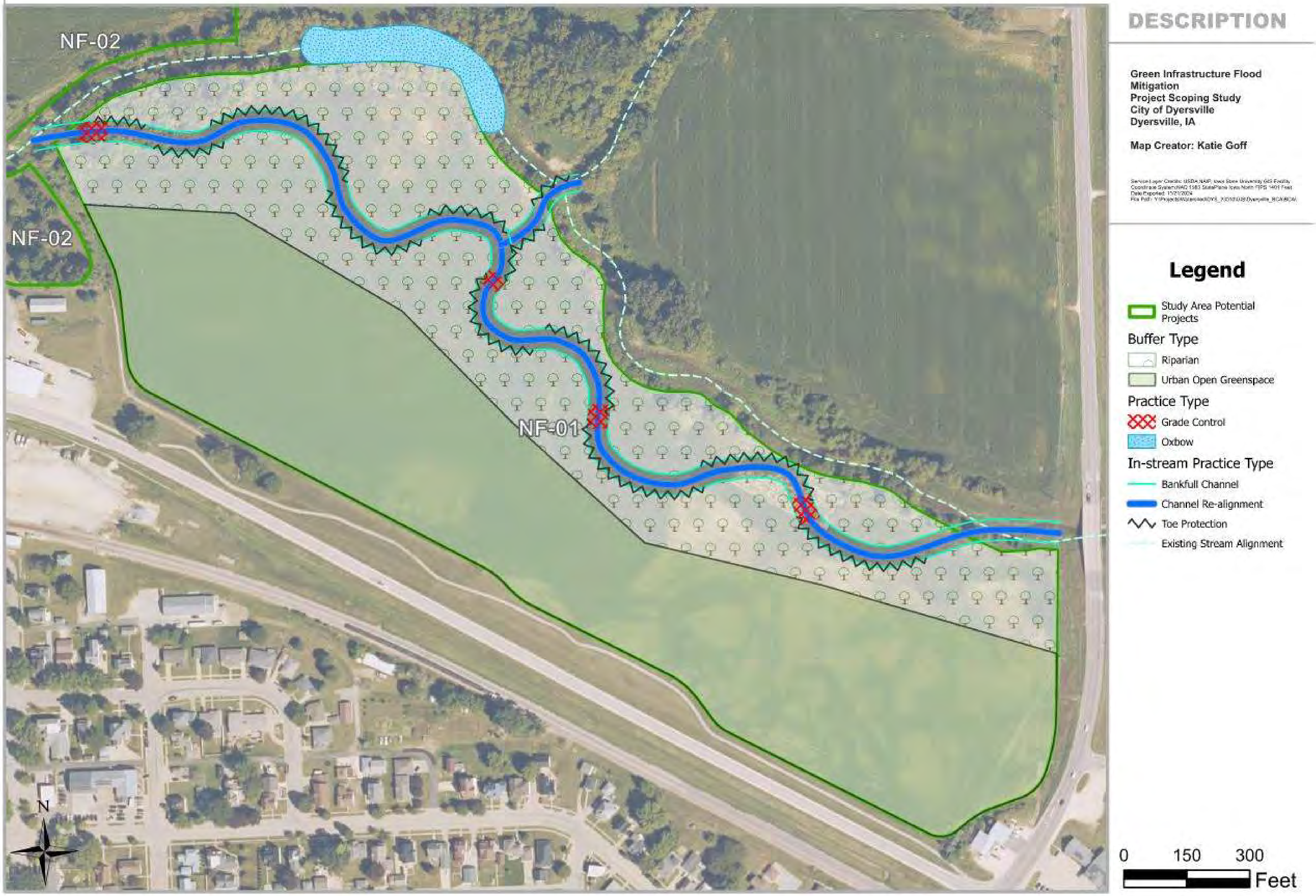
Conclusion

The large volume of water flowing into and through Dyersville requires an equally large-scale solution. Flood detention alone will not provide enough storage to create a significant impact on flooding; however, it could be combined with additional alternatives to alleviate downstream flooding. Additionally, the proposed excavation could generate water quality benefits such as providing a larger area for sediment deposition during more frequent recurrence interval storms. This alternative takes advantage of the large available area to slightly impact the WSEL, and it provides an opportunity to create significant ecosystem service benefits through stream, floodplain, and riparian habitat restoration.

Table 11: Conceptual Construction Costs for NF-01 (Upstream Flood Detention)

ITEM DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
CLEARING AND GRUBBING	LS	1	$ 85,000.00	$ 85,000.00
TOPSOIL, ONSITE	CY	68000	$ 8.00	$ 544,000.00
EXCAVATION, CLASS 10, EXCAVATION W/ REMOVAL	CY	470000	$ 20.00	$ 9,400,000.00
TEMPORARY TRAFFIC CONTROL	LS	1	$ 8,000.00	$ 8,000.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, TYPE 5	AC	65	$ 3,000.00	$ 195,000.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, NATIVE	AC	65	$ 6,000.00	$ 390,000.00
SWPPP PREPARATION	LS	1	$ 10,000.00	$ 10,000.00
SWPPP MANAGEMENT	LS	1	$ 20,000.00	$ 20,000.00
TEMPORARY RECP, TYPE 3B	SY	9600	$ 3.00	$ 28,800.00
WATTLE, STRAW, 12-INCH	LF	11000	$ 3.00	$ 33,000.00
WATTLE, REMOVAL	LF	11000	$ 1.00	$ 11,000.00
RIP RAP, CLASS B	TON	1850	$ 90.00	$ 166,500.00
SILT FENCE OR SILT FENCE DITCH CHECK	LF	6700	$ 3.00	$ 20,100.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF SEDIMENT	LF	6700	$ 1.00	$ 6,700.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF DEVICE	LF	6700	$ 1.00	$ 6,700.00
STREAM RESTORATION	LF	3000	$ 100.00	$ 300,000.00
RIPARIAN ESTABLISHMENT	AC	63.2	$ 12,000.00	$ 758,400.00
MOBILIZATION	LS	1	$ 1,198,800.00	$ 1,198,800.00
ESTIMATED CONSTRUCTION COST				**$ 13,182,000.00**
ADMINISTRATION, LEGAL, AND ENGINEERING				$ 2,637,000.00
CONTINGENCY AND UNDEFINED DESIGN ITEMS				$ 2,637,000.00
TOTAL ESTIMATED PROJECT COST				**$ 18,456,000.00**

Figure 7
Proposed Practice NF-01



7.2.2 NF-02 (Floodplain Excavation East of 2nd Street)

Description

This alternative includes floodplain excavation in the undeveloped area immediately upstream of the 2nd Street NE Bridge. The area is currently a narrow riparian corridor banked by a small agricultural field on the north side of the river, all on private property. The aim of this practice is to improve conveyance through the corridor and increase the riparian habitat for additional ecological benefit.

City Input

To construct this practice, the City would acquire the property via easement if possible. However, the City has not had contact with the current property owners.

Conceptual Design and Modeling

Approximately 10 acres of land are available for construction of this alternative. For the concept design, the existing stream channel was kept as-is, and the bankfull bench was widened to fill the available area. The concept design assumes a flat bench extending from the existing bankfull elevation that intersects with a 3:1 slope along the outer grading limits. To model this floodplain excavation, the existing cross sections were modified, primarily on the north bank, to a constant longitudinal bench elevation. The modeling indicated this alternative would lower the water surface elevation from 0.5 foot to 1 foot across the 5-, 10-, 25-, and 100-year flood events, having less effect on larger events. While no structures were shown to be removed from these four flood events, the lower water surface elevation would remove the structures from unconventional recurrence interval storms, for example, the 30-year event.

Conceptual Cost Information

This alternative proposes extensive excavation, which contributes to a high construction cost. Excavating and hauling material is by far the primary cost associated with the construction of this alternative. Other major costs include mobilization, stream restoration, riparian establishment, and engineering. Table 13 summarizes the conceptual costs for this alternative.

Maintenance costs for this type of project primarily address vegetation establishment and management via adaptive management. These costs can include general maintenance, prescribed fire, mowing, tree establishment, and invasive species monitoring and management. Typically, maintenance is more intensive during the initial years of growth, and it becomes more self-sustaining as vegetation establishment progresses. The BCA requires an annual cost, so for this analysis, the anticipated maintenance costs were evenly distributed across the lifespan of the project. Annual maintenance costs for this project were assumed to be $5,000, which translates to an additional $96,747 for the 30-year lifespan of the project.

BCA Results

The existing conditions HEC-RAS model was modified to incorporate the proposed floodplain excavation, and the resulting WSEL and discharge rate was entered into the BCA tool following the methods described in Section 6. The total benefit for the impacted structures was not computed due to the minimal direct impact this practice had on structures as no structures were removed from the 5-, 10-, 25-, or 100-year recurrence intervals. Although this practice does not remove structures from the 5-, 10-, 25-, or 100-year storm events, there are still indirect structure benefits that can be computed with the BCA tool. This practice does lower the overall water surface elevation, meaning structures in this practice footprint will see flooding less frequently.

The proposed alternative would also provide ecosystem service benefits because it would convert agricultural land to riparian. Converting the entire 10-acre project area to riparian results in an added annual ecosystem service benefit of $371,990.

Table 12: Benefit-Cost Analysis for NF-02 (Floodplain Excavation East of 2nd Street)

Mitigation Title	Property Type	Ecosystem Services	Benefits (B)	Costs (C)	BCR (B/C)
Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa	COM2: Commercial – Wholesale Trade	100% Riparian	$7,212,655	$5,065,747	1.42

Table 31 in Section 8 compares the cost-benefit information for all the proposed alternatives.

Conclusion

Although the structural impact of this alternative is minimal, this improvement could be coupled with other mitigation efforts to restore open space and riparian habitat for the City. The ten acres of available land provide a substantial opportunity to create ecosystem service benefits through stream, floodplain, and riparian habitat restoration. Not only would this substantial restoration provide ecosystem service benefits, but it would also build upon the City's connection to its waterways.

Table 13: Conceptual Construction Costs for NF-02 (Floodplain Excavation East of 2nd Street)

ITEM DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
CLEARING AND GRUBBING	LS	1	$ 47,500.00	$ 47,500.00
TOPSOIL, ONSITE	CY	11000	$ 8.00	$ 88,000.00
EXCAVATION, CLASS 10, EXCAVATION W/ REMOVAL	CY	130000	$ 20.00	$ 2,600,000.00
TEMPORARY TRAFFIC CONTROL	LS	1	$ 5,000.00	$ 5,000.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, TYPE 5	AC	10	$ 3,000.00	$ 30,000.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, NATIVE	AC	10	$ 6,000.00	$ 60,000.00
SWPPP PREPARATION	LS	1	$ 10,000.00	$ 10,000.00
SWPPP MANAGEMENT	LS	1	$ 20,000.00	$ 20,000.00
TEMPORARY RECP, TYPE 3B	SY	3200	$ 3.00	$ 9,600.00
WATTLE, STRAW, 12-INCH	LF	3500	$ 3.00	$ 10,500.00
WATTLE, REMOVAL	LF	3500	$ 1.00	$ 3,500.00
RIP RAP, CLASS B	TON	610	$ 90.00	$ 54,900.00
SILT FENCE OR SILT FENCE DITCH CHECK	LF	4600	$ 3.00	$ 13,800.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF SEDIMENT	LF	4600	$ 1.00	$ 4,600.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF DEVICE	LF	4600	$ 1.00	$ 4,600.00
STREAM RESTORATION	LF	1700	$ 100.00	$ 170,000.00
RIPARIAN ESTABLISHMENT	AC	10	$ 12,000.00	$ 120,000.00
MOBILIZATION	LS	1	$ 297,000.00	$ 297,000.00
ESTIMATED CONSTRUCTION COST				**$ 3,549,000.00**
ADMINISTRATION, LEGAL, AND ENGINEERING				$ 710,000.00
CONTINGENCY AND UNDEFINED DESIGN ITEMS				$ 710,000.00
TOTAL ESTIMATED PROJECT COST				**$ 4,969,000.00**

Figure 8
Proposed Practice NF-02

DESCRIPTION

Green Infrastructure Flood Mitigation
Project Scoping Study
City of Dyersville
Dyersville, IA

Map Creator: Katie Goff

Legend

Study Area Potential Projects

Buffer Type

Riparian

In-stream Practice Type

Channel Defining Structure

Toe Protection

Existing Stream Alignment

0 100 200 Feet

7.2.3 NF-03 (2nd Street Bridge Modification)

Description

This alternative consists of modifying the 2nd Street NE Bridge over NFMR to improve stream conveyance through the narrow corridor and protect the homes immediately upstream of the bridge. The modifications could include adding an additional bridge opening or increasing the size of the existing opening to provide more space through which the water can flow. This practice also involves widening the channel and excavating the overbank area.

City Input

The City did not have a strong interest in pursuing this option because of the perceived cost, difficulty of construction, and impact near a developed area of town.

Conceptual Design and Modeling

The proposed bridge modification is limited by its proximity to existing structures and utilities. A complete survey would be required for design.

The available site is approximately 80 feet wide and encompasses an area of approximately 0.2 acres. The existing bridge is approximately 180 feet long by 30 feet wide, and it sits within an 80-foot right-of-way. A very conceptual approach was taken to model this proposed alternative. The purpose of this practice was to increase conveyance by increasing the flow area at the bridge. In the model, this was achieved by excavating under the bridge to the existing riverbed elevation, which provided additional cross-sectional area. Note that this is not how the flow area would be increased in a real-world scenario. Instead, the approach may be to add an additional flow opening such as a culvert or overflow structure next to the bridge. This approach was not modeled because of the unknown site limitations. Incorporating this conceptual approach into the HEC-RAS model indicated this alternative would remove one structure from the 100-year floodplain.

Conceptual Cost Information

Conceptual costs were prepared for only the floodplain excavation portion of this alternative. Not including bridge modification, the primary costs associated with construction of this alternative include earthwork, traffic control, mobilization, and engineering. Estimating the cost for bridge modification is not feasible without a formal site survey and design and without a better understanding of the project requirements. However, bridge modification would likely add at least $2M to the estimated construction cost as well as additional engineering and administration fees.

Maintenance costs for the floodplain excavation portion of this project primarily address vegetation establishment and management via adaptive management. These costs can include general maintenance, prescribed fire, mowing, tree establishment, and invasive species monitoring and management. Typically, maintenance is more intensive during the initial years of growth, and it becomes more self-sustaining as vegetation establishment progresses. The BCA requires an annual cost, so for this analysis, the anticipated maintenance costs were evenly distributed across the lifespan of the project. Annual maintenance costs for this project were assumed to be $5,000, which translates to an additional $96,747 for the 30-year lifespan of the project.

BCA Results

The existing conditions HEC-RAS model was modified to incorporate the proposed floodplain excavation and conceptual best-case scenario of coring out the bridge opening, and the resulting WSEL and discharge rate was entered into the BCA tool following the methods described in Section 6. Assuming a practice lifespan of 30 years, the annual benefit for the impacted structure removed from the 100-year recurrence interval is $1,908. Additionally, this practice does lower the overall water surface elevation, meaning structures in this practice footprint will see flooding less frequently.

The proposed alternative would also provide ecosystem service benefits because it would convert urban green open land immediately around the bridge to riparian. Converting the entire 0.2-acre project area to riparian results in an added annual ecosystem service benefit of $7,440.

Table 14: Benefit-Cost Analysis for NF-03 (2nd Street Bridge Modification)

Mitigation Title	Property Type	Ecosystem Services	Benefits (B)	Costs (C)	BCR (B/C)
Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa	COM2: Commercial – Wholesale Trade	100% Riparian	$180,882	$288,747	0.63

Table 31 in Section 8 compares the cost-benefit information for all the proposed alternatives.

Conclusion

This project site is not large enough for floodplain excavation to affect flooding. Bridge modification has some potential to make an impact; however, the design and construction would be much more complex. This bridge will likely be replaced within the next twenty years. Because of the minimal flood impact and higher construction cost, it may be more economical to incorporate this proposed alternative at the time of replacement.

Table 15: Conceptual Construction Costs for NF-03 (2nd Street Bridge Modification)

ITEM DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
CLEARING AND GRUBBING	LS	1	$ 5,000.00	$ 5,000.00
TOPSOIL, ONSITE	CY	200	$ 8.00	$ 1,600.00
EXCAVATION, CLASS 10, EXCAVATION W/ REMOVAL	CY	3400	$ 20.00	$ 68,000.00
TEMPORARY TRAFFIC CONTROL	LS	1	$ 10,000.00	$ 10,000.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, TYPE 5	AC	0.2	$ 3,000.00	$ 600.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, NATIVE	AC	0.2	$ 6,000.00	$ 1,200.00
SWPPP PREPARATION	LS	1	$ 5,000.00	$ 5,000.00
SWPPP MANAGEMENT	LS	1	$ 10,000.00	$ 10,000.00
TEMPORARY RECP, TYPE 3B	SY	300	$ 3.00	$ 900.00
WATTLE, STRAW, 12-INCH	LF	330	$ 3.00	$ 990.00
WATTLE, REMOVAL	LF	330	$ 1.00	$ 330.00
RIP RAP, CLASS B	TON	60	$ 90.00	$ 5,400.00
SILT FENCE OR SILT FENCE DITCH CHECK	LF	520	$ 3.00	$ 1,560.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF SEDIMENT	LF	520	$ 1.00	$ 520.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF DEVICE	LF	520	$ 1.00	$ 520.00
STREAM RESTORATION	LF	90	$ 100.00	$ 9,000.00
RIPARIAN ESTABLISHMENT	AC	0.2	$ 12,000.00	$ 2,400.00
MOBILIZATION	LS	1	$ 12,980.00	$ 12,980.00
ESTIMATED CONSTRUCTION COST				**$ 136,000.00**
ADMINISTRATION, LEGAL, AND ENGINEERING				$ 28,000.00
CONTINGENCY AND UNDEFINED DESIGN ITEMS				$ 28,000.00
TOTAL ESTIMATED PROJECT COST				**$ 192,000.00**

Figure 9
Proposed Practice NF-03

DESCRIPTION

Green Infrastructure Flood Mitigation
Project Scoping Study
City of Dyersville
Dyersville, IA

Map Creator: Katie Goff

Legend

Study Area Potential Projects
Existing Stream Alignment

Buffer Type

Riparian

0 25 50
Feet

7.2.4 NF-04 (Floodplain Excavation West of 2nd Street Bridge)

Description

This alternative includes floodplain excavation in the undeveloped area between the 2nd Street NE bridge and the Beltline Road Bridge. The area is currently a narrow riparian corridor surrounded by a small agricultural field, open grass, and timber. The aim of this practice is to improve conveyance through the corridor and increase the riparian habitat for additional ecological benefit.

City Input

The proposed practice is located primarily on City-owned property, and the City strongly supports this alternative (Figure A5).

Conceptual Design and Modeling

Approximately 22 acres of land are available for construction of this alternative. To model the floodplain excavation, the existing cross sections were modified within the project area. The existing stream channel alignment was modified slightly to accommodate a gentler stream curvature prior to encountering the Beltline Road Bridge. A W-weir (grade control) is shown on Figure 10 just upstream of the Beltline Road bridge, which will help protect the bridge pier and facilitate sediment transport on both sides of the pier. A bankfull bench was widened to fill the available area with a 3:1 slope along the outside edge. The excavated bench was modeled with a longitudinal slope to match the existing stream slope by interpolating across several cross sections. The modeling indicated this alternative would lower the overall water surface elevation, meaning structures in this practice footprint will see flooding less frequently.

Conceptual Cost Information

This alternative proposes extensive excavation, which contributes to a high construction cost. Excavating and hauling material is by far the primary cost associated with the construction of this alternative. Other major costs include mobilization, riparian establishment, stream restoration, permanent seeding, and engineering. Table 17 summarizes the conceptual costs for this alternative.

Maintenance costs for this type of project primarily address vegetation establishment and management via adaptive management. These costs can include general maintenance, prescribed fire, mowing, tree establishment, and invasive species monitoring and management. Typically, maintenance is more intensive during the initial years of growth, and it becomes more self-sustaining as vegetation establishment progresses. The BCA requires an annual cost, so for this analysis, the anticipated maintenance costs were evenly distributed across the lifespan of the project. Annual maintenance costs for this project were assumed to be $12,000, which translates to an additional $232,194 for the 30-year lifespan of the project.

BCA Results

The existing conditions HEC-RAS model was modified to incorporate the proposed floodplain excavation, and the resulting WSEL and discharge rate was entered into the BCA tool following the methods described in Section 6. The total benefit for the impacted structures was not computed due to the minimal direct impact this practice had on structures as no structures were removed from the 5-, 10-, 25-, or 100-year recurrence intervals. Although this practice does not remove structures from the 5-, 10-, 25-, or 100-year storm events, there are still indirect structure benefits that can be computed with the BCA tool. This practice does lower the overall water surface elevation, meaning structures in this practice footprint will see flooding less frequently.

The proposed alternative would also provide ecosystem service benefits because it would convert agricultural land to riparian. Converting the entire 22-acre project area to riparian results in an added annual ecosystem service benefit of $818,378.

Table 16: Benefit-Cost Analysis for NF-04 (Floodplain Excavation West of 2nd Street Bridge)

Mitigation Title	Property Type	Ecosystem Services	Benefits (B)	Costs (C)	BCR (B/C)
Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa	COM2: Commercial – Wholesale Trade	100% Riparian	$15,843,216	$10,616,194	1.49

Table 31 in Section 8 compares the cost-benefit information for all the proposed alternatives.

Conclusion

Although the structural impact of this alternative is minimal, this improvement could be coupled with other mitigation efforts to restore open space and riparian habitat for the City. The twenty-two acres of available land provide a substantial opportunity to create ecosystem service benefits through stream, floodplain, and riparian habitat restoration. Not only would this substantial restoration provide ecosystem service benefits, but it would also build upon the City's connection to its waterways.

Table 16: Conceptual Construction Costs for NF-04 (Floodplain Excavation West of 2nd Street)

ITEM DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
CLEARING AND GRUBBING	LS	1	$ 139,000.00	$ 139,000.00
TOPSOIL, ONSITE	CY	24000	$ 8.00	$ 192,000.00
EXCAVATION, CLASS 10, EXCAVATION W/ REMOVAL	CY	280000	$ 20.00	$ 5,600,000.00
TEMPORARY TRAFFIC CONTROL	LS	1	$ 8,000.00	$ 8,000.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, TYPE 5	AC	22	$ 3,000.00	$ 66,000.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, NATIVE	AC	22	$ 6,000.00	$ 132,000.00
SWPPP PREPARATION	LS	1	$ 10,000.00	$ 10,000.00
SWPPP MANAGEMENT	LS	1	$ 20,000.00	$ 20,000.00
TEMPORARY RECP, TYPE 3B	SY	5200	$ 3.00	$ 15,600.00
WATTLE, STRAW, 12-INCH	LF	5800	$ 3.00	$ 17,400.00
WATTLE, REMOVAL	LF	5800	$ 1.00	$ 5,800.00
RIP RAP, CLASS B	TON	1000	$ 90.00	$ 90,000.00
SILT FENCE OR SILT FENCE DITCH CHECK	LF	7600	$ 3.00	$ 22,800.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF SEDIMENT	LF	7600	$ 1.00	$ 7,600.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF DEVICE	LF	7600	$ 1.00	$ 7,600.00
STREAM RESTORATION	LF	1500	$ 100.00	$ 150,000.00
RIPARIAN ESTABLISHMENT	AC	21.5	$ 12,000.00	$ 258,000.00
MOBILIZATION	LS	1	$ 674,200.00	$ 674,200.00
ESTIMATED CONSTRUCTION COST				**$ 7,416,000.00**
ADMINISTRATION, LEGAL, AND ENGINEERING				$ 1,484,000.00
CONTINGENCY AND UNDEFINED DESIGN ITEMS				$ 1,484,000.00
TOTAL ESTIMATED PROJECT COST				**$ 10,384,000.00**

Figure 10

Proposed Practice NF-04

DESCRIPTION

Green Infrastructure Flood Mitigation
Project Scoping Study
City of Dyersville
Dyersville, IA

Map Creator: Katie Goff

Legend

- Study Area Potential Projects

Buffer Type

- Riparian

Practice Type

- Grade Control

In-stream Practice Type

- Bankfull Channel
- Channel Re-alignment
- Grade Control
- Toe Protection
- Existing Stream Alignment

0 100 200 Feet

7.2.5 NF-05 (Lower 1st Street Road Profile)

Description

This alternative proposes lowering 1st Street SW between 1st Avenue and 3rd Avenue. This stretch of 1st Street runs along the west bank of NFMR. Business, residential houses, and park space are all located along this street segment. The proposed street reconstruction creates a secondary waterway during high flow events to allow street flooding rather than structure inundation. This area already floods during rain events. However, this alternative would increase conveyance, especially during more frequent recurrence interval storms.

City Input

The City did not have a strong interest in pursuing this option because of the perceived cost, difficulty of construction, and impact near a recently improved and historic area of town.

Conceptual Design and Modeling

The proposed reconstruction is limited by its proximity to existing structures and utilities. A complete survey would be required for design.

Conceptual Cost Information

The primary costs associated with construction of this alternative include roadbed preparation, road reconstruction, grading, traffic control, mobilization, and engineering. A full cost estimate will require a better understanding of the extent of the project and a thorough site survey.

BCA Results

This alternative was not considered in the BCA.

Conclusion

Due to the high cost of road reconstruction, especially near the downtown area, and the uncertainties associated with estimating the cost, the benefits likely do not outweigh the drawbacks of this project. Additionally, this alternative does not fit the City's desire to incorporate nature-based solutions to address flooding.

7.2.6 NF-06 (Floodplain Excavation at Westside Park)

Description

This alternative includes floodplain excavation along the west bank of NFMR between 3rd Avenue Bridge and the Pedestrian Bridge north of the Bear Creek confluence. The area is located on City-owned property directly adjacent to Westside Park, and it contains a paved pedestrian trail and grassed corridor. The aim of this practice is to improve conveyance through the approximately 50-foot-wide corridor and increase the riparian habitat for additional ecological benefit.

Conceptual Design and Modeling

The available corridor is approximately 50 feet wide and encompasses an area of approximately 0.7 acres. To model the floodplain excavation, the existing cross sections were modified to include this area as additional overbank width. The existing stream channel was kept as-is, and the bankfull bench was widened to fill the available area with a 3:1 slope along the outside edge. The excavated bench was modeled with a longitudinal slope to match the existing stream slope by interpolating across several cross sections. The modeling indicated this alternative would remove one structure from the 100-year floodplain.

Conceptual Cost Information

Excavation is a major element of this alternative; however, restoration is the central component because of this project's small footprint and its proximity to an existing trail and park. Streambank stabilization practices such as fabric-encapsulated soil lifts would likely be necessary to maintain a relatively steep streambank adjacent to the trail. This type of practice is considerably more expensive than other stabilization techniques per linear foot. The primary costs associated with construction of this alternative include stream restoration, mobilization, excavation, and engineering. Table 19 summarizes the conceptual costs for this alternative.

Maintenance costs for this type of project primarily address vegetation establishment and management via adaptive management. These costs can include general maintenance, prescribed fire, mowing, tree establishment, and invasive species monitoring and management. Invasive Japanese knotweed is already established on the streambanks, making long-term management more challenging. Typically, maintenance is more intensive during the initial years of growth, and it becomes more self-sustaining as vegetation establishment progresses. The BCA requires an annual cost, so for this analysis, the anticipated maintenance costs were evenly distributed across the lifespan of the project. Annual maintenance costs for this project were assumed to be $7,500, which translates to an additional $145,121 for the 30-year lifespan of the project.

BCA Results

The existing conditions HEC-RAS model was modified to incorporate the proposed floodplain excavation, and the resulting WSEL and discharge rate was entered into the BCA tool following the methods described in Section 6. Assuming a practice lifespan of 30 years, the annual benefit for the impacted structure removed from the 100-year recurrence interval is $167. Additionally, this practice does lower the overall water surface elevation, meaning structures in this practice footprint will see flooding less frequently. This practice has an additional social benefit totaling $13,622.

The proposed alternative would also provide ecosystem service benefits because it would restore and reconnect the stream with its floodplain by lowering and slightly increasing the bankfull bench. Restoring the entire 0.7-acre project area to urban green open space results in an added annual ecosystem service benefit of $10,879.

Table 18: Benefit-Cost Analysis for NF-06 (Excavation at Westside Park)

Mitigation Title	Property Type	Ecosystem Services	Benefits (B)	Costs (C)	BCR (B/C)
Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa	RES: Two or More Stories	100% Urban Green Open Space	$227,332	$1,054,121	0.22

Table 31 in Section 8 compares the cost-benefit information for all the proposed alternatives.

Conclusion

This project site is not large enough for floodplain excavation to significantly affect flooding. Although the impact of this alternative alone is minimal, this improvement could be coupled with other mitigation efforts to restore open space and riparian habitat for the City. This could provide ecosystem services benefits and build upon the City's connection to its waterways, especially since this practice is located along a pedestrian trail with easy river access. This area is currently prone to bank collapse potentially threatening the nearby multi-use trail in the future. Moreover, invasive Japanese knotweed is dominant on the streambanks which poses a potential source for invasive species dispersal for any downstream restoration projects. For these reasons, this is an area of concern which should be addressed outside of flood mitigation efforts.

Table 18: Conceptual Construction Costs for NF-06 (Floodplain Excavation at Westside Park)

ITEM DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
CLEARING AND GRUBBING	LS	1	$ 3,000.00	$ 3,000.00
TOPSOIL, ONSITE	CY	780	$ 8.00	$ 6,240.00
EXCAVATION, CLASS 10, EXCAVATION W/ REMOVAL	CY	8600	$ 20.00	$ 172,000.00
TEMPORARY TRAFFIC CONTROL	LS	1	$ 5,000.00	$ 5,000.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, TYPE 5	AC	0.7	$ 3,000.00	$ 2,100.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, NATIVE	AC	0.7	$ 6,000.00	$ 4,200.00
SWPPP PREPARATION	LS	1	$ 5,000.00	$ 5,000.00
SWPPP MANAGEMENT	LS	1	$ 10,000.00	$ 10,000.00
TEMPORARY RECP, TYPE 3B	SY	2800	$ 3.00	$ 8,400.00
WATTLE, STRAW, 12-INCH	LF	3200	$ 3.00	$ 9,600.00
WATTLE, REMOVAL	LF	3200	$ 1.00	$ 3,200.00
RIP RAP, CLASS B	TON	540	$ 90.00	$ 48,600.00
SILT FENCE OR SILT FENCE DITCH CHECK	LF	3200	$ 3.00	$ 9,600.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF SEDIMENT	LF	3200	$ 1.00	$ 3,200.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF DEVICE	LF	3200	$ 1.00	$ 3,200.00
STREAM RESTORATION	LF	1600	$ 180.00	$ 288,000.00
RIPARIAN ESTABLISHMENT	AC	0.7	$ 12,000.00	$ 8,400.00
MOBILIZATION	LS	1	$ 59,260.00	$ 59,260.00
ESTIMATED CONSTRUCTION COST				**$ 649,000.00**
ADMINISTRATION, LEGAL, AND ENGINEERING				$ 130,000.00
CONTINGENCY AND UNDEFINED DESIGN ITEMS				$ 130,000.00
TOTAL ESTIMATED PROJECT COST				**$ 909,000.00**

7.2.7 NF-07 (Berm Removal and Floodplain Excavation at Westside Park)

Description

This alternative proposes floodplain excavation and the removal of a berm located on the east bank of NFMR across from Westside Park, just north of Candy Cane Park. The berm is set between the river and a small agricultural field on private property with the intent to protect the crops. However, the berm does not protect the crops from flooding as flood water enters the field from the south. Additionally, the existing properties to the east are already built above the existing berm elevation, so the berm is not necessary for property flood protection. Removing the existing berm allows for floodplain connection and improved conveyance.

City Input

The property owners have indicated interest in selling the property to the City (see Figure A5).

Conceptual Design and Modeling

Approximately 5 acres of land are available for construction of this alternative. For the concept design, the existing stream channel was kept as-is, and the east bankfull bench was widened to fill the available area. The concept design assumes a flat bench extending from the existing bankfull elevation that intersects with a 3:1 slope along the outer grading limits. To model this floodplain excavation, the existing cross sections were modified along the east side of the river to a constant longitudinal bench elevation. The modeling indicated this alternative would remove one structure from the 25-year floodplain and four structures from the 100-year floodplain.

Conceptual Cost Information

This alternative proposes extensive excavation, which contributes to a high construction cost. Excavating and hauling material is by far the primary cost associated with the construction of this alternative. Other major costs include mobilization, stream restoration, riparian establishment, and engineering. Table 21 summarizes the conceptual costs for this alternative.

Maintenance costs for this type of project primarily address vegetation establishment and management via adaptive management. These costs can include general maintenance, prescribed fire, mowing, tree establishment, and invasive species monitoring and management. Typically, maintenance is more intensive during the initial years of growth, and it becomes more self-sustaining as vegetation establishment progresses. The BCA requires an annual cost, so for this analysis, the anticipated maintenance costs were evenly distributed across the lifespan of the project. Annual maintenance costs for this project were assumed to be $10,000, which translates to an additional $193,495 for the 30-year lifespan of the project.

BCA Results

The existing conditions HEC-RAS model was modified to incorporate the proposed floodplain excavation, and the resulting WSEL and discharge rate was entered into the BCA tool following the methods described in Section 6. Assuming a practice lifespan of 30 years, the annual benefit for the impacted structure removed from the 25-year recurrence interval and the four structures removed from the 100-year recurrence interval is $747. Additionally, this practice does lower the overall water surface elevation, meaning structures in this practice footprint will see flooding less frequently. This practice has an additional social benefit totaling $13,622.

The proposed alternative would also provide ecosystem service benefits because it would convert agricultural land to riparian and reconnect the stream with its floodplain. Restoring the entire 4.5-acre project area to riparian results in an added annual ecosystem service benefit of $167,396.

Table 20: Benefit-Cost Analysis for NF-07 (Berm Removal and Excavation at Westside Park)

Mitigation Title	Property Type	Ecosystem Services	Benefits (B)	Costs (C)	BCR (B/C)
Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa	REL1: Religious/Non-Profit	-	$337	-	-
Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa	RES: Two or More Stories	-	$22,732	-	-
Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa	COM2: Commercial – Wholesale Trade	-	$1,577	-	-
Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa	COM2: Commercial – Wholesale Trade	-	$1,225	-	-
Floodplain and Stream Restoration @ 244 St NE, Dyersville, Iowa	COM2: Commercial – Wholesale Trade	-	$2,187	-	-
Ecosystem Services	-	100% Riparian	$3,239,017	-	-
Totals:	**-**	**100% Riparian**	**$3,267,075**	**$2,555,495**	**1.28**

Table 31 in Section 8 compares the cost-benefit information for all the proposed alternatives.

Conclusion

Although this improvement impacts a small area, the buildings surrounding the site are concentrated, which increases this alternative's effect. Additionally, it could be incorporated in series with other mitigation efforts to further restore open space and riparian habitat throughout the City. The restoration of stream, floodplain, and riparian habitat would provide ecosystem service benefits, and it builds upon the City's connection to its waterways.

Table 21: Conceptual Construction Costs for NF-07 (Berm Removal and Floodplain Excavation at Westside Park)

ITEM DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
CLEARING AND GRUBBING	LS	1	$ 25,000.00	$ 25,000.00
TOPSOIL, ONSITE	CY	4800	$ 8.00	$ 38,400.00
EXCAVATION, CLASS 10, EXCAVATION W/ REMOVAL	CY	62000	$ 20.00	$ 1,240,000.00
TEMPORARY TRAFFIC CONTROL	LS	1	$ 5,000.00	$ 5,000.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, TYPE 5	AC	4.5	$ 3,000.00	$ 13,500.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, NATIVE	AC	4.5	$ 6,000.00	$ 27,000.00
SWPPP PREPARATION	LS	1	$ 10,000.00	$ 10,000.00
SWPPP MANAGEMENT	LS	1	$ 20,000.00	$ 20,000.00
TEMPORARY RECP, TYPE 3B	SY	1300	$ 3.00	$ 3,900.00
WATTLE, STRAW, 12-INCH	LF	1400	$ 3.00	$ 4,200.00
WATTLE, REMOVAL	LF	1400	$ 1.00	$ 1,400.00
RIP RAP, CLASS B	TON	240	$ 90.00	$ 21,600.00
SILT FENCE OR SILT FENCE DITCH CHECK	LF	2000	$ 3.00	$ 6,000.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF SEDIMENT	LF	2000	$ 1.00	$ 2,000.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF DEVICE	LF	2000	$ 1.00	$ 2,000.00
STREAM RESTORATION	LF	700	$ 100.00	$ 70,000.00
RIPARIAN ESTABLISHMENT	AC	4.5	$ 12,000.00	$ 54,000.00
MOBILIZATION	LS	1	$ 142,000.00	$ 142,000.00
ESTIMATED CONSTRUCTION COST				**$ 1,686,000.00**
ADMINISTRATION, LEGAL, AND ENGINEERING				$ 338,000.00
CONTINGENCY AND UNDEFINED DESIGN ITEMS				$ 338,000.00
TOTAL ESTIMATED PROJECT COST				**$ 2,362,000.00**

Figure 11

Proposed Practice NF-06 and NF-07

DESCRIPTION

Green Infrastructure Flood Mitigation
Project Scoping Study
City of Dyersville
Dyersville, IA

Map Creator: Katie Goff

Service Layer Credits: Iowa DNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, EPA, USDA, USDA NAIP, Iowa State University GIS Facility

Legend

Study Area Potential Projects

Buffer Type

Riparian

Urban Open Greenspace

In-stream Practice Type

Toe Protection

Existing Stream Alignment

0 125 250
Feet

7.2.8 NF-08 (Levee and Pump at Candy Cane Park)

Description

This alternative involves the construction and maintenance of an earthen levee located at Candy Cane Park south of Arbor Court Drive. The proposed levee would cut between the two baseball fields at Candy Cane Park, wrap to the east along the south edge of the baseball fields, and extend to the end of 9th Avenue SE. A pump system would likely be required for this alternative. The purpose of this proposed practice is to improve conveyance and protect the properties on 2nd Street SE and north of Candy Cane Park.

City Input

The proposed practice would be located on City-owned property, so this project is feasible from a land acquisition standpoint. However, the City is not in favor of the ongoing cost of a pump station, negatively impacted aesthetic, and the cost of needing a permit compared to the less significant benefits the alternative provides. For these reasons, this alternative was not considered further.

7.2.9 NF-09 (Floodplain Excavation South of Candy Cane Park)

Description

This alternative consists of floodplain excavation in the undeveloped area south of Candy Cane Park. The area is currently open field owned by the City; however, there are plans for future bridge and road construction at this location. The goal of this proposed alternative is to improve conveyance while also accommodating future construction. Additionally, the proposed project would increase the riparian habitat for added ecological benefit.

City Input

The City supports this project as long as it aligns with the future construction plans. The future bridge construction will connect 12th Avenue SW to 13th Avenue SE, which crosses through this proposed practice. The current bridge plan includes two 600- to 700-foot spans separated by a built embankment, and it will be designed to overtop above a 100-year storm event. The future road construction will connect 8th Avenue to 13th Avenue along the east edge of the proposed project site. The City would like to see an urban design in this area, including pockets of marsh in the northern portion and a potential wetland in the southern portion. All construction in this area will need to consider the existing sanitary sewer main passing through the City-owned property east of NFMR across from 13th Avenue.

Conceptual Design and Modeling

Approximately 58 acres of land are available for construction of this alternative. For the concept design, the existing stream channel slightly meandered, and the bankfull bench was widened to fill the available area. The concept design assumes a flat bench extending from the existing bankfull elevation that intersects with a 3:1 slope along the outer grading limits. The final design would include additional components, such as lower marsh areas and wetland, and would need to incorporate the proposed bridge construction. To approximately model this floodplain excavation, the existing cross sections were modified within the project area to a constant longitudinal bench elevation, and a concept-level bridge was blocked in as a structure. The modeling indicated this alternative would remove three structures from the 5-year floodplain, one structure from the 25-year floodplain, and three structures from the 100-year floodplain.

Conceptual Cost Information

This alternative covers a large area and proposes extensive excavation, which leads to a high construction cost. Excavating and hauling material is by far the primary cost associated with the construction of this alternative. Other major costs include mobilization, riparian establishment, stream restoration, seeding and erosion control, and engineering. Table 23 summarizes the conceptual costs for this alternative.

Maintenance costs for this type of project primarily address vegetation establishment and management via adaptive management. These costs can include general maintenance, prescribed fire, mowing, tree establishment, and invasive species monitoring and management. Typically, maintenance is more intensive during the initial years of growth, and it becomes more self-sustaining as vegetation establishment progresses. The BCA requires an annual cost, so for this analysis, the anticipated maintenance costs were evenly distributed across the lifespan of the project. Annual maintenance costs for this project were assumed to be $20,000, which translates to an additional $386,990 for the 30-year lifespan of the project.

BCA Results

The existing conditions HEC-RAS model was modified to incorporate the proposed floodplain excavation, and the resulting WSEL and discharge rate was entered into the BCA tool following the methods described in Section 6. Assuming a practice lifespan of 30 years, the annual benefit for the three impacted structures removed from the 5-year recurrence interval, one impacted structure removed from the 25-year recurrence interval, and the three structures removed from the 100-year recurrence interval is $9710. Additionally, this practice does lower the overall water surface elevation, meaning structures in this practice footprint will see flooding less frequently. This practice has an additional social benefit totaling $13,622.

The proposed alternative would also provide ecosystem service benefits because it would convert agricultural land to urban green open space and riparian. Restoring the entire 58-acre project area to riparian results in an added annual ecosystem service benefit of $1,655,076.

Table 22: Benefit-Cost Analysis for NF-09 (Floodplain Excavation South of Candy Cane Park)

Mitigation Title	Property Type	Ecosystem Services	Benefits (B)	Costs (C)	BCR (B/C)
Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa	COM8: Commercial – Entertainment and Recreation	-	$34,031	-	-
Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa	COM8: Commercial – Entertainment and Recreation	-	$97,220	-	-
Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa	COM8: Commercial – Entertainment and Recreation	-	$33,564	-	-
Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa	REL1: Religious/Non-Profit	-	$265	-	-
Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa	RES: Two or More Stories	-	$21,051	-	-
Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa	COM2: Commercial – Wholesale Trade	-	$129	-	-
Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa	COM2: Commercial – Wholesale Trade	-	$15,208	-	-
Ecosystem Services	-	40% Urban Green Open Space 60% Riparian	$32,024,881	-	-
Totals:	**-**	**40% Urban Green Open Space 60% Riparian**	**$32,226,349**	**$30,034,990**	**1.07**

Table 31 in Section 8 compares the cost-benefit information for all the proposed alternatives.

Conclusion

This alternative appears to have a moderate structural impact; however, the future bridge construction is a significant unknown factor in the conceptual modeling. Although the impact of this alternative may be overshadowed by the proposed bridge construction, it works hand-in-hand with other mitigation efforts to restore open space and riparian habitat for the City. The large available area has the potential to provide substantial ecosystem services benefits and build upon the City's connection to its waterways, especially since this alternative is located adjacent to a city park. Additionally, it complements future construction plans to maximize the ecological potential of the site.

Table 23: Conceptual Construction Costs for NF-09 (Floodplain Excavation at Candy Cane Park)

ITEM DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
CLEARING AND GRUBBING	LS	1	$ 134,500.00	$ 134,500.00
TOPSOIL, ONSITE	CY	63000	$ 8.00	$ 504,000.00
EXCAVATION, CLASS 10, EXCAVATION W/ REMOVAL	CY	850000	$ 20.00	$ 17,000,000.00
TEMPORARY TRAFFIC CONTROL	LS	1	$ 5,000.00	$ 5,000.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, TYPE 5	AC	58	$ 3,000.00	$ 174,000.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, NATIVE	AC	58	$ 6,000.00	$ 348,000.00
SWPPP PREPARATION	LS	1	$ 10,000.00	$ 10,000.00
SWPPP MANAGEMENT	LS	1	$ 20,000.00	$ 20,000.00
TEMPORARY RECP, TYPE 3B	SY	4000	$ 3.00	$ 12,000.00
WATTLE, STRAW, 12-INCH	LF	4500	$ 3.00	$ 13,500.00
WATTLE, REMOVAL	LF	4500	$ 1.00	$ 4,500.00
RIP RAP, CLASS B	TON	780	$ 90.00	$ 70,200.00
SILT FENCE OR SILT FENCE DITCH CHECK	LF	6500	$ 3.00	$ 19,500.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF SEDIMENT	LF	6500	$ 1.00	$ 6,500.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF DEVICE	LF	6500	$ 1.00	$ 6,500.00
STREAM RESTORATION	LF	2300	$ 100.00	$ 230,000.00
RIPARIAN ESTABLISHMENT	AC	57.7	$ 12,000.00	$ 692,400.00
MOBILIZATION	LS	1	$ 1,925,400.00	$ 1,925,400.00
ESTIMATED CONSTRUCTION COST				**$ 21,176,000.00**
ADMINISTRATION, LEGAL, AND ENGINEERING				$ 4,236,000.00
CONTINGENCY AND UNDEFINED DESIGN ITEMS				$ 4,236,000.00
TOTAL ESTIMATED PROJECT COST				**$ 29,648,000.00**

Figure 12
Proposed Practice NF-09

DESCRIPTION

Green Infrastructure Flood Mitigation
Project Scoping Study
City of Dyersville
Dyersville, IA

Map Creator: Katie Goff

Service Layer Credits: Iowa DNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA, USDA NAIP, Iowa State University GIS Facility
Coordinate System: NAD 1983 StatePlane Iowa North FIPS 1401 Feet

Legend

Study Area Potential Projects

Buffer Type
- Riparian
- Urban Open Greenspace

Practice Type
- Grade Control
- Oxbow

In-stream Practice Type
- Bankfull Channel
- Channel Re-alignment
- Toe Protection
- Existing Stream Alignment

7.2.10 NF-10 (Floodplain Excavation South of Highway 20)

Description

This alternative includes floodplain excavation in the undeveloped area south of Highway 20 and west of the Dyersville wastewater treatment facility. The area is currently undeveloped, and the proposed practice would improve conveyance as floodwater leaves the City. This practice would also increase riparian habitat for additional ecological benefit.

Highway 20 and bridge modification was also discussed as part of this alternative. However, not enough information about the existing conditions and the potential modification is known to pursue this option. Furthermore, construction on a highway and highway bridge would likely be cost prohibitive compared to the impact the modification would provide.

City Input

The City currently uses the open area for topsoil and would prefer to keep this topsoil source. However, the proposed floodplain excavation was modeled to determine its flood impact.

Conceptual Design and Modeling

Approximately 15 acres of land are available for construction of this alternative. For the concept design, the existing stream channel was kept as-is, and the bankfull bench was widened to fill the available area. The concept design assumes a flat bench extending from the existing bankfull elevation that intersects with a 3:1 slope along the outer grading limits. To model this floodplain excavation, the existing cross sections were modified within the project area to a constant longitudinal bench elevation. The modeling indicated this alternative would remove one structure from the 25-year floodplain and fourteen structures from the 100-year floodplain.

Conceptual Cost Information

This alternative proposes extensive excavation, which contributes to a high construction cost. Excavating and hauling material is by far the primary cost associated with the construction of this alternative. Other major costs include mobilization, riparian establishment, stream restoration, and engineering. Table 25 summarizes the conceptual costs for this alternative.

Maintenance costs for this type of project primarily address vegetation establishment and management via adaptive management. These costs can include general maintenance, prescribed fire, mowing, tree establishment, and invasive species monitoring and management. Typically, maintenance is more intensive during the initial years of growth, and it becomes more self-sustaining as vegetation establishment progresses. The BCA requires an annual cost, so for this analysis, the anticipated maintenance costs were evenly distributed across the lifespan of the project. Annual maintenance costs for this project were assumed to be $15,000, which translates to an additional $290,242 for the 30-year lifespan of the project.

BCA Results

The existing conditions HEC-RAS model was modified to incorporate the proposed floodplain excavation, and the resulting WSEL and discharge rate was entered into the BCA tool following the methods described in Section 6. Assuming a practice lifespan of 30 years, the annual benefit for the one impacted structure removed from the 25-year recurrence interval, and the fourteen structures removed from the 100-year recurrence interval is $12,130. Additionally, this practice does lower the overall water surface elevation, meaning structures in this practice footprint will see flooding less frequently. This practice has an additional social benefit totaling $149,842.

The proposed alternative would also provide ecosystem service benefits because it would convert agricultural land to riparian. Restoring the entire 15-acre project area to riparian results in an added annual ecosystem service benefit of $557,985.

Table 24: Benefit-Cost Analysis for NF-10 (Floodplain Excavation South of Highway 20)

Mitigation Title	Property Type	Ecosystem Services	Benefits (B)	Costs (C)	BCR (B/C)
Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa	REL1: Religious/Non-Profit	-	$1,004	-	-
Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa	RES: Two or More Stories	-	$34,655	-	-
Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa	RES: Two or More Stories	-	$27,308	-	-
Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa	RES: One Story	-	$30,051	-	-
Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa	RES: Two or More Stories	-	$30,800	-	-
Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa	RES: Two or More Stories	-	$29,214	-	-
Floodplain and Stream Restoration @ 527 2nd St SW, Dyersville, Iowa	RES: Two or More Stories	-	$30,275	-	-
Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa	RES: Two or More Stories	-	$36,730	-	-
Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa	RES: Two or More Stories	-	$33,043	-	-
Floodplain and Stream Restoration @ 112 1st St SW, Dyersville, Iowa	RES: Two or More Stories	-	$29,631	-	-
Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa	COM2: Commercial – Wholesale Trade	-	$8,154	-	-
Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa	RES: Two or More Stories	-	$21,693	-	-
Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa	COM8: Commercial – Entertainment and Recreation	-	$13,413	-	-
Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa	RES: Two or More Stories	-	$22,961	-	-
Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa	COM2: Commercial – Wholesale Trade	-	$16,190	-	-
Ecosystem Services	-	100% Riparian	$10,796,724	-	-
Totals:	**-**	**100% Riparian**	**$11,161,846**	**$6,561,242**	**1.70**

Table 31 in Section 8 compares the cost-benefit information for all the proposed alternatives.

Conclusion

This alternative generates a significant positive impact on structural flooding in Dyersville. Furthermore, the fifteen acres of available land provide a substantial opportunity to create ecosystem service benefits through stream, floodplain, and riparian habitat restoration. Not only would this alternative provide structural and ecosystem service benefits, but it would also give purpose to a currently unused swath of land near the WWTP.

Table 25: Conceptual Construction Costs for NF-10 (Floodplain Excavation South of Highway 20)

ITEM DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
CLEARING AND GRUBBING	LS	1	$ 89,500.00	$ 89,500.00
TOPSOIL, ONSITE	CY	15400	$ 8.00	$ 123,200.00
EXCAVATION, CLASS 10, EXCAVATION W/ REMOVAL	CY	163000	$ 20.00	$ 3,260,000.00
TEMPORARY TRAFFIC CONTROL	LS	1	$ 8,000.00	$ 8,000.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, TYPE 5	AC	15	$ 3,000.00	$ 45,000.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, NATIVE	AC	15	$ 6,000.00	$ 90,000.00
SWPPP PREPARATION	LS	1	$ 10,000.00	$ 10,000.00
SWPPP MANAGEMENT	LS	1	$ 20,000.00	$ 20,000.00
TEMPORARY RECP, TYPE 3B	SY	4300	$ 3.00	$ 12,900.00
WATTLE, STRAW, 12-INCH	LF	4800	$ 3.00	$ 14,400.00
WATTLE, REMOVAL	LF	4800	$ 1.00	$ 4,800.00
RIP RAP, CLASS B	TON	820	$ 90.00	$ 73,800.00
SILT FENCE OR SILT FENCE DITCH CHECK	LF	5900	$ 3.00	$ 17,700.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF SEDIMENT	LF	5900	$ 1.00	$ 5,900.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF DEVICE	LF	5900	$ 1.00	$ 5,900.00
STREAM RESTORATION	LF	1200	$ 100.00	$ 120,000.00
RIPARIAN ESTABLISHMENT	AC	14.2	$ 12,000.00	$ 170,400.00
MOBILIZATION	LS	1	$ 407,500.00	$ 407,500.00
ESTIMATED CONSTRUCTION COST				**$ 4,479,000.00**
ADMINISTRATION, LEGAL, AND ENGINEERING				$ 896,000.00
CONTINGENCY AND UNDEFINED DESIGN ITEMS				$ 896,000.00
TOTAL ESTIMATED PROJECT COST				**$ 6,271,000.00**

Figure 13
Proposed Practice NF-10

DESCRIPTION

Green Infrastructure Flood Mitigation
Project Scoping Study
City of Dyersville
Dyersville, IA

Map Creator: Katie Goff

Service Layer Credits: Iowa DNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA, USDA NAIP, Iowa State University GIS Facility
Coordinate System: NAD 1983 StatePlane Iowa North FIPS 1401 Feet
Date Exported: [illegible]
File Path: [illegible]

Legend

Study Area Potential Projects

Buffer Type

Riparian

Practice Type

Grade Control

In-stream Practice Type

Toe Protection

Existing Stream Alignment

0 200 400
Feet

7.2.11 NF-11 (Floodplain Excavation South of Railroad)

Description

This alternative includes floodplain excavation in the NFMR corridor between the railroad bridge and the 1st Avenue bridge. The excavation would primarily occur on the west bank of the river in the gravel area used as a municipal parking lot. The aim of this practice is to improve conveyance through the corridor and increase the riparian habitat for additional ecological benefit.

City Input

This area already floods during storm events, and 2nd Street acts as a channel to route water back to NFMR. The City owns the majority of the property but would need to acquire some private property to excavate the full area (See Figure A5).

Conceptual Design and Modeling

The gravel lot provides approximately 1 acre of land for construction of this alternative. For the concept design, the existing stream channel was kept as-is, and the bankfull bench was widened to fill the available area. The concept design assumes a flat bench extending from the existing bankfull elevation that intersects with a 3:1 slope along the outer grading limits. To model this floodplain excavation, the existing cross sections were modified within the project area to a constant longitudinal bench elevation. The modeling indicated this alternative would not remove structures from the 25-year floodplain.

Conceptual Cost Information

Earthwork is a major component of this project; excavation and hauling are the primary costs associated with the construction of this alternative. Other major costs include mobilization, stream restoration, riparian establishment, traffic control, and engineering. Table 27 summarizes the conceptual costs for this alternative.

Maintenance costs for this type of project primarily address vegetation establishment and management via adaptive management. These costs can include general maintenance, prescribed fire, mowing, tree establishment, and invasive species monitoring and management. Typically, maintenance is more intensive during the initial years of growth, and it becomes more self-sustaining as vegetation establishment progresses. The BCA requires an annual cost, so for this analysis, the anticipated maintenance costs were evenly distributed across the lifespan of the project. Annual maintenance costs for this project were assumed to be $5,000, which translates to an additional $96,747 for the 30-year lifespan of the project.

BCA Results

The existing conditions HEC-RAS model was modified to incorporate the proposed floodplain excavation, and the resulting WSEL and discharge rate was entered into the BCA tool following the methods described in Section 6. The total benefit for the impacted structures was not computed due to the minimal direct impact this practice had on structures as no structures were removed from the 5-, 10-, 25-, or 100-year recurrence intervals. Although this practice does not remove structures from the 5-, 10-, 25-, or 100-year storm events, there are still indirect structure benefits that can be computed with the BCA tool. This practice does lower the overall water surface elevation, meaning structures in this practice footprint will see flooding less frequently.

The proposed alternative would also provide ecosystem service benefits because it would restore and reconnect the stream with its floodplain by lowering and increasing the bankfull bench. Restoring the entire 1-acre project area to urban green open space results in an added annual ecosystem service benefit of $15,541.

Table 26: Benefit-Cost Analysis for NF-11 (Floodplain Excavation South of Railroad)

Mitigation Title	Property Type	Ecosystem Services	Benefits (B)	Costs (C)	BCR (B/C)
Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa	COM2: Commercial – Wholesale Trade	100% Urban Green Open Space	$301,186	$906,747	0.33

Table 31 in Section 8 compares the cost-benefit information for all the proposed alternatives.

Conclusion
This project site is not large enough for floodplain excavation to significantly affect flooding. Although the impact of this alternative alone is minimal, this improvement could be coupled with other mitigation efforts to restore open space and riparian habitat for the City. This could provide ecosystem services benefits, enhance a historic area of town, and build upon the City's connection to its waterways, especially since this practice is located in the highly trafficked downtown area.

Table 27: Conceptual Construction Costs for NF-11 (Floodplain Excavation South of Railroad)

ITEM DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
CLEARING AND GRUBBING	LS	1	$ 3,000.00	$ 3,000.00
TOPSOIL, ONSITE	CY	1100	$ 8.00	$ 8,800.00
EXCAVATION, CLASS 10, EXCAVATION W/ REMOVAL	CY	19000	$ 20.00	$ 380,000.00
TEMPORARY TRAFFIC CONTROL	LS	1	$ 10,000.00	$ 10,000.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, TYPE 5	AC	1	$ 3,000.00	$ 3,000.00
CONVENTIONAL SEEDING, FERTILIZING, AND MULCHING, NATIVE	AC	1	$ 6,000.00	$ 6,000.00
SWPPP PREPARATION	LS	1	$ 3,000.00	$ 3,000.00
SWPPP MANAGEMENT	LS	1	$ 6,000.00	$ 6,000.00
TEMPORARY RECP, TYPE 3B	SY	1100	$ 3.00	$ 3,300.00
WATTLE, STRAW, 12-INCH	LF	1200	$ 3.00	$ 3,600.00
WATTLE, REMOVAL	LF	1200	$ 1.00	$ 1,200.00
RIP RAP, CLASS B	TON	200	$ 90.00	$ 18,000.00
SILT FENCE OR SILT FENCE DITCH CHECK	LF	1500	$ 3.00	$ 4,500.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF SEDIMENT	LF	1500	$ 1.00	$ 1,500.00
SILT FENCE OR SILT FENCE DITCH CHECK, REMOVAL OF DEVICE	LF	1500	$ 1.00	$ 1,500.00
STREAM RESTORATION	LF	600	$ 100.00	$ 60,000.00
RIPARIAN ESTABLISHMENT	AC	1	$ 12,000.00	$ 12,000.00
MOBILIZATION	LS	1	$ 52,600.00	$ 52,600.00
ESTIMATED CONSTRUCTION COST				**$ 578,000.00**
ADMINISTRATION, LEGAL, AND ENGINEERING				$ 116,000.00
CONTINGENCY AND UNDEFINED DESIGN ITEMS				$ 116,000.00
TOTAL ESTIMATED PROJECT COST				**$ 810,000.00**

Figure 14

Proposed Practice NF-11

DESCRIPTION

Green Infrastructure Flood Mitigation
Project Scoping Study
City of Dyersville
Dyersville, IA

Map Creator: Katie Goff

Service Layer Credits: Iowa DNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, EPA, USDA, USDA NAIP, Iowa State University GIS Facility
Coordinate System: NAD 1983 StatePlane Iowa North FIPS 1401 Feet
Date Exported: [illegible]
File Path: [illegible]

Legend

Study Area Potential Projects

Buffer Type

Riparian

Existing Stream Alignment

0 100 200 Feet

7.2.12 NF-12 (Property Acquisition/Relocation)

Description

This alternative entails property acquisition and the relocation or demolition of at-risk structures. There are impacted properties located throughout the City; in the downtown area especially, structures are built up to the banks of NFMR. Acquiring the impacted properties, relocating or razing the structures, and converting the land to open space may be more cost effective than continuing to address flood damage. The resulting open space can be considered for future recreational development such as parks, trails, or picnic areas, or it could be restored as riparian habitat to provide additional ecosystem services benefits.

FEMA funding covers both structure relocation and structure demolition because it permanently removes structures from the floodplain. The acquired land is required to remain as open space in perpetuity, which aligns with Dyersville's goal of incorporating nature-based solutions in its flood mitigation efforts.

City Input

Through discussions with the City, several frequently impacted structures were identified that could potentially be acquired. These structures include three non-residential structures on 1st Street SW and one residential structure on 4th Street SW. The feasibility of acquiring the property and structures varies.

Conceptual Design and Modeling

Modeling and design were not completed for individual properties, as the realization of this alternative is based primarily on the City's desire to pursue the property acquisition process. FEMA provides more information on the property acquisition process on their website:

https://www.fema.gov/grants/mitigation/guide/part-12/b/1

Conceptual Cost Information

Cost considerations for property acquisition include the existing property conditions, the type of structure, and the landowner's willingness to participate in the program. Because they vary based on the individual property, detailed cost estimates were not created for property acquisition as part of this analysis. Instead, the values of the impacted structures were compiled based on publicly available information found on the county assessor website. Note that FEMA funding for property acquisition is based on valuation of the property through an appraisal, not the assessed value. The assessor values were used in this analysis to indicate high-level cost effectiveness of the proposed property acquisition, so the final values will be adjusted for each property that is selected for acquisition.

BCA Results

The proposed alternative would remove the following four structure from all recurrence intervals resulting in the following benefits. Data and calculations reliant on current public assessor data.

Table 28: Benefit-Cost Analysis for NF-12 (Property Acquisition/Relocation)

Mitigation Title	Property Type	Ecosystem Services	Benefits (B)	Costs (C)	BCR (B/C)
Acquisition @ 114 1st St SW, Dyersville, Iowa	Non-Residential	-	\$775,411	\$84,900	9.13
Acquisition @ 122 1st St SW, Dyersville, Iowa	Non-Residential	-	\$775,411	\$63,700	12.17
Acquisition @ 214 1st St SW, Dyersville, Iowa	Non-Residential	-	\$775,411	\$59,900	12.95
Acquisition @ 320 4th St SW, Dyersville, Iowa	Residential	-	\$775,411	\$106,700	7.27

Table 31 in Section 8 compares the cost-benefit information for all the proposed alternatives.

Conclusion

Acquiring property and removing the impacted structures is the most direct way to eliminate them from the floodplain. Once a structure is removed or relocated, there is also no continued maintenance cost. However, the process of property acquisition, business/resident relocation, and structure demolition is not as straightforward, and it requires significant coordination and cooperation. The City should assess which frequently impacted properties are worth pursing and begin communicating with the property owner(s) to develop an acquisition plan.

7.3 ANALYSIS LIMITATIONS

The modeling and design developed for this study were completed at a conceptual level with the goal of providing the City with a general idea of what each alternative would entail and its potential impact. Because of the conceptual nature of this study, it has several limitations worth noting:

- The modeling was completed in HEC-RAS using a 1D steady-state model, and the model analyzes the impacts of individual projects. Modeling multiple practices simultaneously would require an unsteady-state model, which becomes much more complicated. Model will be revised and expanded to include Bear Creek with final design.
- Cost estimates for this study only include major items and are meant to provide an order of magnitude understanding of the proposed alternative. Final design would include a more detailed breakdown of project components, which would likely introduce additional costs. A contingency has been incorporated into the cost estimate for the proposed alternatives; however, it is important to note the conceptual nature of the estimates.
- The model relied primarily on LiDAR data for existing surface conditions. Traditional site survey would be necessary to more accurately represent the existing conditions of the selected sites.

More detailed modeling and design will be required for the alternatives selected for implementation.

8 RECOMMENDATIONS

As evidenced by the extensive analysis, it is important to consider several factors when determining recommended alternatives. Key considerations include the following:

- **Structural Impact** – Does the proposed alternative remove structures from the floodplain or reduce the frequency at which structures are impacted by flooding?
- **Ecological Benefits** – Does the proposed alternative create ecological benefits by restoring urban open space or riparian habitat?
- **Benefit Cost Ratio** – Is the proposed alternative economical compared to the benefits it generates?
- **City Input** – Does the proposed alternative align with the City's goals for flood mitigation and vision for nature-based solutions?

The following sections detail the analysis considerations of the proposed alternatives.

8.1 CONSIDERATIONS FOR RECOMMENDATION

8.1.1 Structural Impact Comparison

The structural impact of each alternative was determined with the hydraulic analysis. The hydraulic analysis used HEC-RAS to conceptually model the proposed alternatives and determine the new water surface elevations of flood events. An alternative was considered favorable if it lowered the WSEL elevation at an existing structure. The HEC-RAS analysis focused on 5-, 10-, 25-, and 100-year storm events as indicators of the flood impact. However, lowering the WSEL by any amount at a structure reduces its flood risk, albeit for irregular storm events. As shown in Table 29 below NF-07, NF-09, and NF-10 had the most positive structural impact.

Table 29: Number of Structures Removed from the Modeled 5-, 10-, and 25-Year Floodplain for Each Mitigation Alternative

Modeled Alternative	# of Structures within the Modeled 5-yr Floodplain	# of Structures within the Modeled 10-yr Floodplain	# of Structures within the Modeled 25-yr Floodplain	# of Structures within the Modeled 100-yr Floodplain
Existing Conditions	3	0	7	30
NF-01	3	0	7	*(Not Modeled)*
NF-02	3	0	7	30
NF-03	3	0	7	29
NF-04	3	0	7	30
NF-05	*(Not Modeled)*	*(Not Modeled)*	*(Not Modeled)*	*(Not Modeled)*
NF-06	3	0	7	29
NF-07	3	0	6	26
NF-08	*(Not Modeled)*	*(Not Modeled)*	*(Not Modeled)*	*(Not Modeled)*
NF-09	0	0	6	27
NF-10	3	0	6	16
NF-11	3	0	7	30
NF-12	*(Not Modeled)*	*(Not Modeled)*	*(Not Modeled)*	*(Not Modeled)*

8.1.2 Ecosystem Service Benefits Comparison

The ecosystem benefits of each alternative were quantified with the BCA tool. The benefits were highly dependent on the proposed land use at each project site. The majority of the alternatives propose restoration of riparian habitat, which is the most natural, and favorable, option. Practice NF-01 and Practice NF-09 incorporate a mix of riparian habitat and urban green space due to their size, which is sizable enough for potential recreational development, and the City's vision for future construction. Practice NF-06 was assumed to be all urban green space because of its current and expected continued use as a park. Regardless of the proposed riparian or urban green space land use, all the proposed alternatives generated ecosystem service benefits.

Table 30: Summary of Ecosystem Service Benefits for Each Mitigation Alternative

Modeled Alternative	Modeled Land Use	Annual Ecosystem Service Benefits
NF-01	40% Urban Green Space, 60% Riparian	$ 1,854,827
NF-02	100% Riparian	$ 371,990
NF-03	100% Riparian	$ 7,440
NF-04	100% Riparian	$ 818,378
NF-05	*(Not Modeled)*	*(Not Modeled)*
NF-06	100% Urban Green Space	$ 10,879
NF-07	100% Riparian	$ 167,396
NF-08	*(Not Modeled)*	*(Not Modeled)*
NF-09	40% Urban Green Space, 60% Riparian	$ 1,655,076
NF-10	100% Riparian	$ 557,985
NF-11	100% Riparian	$ 15,541
NF-12	*(Not Modeled)*	*(Not Modeled)*

8.1.3 Benefit and Cost Comparison

The benefit cost ratio is what BRIC uses to determine the cost effectiveness of a proposed alternative. A project is considered favorable and eligible for BRIC funding if the BCR is over 1.0. Since the proposed projects are primarily floodplain excavation and restoration, the ecosystem service benefits weight heavily into the ratio calculation, and larger projects tend to have a higher BCR. Projects NF-03, NF-06, and NF-11, all one acre or less, did not meet the BCR threshold.

Table 31: Benefit and Cost Comparison for Each Mitigation Alternative

Modeled Alternative	Alternative Benefits (B)	Alternative Costs (C)	Benefit Cost Ratio (B/C)
NF-01	$ 35,892,746	$ 18,842,990	1.90
NF-02	$ 7,212,566	$ 5,065,747	1.42
NF-03	$ 180,882	$ 288,747	0.63
NF-04	$ 15,843,216	$ 10,616,194	1.49
NF-05	*(Not Modeled)*	*(Not Modeled)*	*(Not Modeled)*
NF-06	$ 227,332	$ 1,054,121	0.22
NF-07	$ 3,267,075	$ 2,555,495	1.28
NF-08	*(Not Modeled)*	*(Not Modeled)*	*(Not Modeled)*
NF-09	$ 32,226,349	$ 30,034,990	1.07
NF-10	$ 11,164,599	$ 6,561,242	1.70
NF-11	$ 301,186	$ 906,747	0.33
NF-12	$ 3,101,644	$ 315,200	9.84

It should be noted that the benefits and costs were considered for each project individually. Combining multiple alternatives as one project would affect the total flood impact, and it could also potentially affect the total cost. For example, if two alternatives impact the same structure, they both may work together to lower the WSEL on a structure. However, if one alternative removes the structure from the floodplain, the other will not provide additional benefit. The construction costs are generally cumulative, but combining construction has the potential to lower unit costs or lump sums of some items. It is recommended that a cost-benefit analysis is completed on the final collection of selected alternatives to assess the combined impact.

8.1.4 City Values Comparison

It is important for the recommended alternatives to be accepted by the City and by the community as a whole. The City has indicated the desire to incorporate green infrastructure and nature-based solutions to address flooding rather than gray infrastructure. Practices NF-03, NF-05, and NF-08 include structural modifications or mechanical solutions; therefore, they were determined to be incompatible with the City's vision for flood improvements. The remaining projects incorporate riparian habitat restoration or green space restoration, which better align with the community's connectivity to its waterways and the City's intentions for future development.

8.2 RECOMMENDED ALTERNATIVES

The following Table 32 summarizes the key analysis considerations used to determine the recommended alternatives.

Table 32: Summary of Key Analysis Considerations and Recommended Alternatives

Alternative	Structural Impact	Ecosystem Service Benefits	Favorable BCR	Aligns with City Vision/Values	Recommended
NF-01	No	Yes	Yes	Yes	Yes
NF-02	No	Yes	Yes	Yes	Yes
NF-03	Yes	Yes	No	No	No
NF-04	No	Yes	Yes	Yes	Yes
NF-05	*(not analyzed)*	*(not analyzed)*	*(not analyzed)*	No	No
NF-06	Yes	Yes	No	Yes	Yes*
NF-07	Yes	Yes	Yes	Yes	Yes
NF-08	*(not analyzed)*	*(not analyzed)*	*(not analyzed)*	No	No
NF-09	Yes	Yes	Yes	Yes	Yes
NF-10	Yes	Yes	Yes	Yes	Yes
NF-11	No	Yes	No	Yes	Yes*
NF-12	Yes	Yes	Yes	Yes	Yes

To be eligible for BRIC funding, a proposed project must show structural benefit and have a BCR above 1.0. Not only do projects NF-07, NF-09, NF-10, and NF-12 have a BCR above 1.0, but they are beneficial according to all the analysis considerations. It is recommended the City pursue BRIC funding for implementation of these four projects.

Projects NF-01, NF-02, and NF-04 are favorable because their BCR is greater than 1.0. These practices show high ecological and social value; however, preliminary modeling indicates they do not generate a structural impact. Because of their significant environmental impact, it is recommended the City pursue these three projects using alternate funding sources.

Projects NF-06 and NF-11 do not meet the BCR threshold. Although their impact is limited, these practices still provide streambank stabilization and social benefit. While not a priority, it is recommended the City also pursue these two projects utilizing different funding sources. Constructing these alternatives in conjunction with other projects has the potential to reduce the construction costs compared to if the projects are constructed individually.

To continue toward project implementation, the City should prioritize and determine which projects to pursue, engage the community and solicit feedback, determine funding sources, and seek engineering design services.

9 FUNDING OPPORTUNITIES

9.1 FEMA'S HAZARD MITIGATION GRANTS

The BRIC program, managed by FEMA, supports pre-disaster hazard mitigation initiatives aimed at enhancing community resilience against natural disasters. The program allocates funding for projects that reduce risks, such as infrastructure upgrades and capacity-building efforts. Cost-sharing for BRIC requires a 75% federal and 25% non-federal match, although some economically disadvantaged communities may qualify for a higher federal contribution.

Eligible applicants include states, U.S. territories, federally recognized tribes, and local governments, but individuals and nonprofits must partner with these entities to participate. Each fiscal year, a significant portion of funding is set aside for state/territory and tribal allocations, with the remaining distributed via a national competition. Applications are submitted through FEMA's grant management system, and timelines typically involve state-level review before national consideration.

9.2 POSSIBLE ALTERNATIVE FUNDING OPPORTUNITIES

Although not all projects evaluated during this project qualify for BRIC funding, nearly all provide some social or ecosystem value. In keeping with the City of Dyersville's vision to utilizing nature-based solutions along its rivers and stream, a variety of other funding sources are outlined below to help meet these objectives.

This section will cover funding opportunities for the proposed projects outside of the preferred FEMA BRIC funding option. Funding opportunities in the form of non-matching grants, cost-share grants, in-kind services, and low or no-interest loans, such as the Iowa State Revolving Fund (SRF) iowasrf.com/ may be an option. Eligible projects and funding details are determined by the administering agency. More information on the opportunities below can be found through the link provided.

9.2.1 Watershed Improvement Grants (Section 319)

The DNR offers Iowa groups looking to improve our state's streams, rivers, and lakes the opportunity to apply for grants. These grants allow groups, such as Soil and Water Conservation Districts and other organizations, to create watershed projects.

https://www.iowadnr.gov/Environmental-Protection/Water-Quality/Watershed-Improvement/Watershed-Planning

9.2.2 Land & Water Conservation Fund (LWCF)

The LWCF Grant Program is a federal grant program that provides funds to incorporated cities and county conservation boards in the form of 50% reimbursement grants. Grants require a 50% match. Assistance ceilings are determined by population. Eligible projects include acquisition and/or development of land for outdoor recreation. Renovation of existing facilities is also eligible.

https://www.iowadnr.gov/About-DNR/Grants-Other-Funding/Land-Water-Conservation-Fund

9.2.3 Infrastructure Investment and Jobs Act: USDA's NRCS Watershed and Flood Prevention Operations Program (WFPO)

Eligible projects include those that address erosion and sediment control, watershed protection, flood prevention, water quality improvements, rural/municipal/industrial water supply, water management, fish and wildlife habitat enhancement, and hydropower sources. Projects must have public sponsorship, be a watershed only up to 250,000 acres, and have benefits that are directly related to agriculture (including rural communities) that are at least 20 percent of total benefit for the project. Project sponsors can access help through this program in the following ways: request funding to carry out an existing NRCS authorized plan (assistance can include design and construction) or request the Chief of NRCS to authorize a plan developed with USDA Watershed Operations funding. Watershed plans that require $5 million or more in federal funding for construction require Congressional approval. Once the watershed plan is authorized, project sponsors can access NRCS's financial and technical help to implement their plan.

https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/landscape/wfpo/?cid=nrcs143_008271

9.2.4 USDA's NRCS Regional Conservation Partnership Program (RCPP)

"The Regional Conservation Partnership Program (RCPP) promotes coordination of NRCS conservation activities with partners that offer value-added contributions to expand our collective ability to address on-farm, watershed, and regional natural resource concerns. Through RCPP, NRCS seeks to co-invest with partners to implement projects that demonstrate innovative solutions to conservation challenges and provide measurable improvements and outcomes tied to the resource concerns they seek to address."

Successful RCPP projects embody the following core principles:

Impact—RCPP applications must propose effective and compelling solutions that address one or more natural resource priorities to help solve natural resource challenges. Partners are responsible for evaluating a project's impact and results.

Partner Contributions—Partners are responsible for identifying any combination of cash and in-kind value-added contributions to leverage NRCS's RCPP investments. It is NRCS's goal that partner contributions at least equal the NRCS investment in an RCPP project. Substantive partner contributions are given priority consideration as part of the RCPP application evaluation criteria.

Innovation—NRCS seeks projects that integrate multiple conservation approaches, implement innovative conservation approaches or technologies, build new partnerships, and effectively take advantage of program flexibilities to deliver conservation solutions.

Partnerships and Management—Partners must have experience, expertise, and capacity to manage the partnership and project, provide outreach to producers, and quantify the environmental outcomes of an RCPP project. RCPP ranking criteria give preference to applicants that meaningfully engage historically underserved farmers and ranchers. RCPP projects must be carried out on agricultural or nonindustrial private forest land or associated land on which NRCS determines an eligible activity would help achieve conservation benefits (i.e., improved condition of natural resources resulting from implementation of conservation activities). Eligible conservation activities (including Land management/land improvement/restoration practices, land rentals entity-held easements, United States-held easements, and public works/watersheds) may be implemented on public lands when those activities will benefit eligible lands as determined by NRCS and are included in the scope of an approved RCPP project.

There are two funding pools with this program. Partners must apply to either the Critical Conservation Area (CCA) or State/Multistate funding pool. RCPP Classic is the standard version of the program where NRCS and the lead partner both oversee contracts with producers and landowners engaged in RCPP activities. RCPP Alternative Funding Arrangements are partner-led projects that propose innovative use of federal assistance to achieve conservation benefits that are not possible under the RCPP Classic construct. At least four weeks prior to the application deadline, and before starting an application in the RCPP portal, eligible entities interested in applying to RCPP are advised to request a meeting with the appropriate NRCS State RCPP coordinator.

https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/rcpp/

9.2.5 REAP Conservation Education Program (CEP)
Provides grants for conservation education in Iowa. Examples of eligible projects include educational signage, materials and supplies for workshops and training, and educational materials in various formats, such as print or video. Annually the program allocates approximately $350,000 in funding.

https://www.iowadnr.gov/Conservation/REAP/REAP-Funding-at-Work/Conservation-Education

9.2.6 Iowa Great Places Program
Communities with a strong vision for innovation, and enhancing vitality and quality of life, while staying true to what makes your community unique, the Iowa Great Places Program can recognize your efforts and help bring those visions to reality. The program provides designation and supports the development of new and existing infrastructure intended to cultivate the unique and authentic cultural qualities of neighborhoods, communities, and regions in Iowa.

https://iowaculture.gov/about-us/about/grants/iowa-great-places

9.2.7 Wildlife Diversity Grant Program
The Iowa DNR's Wildlife Diversity Program makes small grant available for habitat management projects directly related to wildlife diversity conservation. Approved projects are funded for a single-year basis but can be submitted for additional funding in subsequent years. Projects should be closely related to the goals of Iowa's Wildlife Action Plan. The total grant allotment is $15,000 per year with $7,500 being the maximum amount available per proposal request.

https://www.iowadnr.gov/Conservation/Iowas-Wildlife/Wildlife-Diversity-Program/Wildlife-Grant-Opportunities

9.2.8 Infrastructure Investment and Jobs Act: USDA's NRCS Emergency Watershed Protection Program (EWP)
"The Emergency Watershed Protection (EWP) Program, a federal emergency recovery program, helps local communities recover after a natural disaster strikes. The program offers technical and financial assistance to help local communities relieve imminent threats to life and property caused by floods, fires, windstorms, and other natural disasters that impair a watershed." EWP does not require a disaster declaration by federal or state government officials for program assistance to begin. The NRCS State Conservationist can declare a local watershed emergency and initiate EWP program assistance in cooperation with an eligible sponsor. The NRCS will not provide funding for activities undertaken by a sponsor prior to the signing of a cooperative agreement between NRCS and the sponsor. All funded EWP projects must demonstrate they provide protection from flooding or soil erosion, reduce threats to life and property, restore the hydraulic capacity to the natural environment to the maximum extent practical, and are economically and environmentally defensible and technically sound.

NRCS offers financial and technical assistance for various activities under EWP Program including removal of debris from stream channels, road culverts and bridges, reshaping and protection of eroded streambanks, correct damaged or destroyed drainage facilities, establish vegetative cover on critically eroding lands, repair levees and structures, repair certain conservation practices, and purchase floodplain easements.

https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/

9.2.9 Flood Mitigation Assistance (FMA) Grant
The Flood Mitigation Assistance (FMA) Grant Program is a competitive grant program managed by FEMA. It provides funding to states, local communities, federally recognized tribes, and U.S. territories. The primary goal of the program is to reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program (NFIP).

Key points:

- **Eligibility**: States, local governments, federally recognized tribal governments, and U.S. territories can apply for these grants.
- **Funding Uses**: The grants can be used for projects that mitigate flood risks, such as elevating, relocating, or demolishing buildings in flood-prone areas, and improving drainage systems.
- **Selection Criteria**: Projects are selected based on their cost-effectiveness, eligibility, and the applicant's ranking of the project. FEMA also requires applicants to have hazard mitigation plans in place.
- **Recent Funding**: In the latest grant cycle, FEMA announced nearly $715 million in federal cost share for 197 sub applications, marking a record amount for the program.

The FMA program is a crucial tool in enhancing community resilience against flooding, helping to protect lives, property, and infrastructure from the increasing risks posed by climate change.

9.2.10 Environmental Protection Agency (EPA) Community Change Grant

The Environmental Protection Agency (EPA) Community Change Grant is a significant initiative funded by the Inflation Reduction Act (IRA). This program aims to support disadvantaged communities in tackling environmental and climate justice challenges.

Key points:

- Funding: The program allocates approximately $2 billion to projects that reduce pollution, increase community climate resilience, and build community capacity.
- Eligibility: Eligible applicants include partnerships between community-based non-profit organizations (CBOs) and entities such as federally recognized tribes, local governments, and institutions of higher education.
- Focus Areas: The grants target projects that address issues like air quality improvement, extreme heat mitigation, green space expansion, and clean energy adoption.
- Application Process: Applications are reviewed on a rolling basis, with the final deadline being November 21, 2024. The EPA encourages early submissions to allow time for any necessary revisions.
- Technical Assistance: The EPA offers technical assistance to help applicants develop their projects and applications. This includes support in project development, engineering services, and budget planning.

The Community Change Grant program is designed to deliver transformative benefits to communities most impacted by climate change and historical disinvestment, fostering long-term resilience and environmental justice.

https://www.epa.gov/inflation-reduction-act/inflation-reduction-act-community-change-grants-program

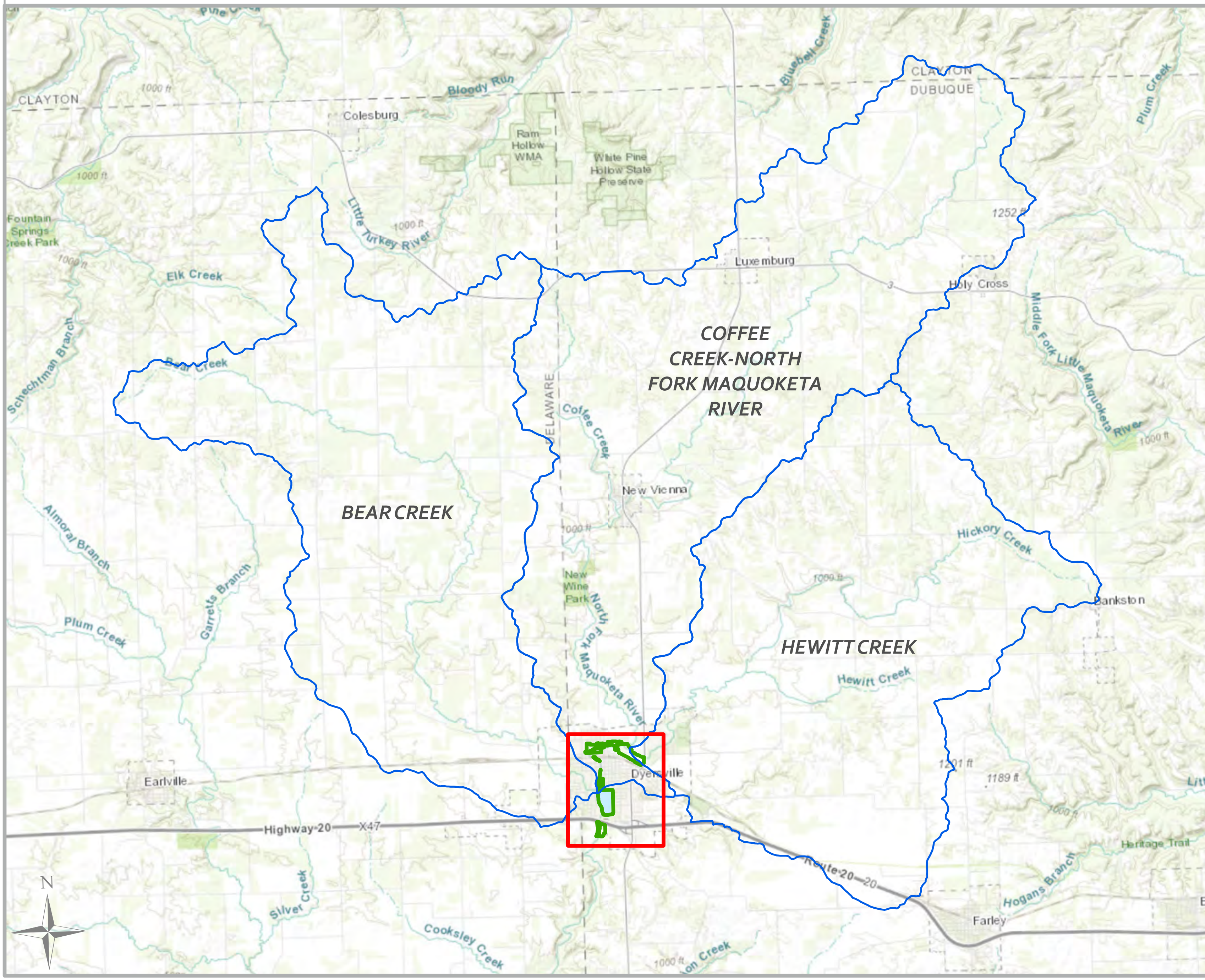
9.3 NEXT STEPS

Funding opportunities may shape the City's determination of which projects to pursue, so the City should consider funding sources as they prioritize proposed improvements. Once the City determines which projects to pursue, funding sources can be solidified, and the City can begin the application process(es). The City has engaged the community and sought feedback throughout the project process, and continued public support will be important as the project moves forward.

Appendix A
Figures

Figure A1

Watershed Map



DESCRIPTION

Green Infrastructure Flood Mitigation
Project Scoping Study
City of Dyersville
Dyersville, IA

Map Creator: Katie Goff

Service Layer Credits: Iowa DNR, Esri Canada, Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS
Coordinate System:NAD 1983 StatePlane Iowa North FIPS 1401 Feet
Date Exported: 11/20/2024
File Path: Y:\Projects\Watershed\DYS_23010\GIS\Dyersville_BCA\BCA\

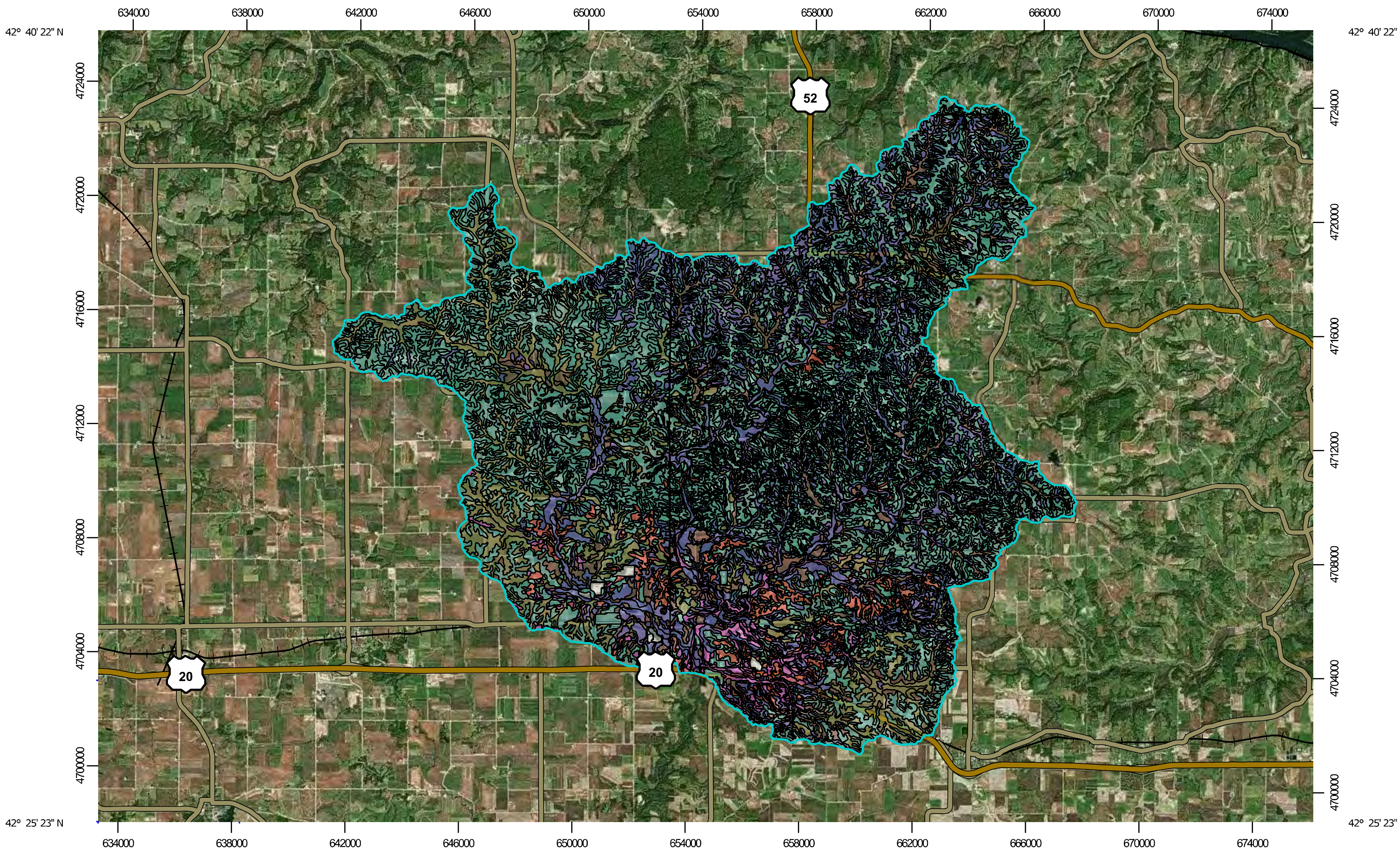
Legend

- HUC12 Watersheds
- Study Area Potential Projects

0 3,000 6,000 12,000 Feet

Figure A2
Web Soil Survey

Hydrologic Soil Group—Clayton County, Iowa, Delaware County, Iowa, and Dubuque County, Iowa
(Dyersville BRIC Study Area)



Map Scale: 1:195,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 2500, 5000, 10000, 15000

Feet: 0, 5000, 10000, 20000, 30000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clayton County, Iowa
Survey Area Data: Version 28, Aug 29, 2024

Soil Survey Area: Delaware County, Iowa
Survey Area Data: Version 31, Aug 29, 2024

Soil Survey Area: Dubuque County, Iowa
Survey Area Data: Version 26, Aug 29, 2024

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 1, 1999—Dec 31, 2003

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
163B	Fayette silt loam, 2 to 6 percent slopes	C	98.2	0.1%
163C2	Fayette silt loam, 5 to 9 percent slopes, moderately eroded	C	50.3	0.1%
163D3	Fayette silty clay loam, 9 to 14 percent slopes, severely eroded	C	4.7	0.0%
291	Atterberry silt loam, 1 to 3 percent slopes	C/D	38.7	0.0%
930B	Orion silt loam, 2 to 5 percent slopes, occassionally flooded	B/D	21.7	0.0%
Subtotals for Soil Survey Area			**213.6**	**0.3%**
Totals for Area of Interest			**78,226.7**	**100.0%**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
11B	Colo-Ely complex, 0 to 5 percent slopes	C/D	2,591.3	3.3%
41B	Sparta loamy sand, 2 to 5 percent slopes	A	44.5	0.1%
41C	Sparta loamy sand, 5 to 9 percent slopes	A	9.1	0.0%
63B	Chelsea loamy fine sand, 2 to 5 percent slopes	A	2.7	0.0%
63D	Chelsea loamy fine sand, 9 to 14 percent slopes	A	4.7	0.0%
65D2	Lindley loam, 9 to 14 percent slopes, moderately eroded	C	10.2	0.0%
65E3	Lindley clay loam, 14 to 18 percent slopes, severely eroded	C	17.5	0.0%
83B	Kenyon loam, 2 to 5 percent slopes	C	1,199.8	1.5%
83C	Kenyon loam, 5 to 9 percent slopes	C	15.6	0.0%
83C2	Kenyon loam, 5 to 9 percent slopes, eroded	C	4.1	0.0%
84	Clyde clay loam, 0 to 3 percent slopes	C/D	7.6	0.0%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
109B	Backbone fine sandy loam, 2 to 5 percent slopes	B	2.8	0.0%
109C	Backbone fine sandy loam, 5 to 9 percent slopes	B	10.8	0.0%
110B	Lamont fine sandy loam, 2 to 5 percent slopes	A	22.2	0.0%
110C	Lamont fine sandy loam, 5 to 9 percent slopes	A	48.4	0.1%
119	Muscatine silt loam, 1 to 3 percent slopes	C/D	415.9	0.5%
120B	Tama silt loam, driftless, 2 to 6 percent slopes	C	3,027.8	3.9%
120C	Tama silt loam, driftless, 5 to 9 percent slopes	C	1,082.2	1.4%
129B	Arenzville-Chaseburg complex, 1 to 5 percent slopes	B	560.4	0.7%
133+	Colo silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	C/D	258.4	0.3%
162B	Downs silt loam, 2 to 6 percent slopes	C	1,171.5	1.5%
162C2	Downs silt loam, 5 to 9 percent slopes, moderately eroded	C	3,837.8	4.9%
162D2	Downs silt loam, 9 to 14 percent slopes, moderately eroded	C	1,496.0	1.9%
163C	Fayette silt loam, 5 to 9 percent slopes	C	17.9	0.0%
163C2	Fayette silt loam, 5 to 9 percent slopes, moderately eroded	C	270.3	0.3%
163D	Fayette silt loam, 9 to 14 percent slopes	C	26.4	0.0%
163D2	Fayette silt loam, 9 to 14 percent slopes, moderately eroded	C	635.1	0.8%
163D3	Fayette silty clay loam, 9 to 14 percent slopes, severely eroded	C	166.5	0.2%
163E2	Fayette silt loam, 14 to 18 percent slopes, moderately eroded	C	208.2	0.3%
163E3	Fayette silty clay loam, 14 to 18 percent slopes, severely eroded	C	61.1	0.1%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
163F	Fayette silt loam, 18 to 25 percent slopes	C	7.9	0.0%
163F2	Fayette silt loam, 18 to 25 percent slopes, moderately eroded	C	21.0	0.0%
171B	Bassett loam, 2 to 5 percent slopes	C	83.2	0.1%
171C2	Bassett loam, 5 to 9 percent slopes, eroded	C	1.2	0.0%
174B	Bolan loam, 2 to 5 percent slopes	B	36.1	0.0%
174C	Bolan loam, 5 to 9 percent slopes	B	28.6	0.0%
175B	Dickinson fine sandy loam, 2 to 5 percent slopes	A	90.3	0.1%
175C	Dickinson fine sandy loam, 5 to 9 percent slopes	A	12.8	0.0%
177	Saude loam, 0 to 2 percent slopes	B	292.8	0.4%
177B	Saude loam, 2 to 5 percent slopes	B	4.2	0.0%
198B	Floyd loam, 1 to 4 percent slopes	B/D	93.6	0.1%
207B	Whalan loam, 20 to 30 inches to limestone, 2 to 5 percent slope	C	20.1	0.0%
213B	Rockton loam, 30 to 40 inches to limestone, 2 to 5 percent	C	41.8	0.1%
214B	Rockton loam, 20 to 30 inches to limestone, 2 to 5 percent	C	33.9	0.0%
241B	Burkhardt-Saude complex, 2 to 5 percent slopes	A	28.8	0.0%
284	Flagler fine sandy loam, 0 to 2 percent slopes	A	2.0	0.0%
285B	Burkhardt sandy loam, 2 to 5 percent slopes	A	10.6	0.0%
302B	Coggon loam, 2 to 5 percent slopes	B	45.6	0.1%
353B	Tell silt loam, 2 to 5 percent slopes	C	7.8	0.0%
377B	Dinsdale silt loam, 2 to 5 percent slopes	C	548.9	0.7%
377C	Dinsdale silt loam, 5 to 9 percent slopes	C	20.4	0.0%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
391B	Clyde-Floyd complex, 1 to 4 percent slopes	C/D	1,626.2	2.1%
399	Readlyn silt loam, 1 to 3 percent slopes	C/D	32.4	0.0%
407B	Schley loam, 1 to 4 percent slopes	B/D	137.1	0.2%
408B	Olin sandy loam, 2 to 5 percent slopes	C	179.9	0.2%
408C	Olin sandy loam, 5 to 9 percent slopes	C	19.6	0.0%
412C	Emeline loam, 2 to 9 percent slopes	D	370.3	0.5%
426B	Aredale silt loam, 2 to 5 percent slopes	B	53.9	0.1%
426C	Aredale silt loam, 5 to 9 percent slopes	B	10.0	0.0%
428B	Ely silty clay loam, 2 to 5 percent slopes	C/D	246.2	0.3%
471	Oran loam, 1 to 3 percent slopes	C/D	5.0	0.0%
478G	Nordness-Rock outcrop complex, 25 to 60 percent slopes	D	57.5	0.1%
485	Spillville loam, 0 to 2 percent slopes, occasionally flooded	B/D	61.6	0.1%
488C2	Newvienna silt loam, 5 to 9 percent slopes, moderately eroded	B	190.0	0.2%
488D2	Newvienna silt loam, 9 to 14 percent slopes, moderately eroded	B	751.6	1.0%
489	Ossian silt loam, 0 to 2 percent slopes	B/D	75.8	0.1%
499B	Nordness silt loam, 2 to 5 percent slopes	D	51.8	0.1%
499D	Nordness silt loam, 5 to 14 percent slopes	D	281.6	0.4%
499F	Nordness silt loam, 14 to 25 percent slopes	D	15.9	0.0%
585	Coland-Spillville complex, 0 to 2 percent slopes, occasionally flooded	C/D	40.0	0.1%
626	Hayfield loam, 0 to 2 percent slopes, rarely flooded	B/D	225.8	0.3%
663D2	Seaton silt loam, 9 to 14 percent slopes, moderately eroded	B	70.2	0.1%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
663E2	Seaton silt loam, 14 to 18 percent slopes, moderately eroded	B	7.5	0.0%
703C	Dubuque silt loam, 5 to 9 percent slopes	C	37.0	0.0%
703E	Dubuque silt loam, 14 to 18 percent slopes	C	28.1	0.0%
763E2	Exette silt loam, 14 to 18 percent slopes, moderately eroded	B	11.1	0.0%
763F2	Exette silt loam, 18 to 25 percent slopes, moderately eroded	B	1.1	0.0%
771B	Waubeek silt loam, 2 to 5 percent slopes	C	294.8	0.4%
771C	Waubeek silt loam, 5 to 9 percent slopes	C	52.0	0.1%
776C	Lilah sandy loam, 2 to 9 percent slopes	A	26.7	0.0%
777	Wapsie loam, 0 to 2 percent slopes	B	335.7	0.4%
809B	Bertram fine sandy loam, 2 to 5 percent slopes	B	0.0	0.0%
809C	Bertram fine sandy loam, 5 to 9 percent slopes	B	5.9	0.0%
826	Rowley silt loam, 0 to 3 percent slopes	B/D	333.2	0.4%
907B	Schley loam, sandy substratum, 2 to 5 percent slopes	B/D	12.7	0.0%
933B	Sawmill silty clay loam, shallow loess, 1 to 4 percent slopes, occasionally flooded	C/D	558.5	0.7%
977B	Richwood silt loam, 1 to 6 percent slopes	B	226.4	0.3%
981	Worthen silt loam, 0 to 2 percent slopes	B	284.5	0.4%
981B	Worthen silt loam, 2 to 5 percent slopes	B	325.8	0.4%
1152	Marshan clay loam, 0 to 2 percent slopes, rarely flooded	C/D	216.5	0.3%
1226	Lawler loam, 0 to 2 percent slopes, rarely flooded	B/D	192.2	0.2%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1485	Spillville loam, channeled, 0 to 2 percent slopes	B	120.8	0.2%
5010	Pits, sand and gravel		16.0	0.0%
5030	Pits, limestone quarry		103.3	0.1%
5040	Anthroportic Udorthents, 2 to 9 percent slopes	C	116.9	0.1%
W	Water		56.0	0.1%
WL	Water, waste lagoon		3.5	0.0%
Subtotals for Soil Survey Area			**26,526.9**	**33.9%**
Totals for Area of Interest			**78,226.7**	**100.0%**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
27B	Terril loam, 2 to 5 percent slopes	B	471.4	0.6%
41C	Sparta loamy fine sand, 3 to 9 percent slopes	A	32.6	0.0%
63C	Chelsea loamy fine sand, 5 to 9 percent slopes	A	151.9	0.2%
63D	Chelsea loamy fine sand, 9 to 14 percent slopes	A	56.8	0.1%
63F	Chelsea loamy fine sand, 18 to 25 percent slopes	A	20.5	0.0%
65E2	Lindley loam, 14 to 18 percent slopes, moderately eroded	C	33.8	0.0%
65F	Lindley loam, 18 to 30 percent slopes	C	79.8	0.1%
83B	Kenyon loam, 2 to 5 percent slopes	C	1,039.6	1.3%
83C	Kenyon loam, 5 to 9 percent slopes	C	226.7	0.3%
84	Clyde loam, 0 to 2 percent slopes	C/D	277.1	0.4%
97	Lawson-Huntsville silt loams, 0 to 2 percent slopes	B/D	89.6	0.1%
109C	Backbone fine sandy loam, 5 to 9 percent slopes	B	346.4	0.4%
109D	Backbone fine sandy loam, 9 to 14 percent slopes	B	159.1	0.2%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
110B	Lamont fine sandy loam, 2 to 5 percent slopes	A	107.1	0.1%
110C	Lamont fine sandy loam, 5 to 9 percent slopes	A	195.4	0.2%
110D	Lamont fine sandy loam, 9 to 14 percent slopes	A	65.6	0.1%
119	Muscatine silt loam, 1 to 3 percent slopes	C/D	224.0	0.3%
120B	Tama silt loam, driftless, 2 to 6 percent slopes	C	549.9	0.7%
120C	Tama silt loam, driftless, 5 to 9 percent slopes	C	472.6	0.6%
120C2	Tama silt loam, driftless, 5 to 9 percent slopes, moderately eroded	C	101.4	0.1%
129B	Arenzville-Chaseburg complex, 1 to 5 percent slopes	B	2,029.0	2.6%
142	Chaseburg silt loam, moderately well drained, 0 to 2 percent slopes	B	934.4	1.2%
162B	Downs silt loam, 2 to 6 percent slopes	C	1,126.2	1.4%
162C2	Downs silt loam, 5 to 9 percent slopes, moderately eroded	C	9,472.8	12.1%
162D2	Downs silt loam, 9 to 14 percent slopes, moderately eroded	C	4,037.6	5.2%
162E2	Downs silt loam, 14 to 18 percent slopes, moderately eroded	C	126.9	0.2%
163B	Fayette silt loam, 2 to 6 percent slopes	C	97.8	0.1%
163C	Fayette silt loam, 5 to 9 percent slopes	C	128.0	0.2%
163C2	Fayette silt loam, 5 to 9 percent slopes, moderately eroded	C	1,055.3	1.3%
163D	Fayette silt loam, 9 to 14 percent slopes	C	192.9	0.2%
163D2	Fayette silt loam, 9 to 14 percent slopes, moderately eroded	C	2,514.9	3.2%
163E	Fayette silt loam, 14 to 18 percent slopes	C	8.9	0.0%
163E2	Fayette silt loam, 14 to 18 percent slopes, moderately eroded	C	347.0	0.4%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
163F	Fayette silt loam, 18 to 25 percent slopes	C	121.5	0.2%
163F2	Fayette silt loam, 18 to 25 percent slopes, moderately eroded	C	306.5	0.4%
163G	Fayette silt loam, 25 to 40 percent slopes	C	9.5	0.0%
171B	Bassett loam, 2 to 5 percent slopes	C	155.6	0.2%
171C	Bassett loam, 5 to 9 percent slopes	C	132.7	0.2%
171C2	Bassett loam, 5 to 9 percent slopes, eroded	C	12.9	0.0%
171D	Bassett loam, 9 to 14 percent slopes	C	3.2	0.0%
171D2	Bassett loam, 9 to 14 percent slopes, eroded	C	12.8	0.0%
175B	Dickinson fine sandy loam, 2 to 5 percent slopes	A	60.5	0.1%
175C	Dickinson fine sandy loam, 5 to 12 percent slopes	A	54.9	0.1%
198B	Floyd loam, 1 to 4 percent slopes	B/D	470.0	0.6%
284B	Flagler sandy loam, 2 to 5 percent slopes	A	246.3	0.3%
285D	Burkhardt sandy loam, 5 to 14 percent slopes	A	103.9	0.1%
291	Atterberry silt loam, 1 to 3 percent slopes	C/D	367.7	0.5%
315	Udifluvents, loamy, 0 to 2 percent slopes	A	484.2	0.6%
320	Arenzville silt loam, 0 to 3 percent slopes, occasionally flooded	B	432.1	0.6%
391B	Clyde-Floyd complex, 1 to 4 percent slopes	C/D	1,488.4	1.9%
394B	Ostrander loam, 2 to 5 percent slopes	C	576.5	0.7%
394C	Ostrander loam, 5 to 9 percent slopes	C	113.1	0.1%
407B	Schley loam, 1 to 4 percent slopes	B/D	249.6	0.3%
408B	Olin sandy loam, 2 to 5 percent slopes	C	66.6	0.1%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
408C	Olin sandy loam, 5 to 9 percent slopes	C	177.5	0.2%
412C	Sogn loam, 2 to 9 percent slopes	D	536.8	0.7%
412E	Emeline loam, 9 to 18 percent slopes	D	1,069.5	1.4%
428B	Ely silt loam, 2 to 5 percent slopes	C/D	43.4	0.1%
478G	Nordness-Rock outcrop complex, 18 to 60 percent slopes	D	241.7	0.3%
480C	Orwood silt loam, 5 to 9 percent slopes	B	124.4	0.2%
480C2	Orwood silt loam, 5 to 9 percent slopes, moderately eroded	B	58.8	0.1%
480D	Orwood silt loam, 9 to 14 percent slopes	B	16.5	0.0%
480D2	Orwood silt loam, 9 to 14 percent slopes, moderately eroded	B	287.1	0.4%
480F2	Orwood silt loam, 14 to 25 percent slopes, moderately eroded	B	71.1	0.1%
482B	Racine loam, 2 to 5 percent slopes	C	476.0	0.6%
482C	Racine loam, 5 to 9 percent slopes	B	557.0	0.7%
482C2	Racine loam, 5 to 9 percent slopes, moderately eroded	B	206.9	0.3%
482D2	Racine loam, 9 to 14 percent slopes, moderately eroded	B	116.2	0.1%
482F2	Racine loam, 14 to 25 percent slopes, moderately eroded	B	2.0	0.0%
485	Spillville loam, 0 to 2 percent slopes, occasionally flooded	B/D	218.0	0.3%
487B	Otter-Worthen silt loams, 2 to 5 percent slopes	B/D	467.0	0.6%
488C2	Newvienna silt loam, 5 to 9 percent slopes, moderately eroded	B	1,482.1	1.9%
488D2	Newvienna silt loam, 9 to 14 percent slopes, moderately eroded	B	4,668.5	6.0%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
499D	Nordness silt loam, 9 to 18 percent slopes	D	160.1	0.2%
499F	Nordness silt loam, 18 to 35 percent slopes	D	326.9	0.4%
512D	Marlean sandy loam, 5 to 14 percent slopes	B	31.2	0.0%
520	Coppock silt loam, 0 to 2 percent slopes	B/D	710.0	0.9%
589+	Otter silt loam, overwash, 0 to 2 percent slopes	B/D	255.5	0.3%
626	Hayfield loam, 0 to 2 percent slopes, rarely flooded	B/D	351.4	0.4%
663D2	Seaton silt loam, 9 to 14 percent slopes, moderately eroded	B	26.9	0.0%
663F	Seaton silt loam, 18 to 25 percent slopes	B	6.2	0.0%
703D	Dubuque silt loam, 9 to 14 percent slopes	C	46.8	0.1%
703D2	Dubuque silt loam, 9 to 14 percent slopes, moderately eroded	C	78.6	0.1%
703E2	Dubuque silt loam, 14 to 18 percent slopes, moderately eroded	C	29.1	0.0%
714C	Winneshiek loam, 20 to 30 inches to limestone, 3 to 9 percent slopes	C	361.8	0.5%
763E2	Exette silt loam, 14 to 18 percent slopes, moderately eroded	B	533.3	0.7%
763F2	Exette silt loam, 18 to 25 percent slopes, moderately eroded	B	557.0	0.7%
777B	Wapsie loam, 2 to 7 percent slopes	B	822.4	1.1%
814B	Rockton loam, 2 to 5 percent slopes	C	89.9	0.1%
814C	Rockton loam, 5 to 9 percent slopes	C	136.7	0.2%
915C	Rollingstone silt loam, 5 to 9 percent slopes	C	69.8	0.1%
915C2	Rollingstone silt loam, 5 to 9 percent slopes, moderately eroded	C	29.3	0.0%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
915D2	Rollingstone silt loam, 9 to 14 percent slopes, moderately eroded	C	103.5	0.1%
930B	Orion silt loam, 2 to 5 percent slopes, occassionally flooded	B/D	2,735.9	3.5%
978B2	Festina silt loam, 1 to 6 percent slopes, moderately eroded	B	394.5	0.5%
981B	Worthen silt loam, 2 to 5 percent slopes	B	82.8	0.1%
1152	Marshan clay loam, 0 to 2 percent slopes, rarely flooded	C/D	204.4	0.3%
5030	Pits, limestone quarry		59.9	0.1%
5040	Anthroportic Udorthents, 2 to 9 percent slopes	C	176.9	0.2%
5040D	Orthents, loamy, 5 to 14 percent slopes		5.8	0.0%
W	Water		24.4	0.0%
WL	Water, waste lagoon		13.2	0.0%
Subtotals for Soil Survey Area			**51,486.2**	**65.8%**
Totals for Area of Interest			**78,226.7**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

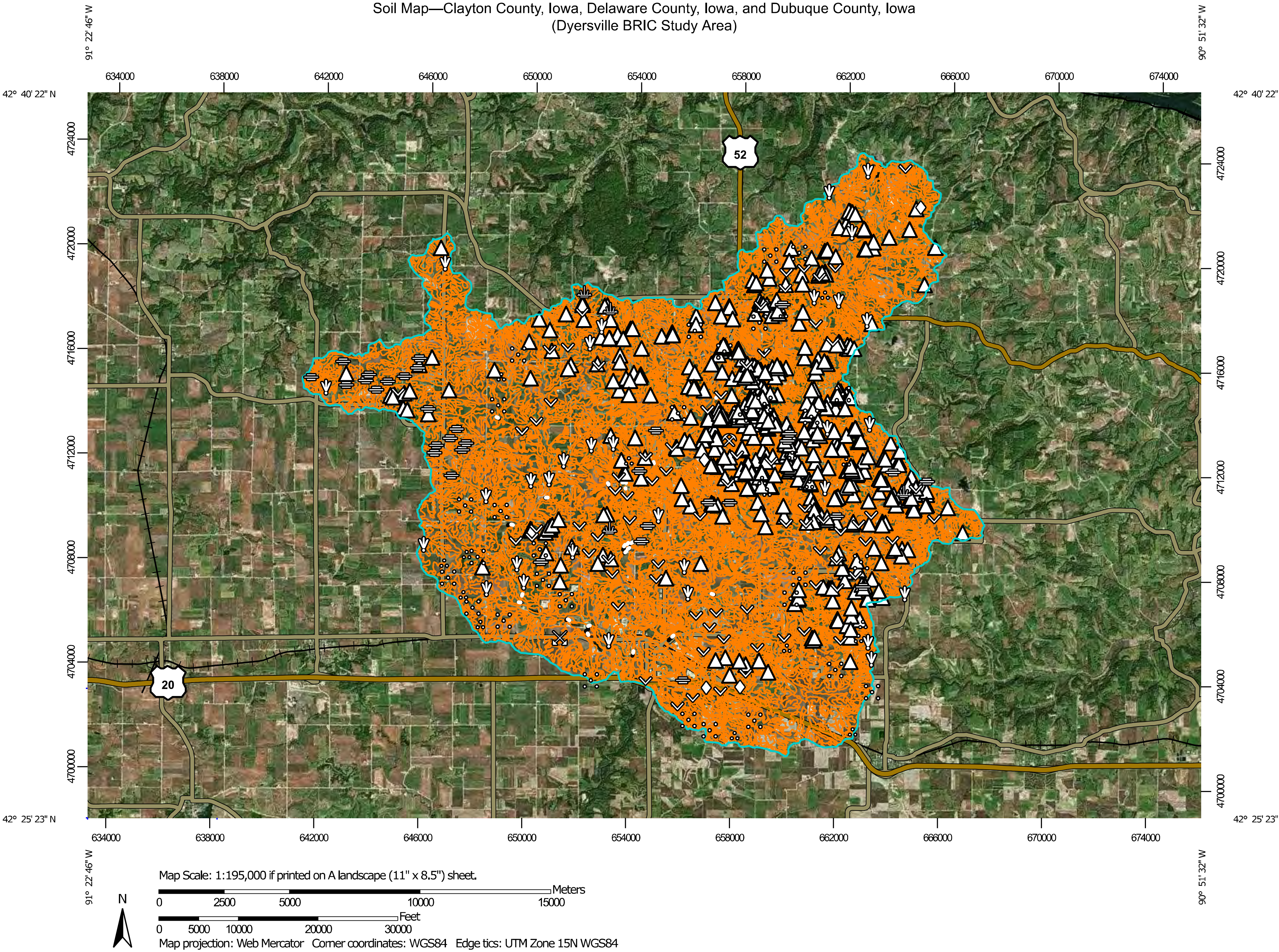
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Soil Map—Clayton County, Iowa, Delaware County, Iowa, and Dubuque County, Iowa
(Dyersville BRIC Study Area)



Map Scale: 1:195,000 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clayton County, Iowa
Survey Area Data: Version 28, Aug 29, 2024

Soil Survey Area: Delaware County, Iowa
Survey Area Data: Version 31, Aug 29, 2024

Soil Survey Area: Dubuque County, Iowa
Survey Area Data: Version 26, Aug 29, 2024

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 1, 1999—Dec 31, 2003

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
163B	Fayette silt loam, 2 to 6 percent slopes	98.2	0.1%
163C2	Fayette silt loam, 5 to 9 percent slopes, moderately eroded	50.3	0.1%
163D3	Fayette silty clay loam, 9 to 14 percent slopes, severely eroded	4.7	0.0%
291	Atterberry silt loam, 1 to 3 percent slopes	38.7	0.0%
930B	Orion silt loam, 2 to 5 percent slopes, occassionally flooded	21.7	0.0%
Subtotals for Soil Survey Area		**213.6**	**0.3%**
Totals for Area of Interest		**78,226.7**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
11B	Colo-Ely complex, 0 to 5 percent slopes	2,591.3	3.3%
41B	Sparta loamy sand, 2 to 5 percent slopes	44.5	0.1%
41C	Sparta loamy sand, 5 to 9 percent slopes	9.1	0.0%
63B	Chelsea loamy fine sand, 2 to 5 percent slopes	2.7	0.0%
63D	Chelsea loamy fine sand, 9 to 14 percent slopes	4.7	0.0%
65D2	Lindley loam, 9 to 14 percent slopes, moderately eroded	10.2	0.0%
65E3	Lindley clay loam, 14 to 18 percent slopes, severely eroded	17.5	0.0%
83B	Kenyon loam, 2 to 5 percent slopes	1,199.8	1.5%
83C	Kenyon loam, 5 to 9 percent slopes	15.6	0.0%
83C2	Kenyon loam, 5 to 9 percent slopes, eroded	4.1	0.0%
84	Clyde clay loam, 0 to 3 percent slopes	7.6	0.0%
109B	Backbone fine sandy loam, 2 to 5 percent slopes	2.8	0.0%
109C	Backbone fine sandy loam, 5 to 9 percent slopes	10.8	0.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
110B	Lamont fine sandy loam, 2 to 5 percent slopes	22.2	0.0%
110C	Lamont fine sandy loam, 5 to 9 percent slopes	48.4	0.1%
119	Muscatine silt loam, 1 to 3 percent slopes	415.9	0.5%
120B	Tama silt loam, driftless, 2 to 6 percent slopes	3,027.8	3.9%
120C	Tama silt loam, driftless, 5 to 9 percent slopes	1,082.2	1.4%
129B	Arenzville-Chaseburg complex, 1 to 5 percent slopes	560.4	0.7%
133+	Colo silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	258.4	0.3%
162B	Downs silt loam, 2 to 6 percent slopes	1,171.5	1.5%
162C2	Downs silt loam, 5 to 9 percent slopes, moderately eroded	3,837.8	4.9%
162D2	Downs silt loam, 9 to 14 percent slopes, moderately eroded	1,496.0	1.9%
163C	Fayette silt loam, 5 to 9 percent slopes	17.9	0.0%
163C2	Fayette silt loam, 5 to 9 percent slopes, moderately eroded	270.3	0.3%
163D	Fayette silt loam, 9 to 14 percent slopes	26.4	0.0%
163D2	Fayette silt loam, 9 to 14 percent slopes, moderately eroded	635.1	0.8%
163D3	Fayette silty clay loam, 9 to 14 percent slopes, severely eroded	166.5	0.2%
163E2	Fayette silt loam, 14 to 18 percent slopes, moderately eroded	208.2	0.3%
163E3	Fayette silty clay loam, 14 to 18 percent slopes, severely eroded	61.1	0.1%
163F	Fayette silt loam, 18 to 25 percent slopes	7.9	0.0%
163F2	Fayette silt loam, 18 to 25 percent slopes, moderately eroded	21.0	0.0%
171B	Bassett loam, 2 to 5 percent slopes	83.2	0.1%
171C2	Bassett loam, 5 to 9 percent slopes, eroded	1.2	0.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
174B	Bolan loam, 2 to 5 percent slopes	36.1	0.0%
174C	Bolan loam, 5 to 9 percent slopes	28.6	0.0%
175B	Dickinson fine sandy loam, 2 to 5 percent slopes	90.3	0.1%
175C	Dickinson fine sandy loam, 5 to 9 percent slopes	12.8	0.0%
177	Saude loam, 0 to 2 percent slopes	292.8	0.4%
177B	Saude loam, 2 to 5 percent slopes	4.2	0.0%
198B	Floyd loam, 1 to 4 percent slopes	93.6	0.1%
207B	Whalan loam, 20 to 30 inches to limestone, 2 to 5 percent slope	20.1	0.0%
213B	Rockton loam, 30 to 40 inches to limestone, 2 to 5 percent	41.8	0.1%
214B	Rockton loam, 20 to 30 inches to limestone, 2 to 5 percent	33.9	0.0%
241B	Burkhardt-Saude complex, 2 to 5 percent slopes	28.8	0.0%
284	Flagler fine sandy loam, 0 to 2 percent slopes	2.0	0.0%
285B	Burkhardt sandy loam, 2 to 5 percent slopes	10.6	0.0%
302B	Coggon loam, 2 to 5 percent slopes	45.6	0.1%
353B	Tell silt loam, 2 to 5 percent slopes	7.8	0.0%
377B	Dinsdale silt loam, 2 to 5 percent slopes	548.9	0.7%
377C	Dinsdale silt loam, 5 to 9 percent slopes	20.4	0.0%
391B	Clyde-Floyd complex, 1 to 4 percent slopes	1,626.2	2.1%
399	Readlyn silt loam, 1 to 3 percent slopes	32.4	0.0%
407B	Schley loam, 1 to 4 percent slopes	137.1	0.2%
408B	Olin sandy loam, 2 to 5 percent slopes	179.9	0.2%
408C	Olin sandy loam, 5 to 9 percent slopes	19.6	0.0%
412C	Emeline loam, 2 to 9 percent slopes	370.3	0.5%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
426B	Aredale silt loam, 2 to 5 percent slopes	53.9	0.1%
426C	Aredale silt loam, 5 to 9 percent slopes	10.0	0.0%
428B	Ely silty clay loam, 2 to 5 percent slopes	246.2	0.3%
471	Oran loam, 1 to 3 percent slopes	5.0	0.0%
478G	Nordness-Rock outcrop complex, 25 to 60 percent slopes	57.5	0.1%
485	Spillville loam, 0 to 2 percent slopes, occasionally flooded	61.6	0.1%
488C2	Newvienna silt loam, 5 to 9 percent slopes, moderately eroded	190.0	0.2%
488D2	Newvienna silt loam, 9 to 14 percent slopes, moderately eroded	751.6	1.0%
489	Ossian silt loam, 0 to 2 percent slopes	75.8	0.1%
499B	Nordness silt loam, 2 to 5 percent slopes	51.8	0.1%
499D	Nordness silt loam, 5 to 14 percent slopes	281.6	0.4%
499F	Nordness silt loam, 14 to 25 percent slopes	15.9	0.0%
585	Coland-Spillville complex, 0 to 2 percent slopes, occasionally flooded	40.0	0.1%
626	Hayfield loam, 0 to 2 percent slopes, rarely flooded	225.8	0.3%
663D2	Seaton silt loam, 9 to 14 percent slopes, moderately eroded	70.2	0.1%
663E2	Seaton silt loam, 14 to 18 percent slopes, moderately eroded	7.5	0.0%
703C	Dubuque silt loam, 5 to 9 percent slopes	37.0	0.0%
703E	Dubuque silt loam, 14 to 18 percent slopes	28.1	0.0%
763E2	Exette silt loam, 14 to 18 percent slopes, moderately eroded	11.1	0.0%
763F2	Exette silt loam, 18 to 25 percent slopes, moderately eroded	1.1	0.0%
771B	Waubeek silt loam, 2 to 5 percent slopes	294.8	0.4%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
771C	Waubeek silt loam, 5 to 9 percent slopes	52.0	0.1%
776C	Lilah sandy loam, 2 to 9 percent slopes	26.7	0.0%
777	Wapsie loam, 0 to 2 percent slopes	335.7	0.4%
809B	Bertram fine sandy loam, 2 to 5 percent slopes	0.0	0.0%
809C	Bertram fine sandy loam, 5 to 9 percent slopes	5.9	0.0%
826	Rowley silt loam, 0 to 3 percent slopes	333.2	0.4%
907B	Schley loam, sandy substratum, 2 to 5 percent slopes	12.7	0.0%
933B	Sawmill silty clay loam, shallow loess, 1 to 4 percent slopes, occasionally flooded	558.5	0.7%
977B	Richwood silt loam, 1 to 6 percent slopes	226.4	0.3%
981	Worthen silt loam, 0 to 2 percent slopes	284.5	0.4%
981B	Worthen silt loam, 2 to 5 percent slopes	325.8	0.4%
1152	Marshan clay loam, 0 to 2 percent slopes, rarely flooded	216.5	0.3%
1226	Lawler loam, 0 to 2 percent slopes, rarely flooded	192.2	0.2%
1485	Spillville loam, channeled, 0 to 2 percent slopes	120.8	0.2%
5010	Pits, sand and gravel	16.0	0.0%
5030	Pits, limestone quarry	103.3	0.1%
5040	Anthroportic Udorthents, 2 to 9 percent slopes	116.9	0.1%
W	Water	56.0	0.1%
WL	Water, waste lagoon	3.5	0.0%
Subtotals for Soil Survey Area		**26,526.9**	**33.9%**
Totals for Area of Interest		**78,226.7**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
27B	Terril loam, 2 to 5 percent slopes	471.4	0.6%
41C	Sparta loamy fine sand, 3 to 9 percent slopes	32.6	0.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
63C	Chelsea loamy fine sand, 5 to 9 percent slopes	151.9	0.2%
63D	Chelsea loamy fine sand, 9 to 14 percent slopes	56.8	0.1%
63F	Chelsea loamy fine sand, 18 to 25 percent slopes	20.5	0.0%
65E2	Lindley loam, 14 to 18 percent slopes, moderately eroded	33.8	0.0%
65F	Lindley loam, 18 to 30 percent slopes	79.8	0.1%
83B	Kenyon loam, 2 to 5 percent slopes	1,039.6	1.3%
83C	Kenyon loam, 5 to 9 percent slopes	226.7	0.3%
84	Clyde loam, 0 to 2 percent slopes	277.1	0.4%
97	Lawson-Huntsville silt loams, 0 to 2 percent slopes	89.6	0.1%
109C	Backbone fine sandy loam, 5 to 9 percent slopes	346.4	0.4%
109D	Backbone fine sandy loam, 9 to 14 percent slopes	159.1	0.2%
110B	Lamont fine sandy loam, 2 to 5 percent slopes	107.1	0.1%
110C	Lamont fine sandy loam, 5 to 9 percent slopes	195.4	0.2%
110D	Lamont fine sandy loam, 9 to 14 percent slopes	65.6	0.1%
119	Muscatine silt loam, 1 to 3 percent slopes	224.0	0.3%
120B	Tama silt loam, driftless, 2 to 6 percent slopes	549.9	0.7%
120C	Tama silt loam, driftless, 5 to 9 percent slopes	472.6	0.6%
120C2	Tama silt loam, driftless, 5 to 9 percent slopes, moderately eroded	101.4	0.1%
129B	Arenzville-Chaseburg complex, 1 to 5 percent slopes	2,029.0	2.6%
142	Chaseburg silt loam, moderately well drained, 0 to 2 percent slopes	934.4	1.2%
162B	Downs silt loam, 2 to 6 percent slopes	1,126.2	1.4%
162C2	Downs silt loam, 5 to 9 percent slopes, moderately eroded	9,472.8	12.1%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
162D2	Downs silt loam, 9 to 14 percent slopes, moderately eroded	4,037.6	5.2%
162E2	Downs silt loam, 14 to 18 percent slopes, moderately eroded	126.9	0.2%
163B	Fayette silt loam, 2 to 6 percent slopes	97.8	0.1%
163C	Fayette silt loam, 5 to 9 percent slopes	128.0	0.2%
163C2	Fayette silt loam, 5 to 9 percent slopes, moderately eroded	1,055.3	1.3%
163D	Fayette silt loam, 9 to 14 percent slopes	192.9	0.2%
163D2	Fayette silt loam, 9 to 14 percent slopes, moderately eroded	2,514.9	3.2%
163E	Fayette silt loam, 14 to 18 percent slopes	8.9	0.0%
163E2	Fayette silt loam, 14 to 18 percent slopes, moderately eroded	347.0	0.4%
163F	Fayette silt loam, 18 to 25 percent slopes	121.5	0.2%
163F2	Fayette silt loam, 18 to 25 percent slopes, moderately eroded	306.5	0.4%
163G	Fayette silt loam, 25 to 40 percent slopes	9.5	0.0%
171B	Bassett loam, 2 to 5 percent slopes	155.6	0.2%
171C	Bassett loam, 5 to 9 percent slopes	132.7	0.2%
171C2	Bassett loam, 5 to 9 percent slopes, eroded	12.9	0.0%
171D	Bassett loam, 9 to 14 percent slopes	3.2	0.0%
171D2	Bassett loam, 9 to 14 percent slopes, eroded	12.8	0.0%
175B	Dickinson fine sandy loam, 2 to 5 percent slopes	60.5	0.1%
175C	Dickinson fine sandy loam, 5 to 12 percent slopes	54.9	0.1%
198B	Floyd loam, 1 to 4 percent slopes	470.0	0.6%
284B	Flagler sandy loam, 2 to 5 percent slopes	246.3	0.3%

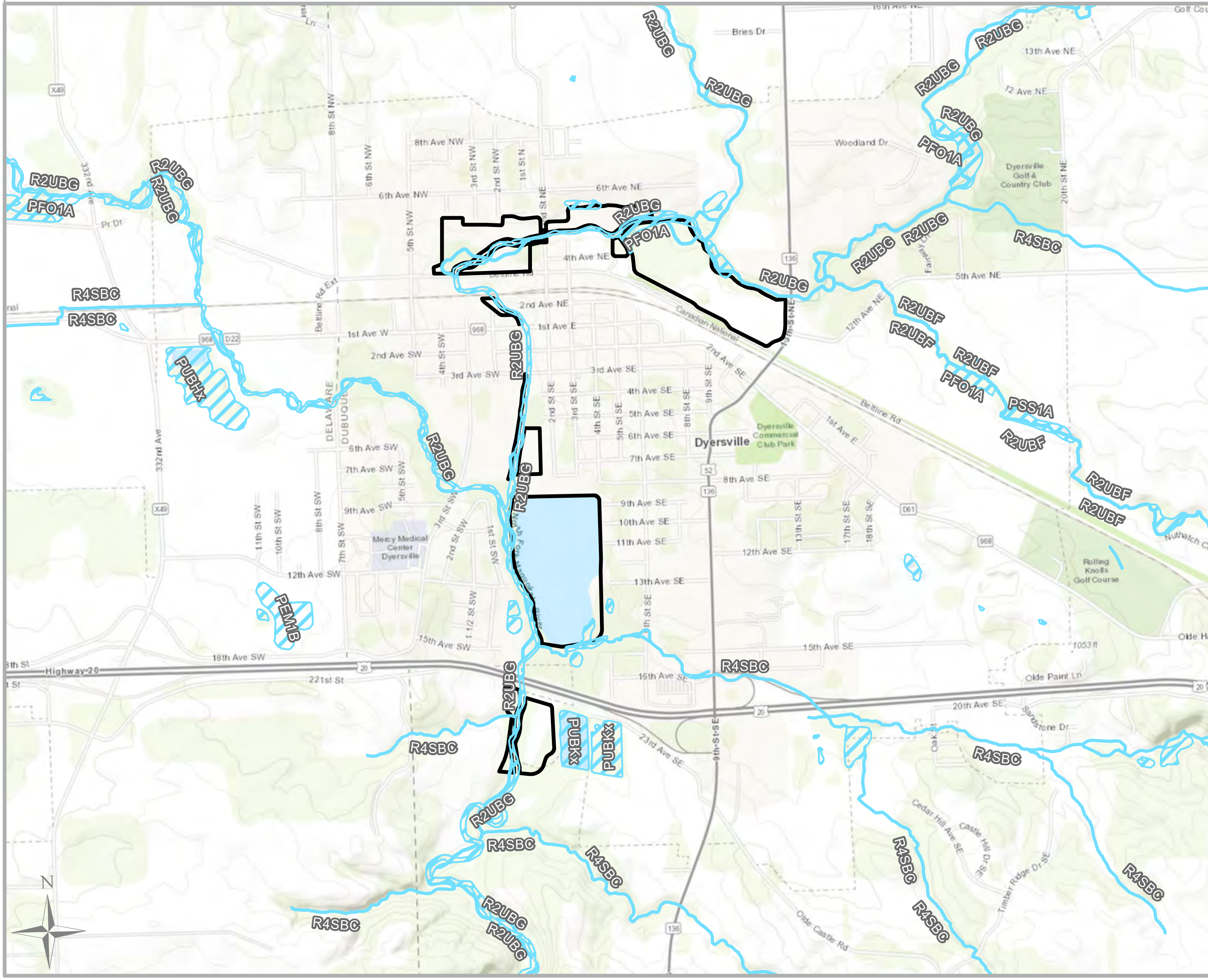
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
285D	Burkhardt sandy loam, 5 to 14 percent slopes	103.9	0.1%
291	Atterberry silt loam, 1 to 3 percent slopes	367.7	0.5%
315	Udifluvents, loamy, 0 to 2 percent slopes	484.2	0.6%
320	Arenzville silt loam, 0 to 3 percent slopes, occasionally flooded	432.1	0.6%
391B	Clyde-Floyd complex, 1 to 4 percent slopes	1,488.4	1.9%
394B	Ostrander loam, 2 to 5 percent slopes	576.5	0.7%
394C	Ostrander loam, 5 to 9 percent slopes	113.1	0.1%
407B	Schley loam, 1 to 4 percent slopes	249.6	0.3%
408B	Olin sandy loam, 2 to 5 percent slopes	66.6	0.1%
408C	Olin sandy loam, 5 to 9 percent slopes	177.5	0.2%
412C	Sogn loam, 2 to 9 percent slopes	536.8	0.7%
412E	Emeline loam, 9 to 18 percent slopes	1,069.5	1.4%
428B	Ely silt loam, 2 to 5 percent slopes	43.4	0.1%
478G	Nordness-Rock outcrop complex, 18 to 60 percent slopes	241.7	0.3%
480C	Orwood silt loam, 5 to 9 percent slopes	124.4	0.2%
480C2	Orwood silt loam, 5 to 9 percent slopes, moderately eroded	58.8	0.1%
480D	Orwood silt loam, 9 to 14 percent slopes	16.5	0.0%
480D2	Orwood silt loam, 9 to 14 percent slopes, moderately eroded	287.1	0.4%
480F2	Orwood silt loam, 14 to 25 percent slopes, moderately eroded	71.1	0.1%
482B	Racine loam, 2 to 5 percent slopes	476.0	0.6%
482C	Racine loam, 5 to 9 percent slopes	557.0	0.7%
482C2	Racine loam, 5 to 9 percent slopes, moderately eroded	206.9	0.3%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
482D2	Racine loam, 9 to 14 percent slopes, moderately eroded	116.2	0.1%
482F2	Racine loam, 14 to 25 percent slopes, moderately eroded	2.0	0.0%
485	Spillville loam, 0 to 2 percent slopes, occasionally flooded	218.0	0.3%
487B	Otter-Worthen silt loams, 2 to 5 percent slopes	467.0	0.6%
488C2	Newvienna silt loam, 5 to 9 percent slopes, moderately eroded	1,482.1	1.9%
488D2	Newvienna silt loam, 9 to 14 percent slopes, moderately eroded	4,668.5	6.0%
499D	Nordness silt loam, 9 to 18 percent slopes	160.1	0.2%
499F	Nordness silt loam, 18 to 35 percent slopes	326.9	0.4%
512D	Marlean sandy loam, 5 to 14 percent slopes	31.2	0.0%
520	Coppock silt loam, 0 to 2 percent slopes	710.0	0.9%
589+	Otter silt loam, overwash, 0 to 2 percent slopes	255.5	0.3%
626	Hayfield loam, 0 to 2 percent slopes, rarely flooded	351.4	0.4%
663D2	Seaton silt loam, 9 to 14 percent slopes, moderately eroded	26.9	0.0%
663F	Seaton silt loam, 18 to 25 percent slopes	6.2	0.0%
703D	Dubuque silt loam, 9 to 14 percent slopes	46.8	0.1%
703D2	Dubuque silt loam, 9 to 14 percent slopes, moderately eroded	78.6	0.1%
703E2	Dubuque silt loam, 14 to 18 percent slopes, moderately eroded	29.1	0.0%
714C	Winneshiek loam, 20 to 30 inches to limestone, 3 to 9 percent slopes	361.8	0.5%
763E2	Exette silt loam, 14 to 18 percent slopes, moderately eroded	533.3	0.7%
763F2	Exette silt loam, 18 to 25 percent slopes, moderately eroded	557.0	0.7%
777B	Wapsie loam, 2 to 7 percent slopes	822.4	1.1%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
814B	Rockton loam, 2 to 5 percent slopes	89.9	0.1%
814C	Rockton loam, 5 to 9 percent slopes	136.7	0.2%
915C	Rollingstone silt loam, 5 to 9 percent slopes	69.8	0.1%
915C2	Rollingstone silt loam, 5 to 9 percent slopes, moderately eroded	29.3	0.0%
915D2	Rollingstone silt loam, 9 to 14 percent slopes, moderately eroded	103.5	0.1%
930B	Orion silt loam, 2 to 5 percent slopes, occassionally flooded	2,735.9	3.5%
978B2	Festina silt loam, 1 to 6 percent slopes, moderately eroded	394.5	0.5%
981B	Worthen silt loam, 2 to 5 percent slopes	82.8	0.1%
1152	Marshan clay loam, 0 to 2 percent slopes, rarely flooded	204.4	0.3%
5030	Pits, limestone quarry	59.9	0.1%
5040	Anthroportic Udorthents, 2 to 9 percent slopes	176.9	0.2%
5040D	Orthents, loamy, 5 to 14 percent slopes	5.8	0.0%
W	Water	24.4	0.0%
WL	Water, waste lagoon	13.2	0.0%
Subtotals for Soil Survey Area		**51,486.2**	**65.8%**
Totals for Area of Interest		**78,226.7**	**100.0%**

Figure A3

National Wetland Inventory



DESCRIPTION

Green Infrastructure Flood Mitigation
Project Scoping Study
City of Dyersville
Dyersville, IA

Map Creator: Katie Goff

Service Layer Credits: Iowa DNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA
Coordinate System:NAD 1983 StatePlane Iowa North FIPS 1401 Feet
Date Exported: 11/21/2024
File Path: Y:\Projects\Watershed\DYS_23010\GIS\Dyersville_BCA\BCA\

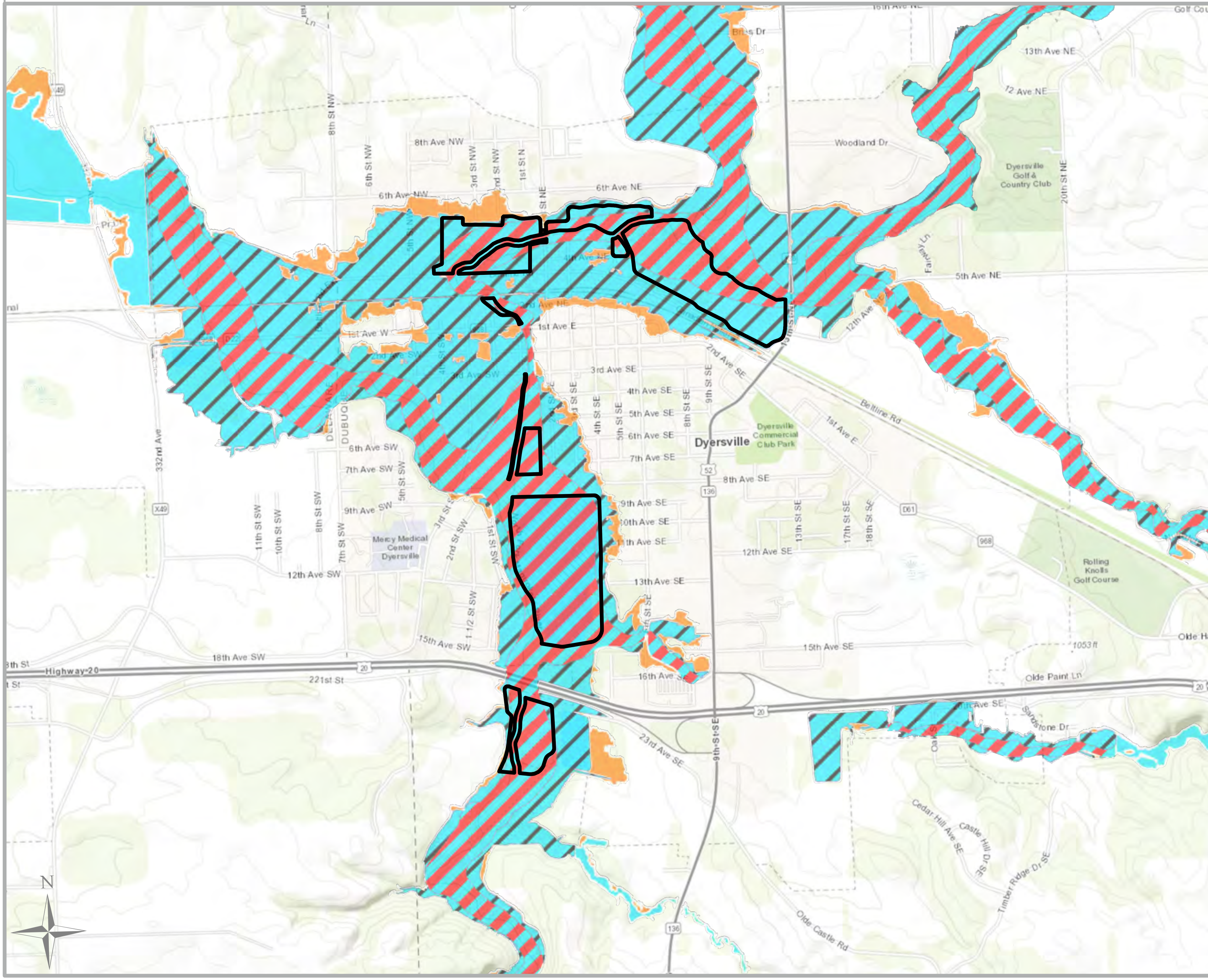
Legend

- NWI Wetland
- Study Area Potential Projects

0 500 1,000 2,000
Feet

Figure A4

FEMA Floodplain Map



DESCRIPTION

Green Infrastructure Flood Mitigation
Project Scoping Study
City of Dyersville
Dyersville, IA

Map Creator: Katie Goff

Service Layer Credits: Iowa Department of Natural Resources and Iowa Flood Center, Iowa DNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA
Coordinate System:NAD 1983 StatePlane Iowa North FIPS 1401 Feet
Date Exported: 11/20/2024
File Path: Y:\Projects\Watershed\DYS_23010\GIS\Dyersville_BCA\BCA\

Legend

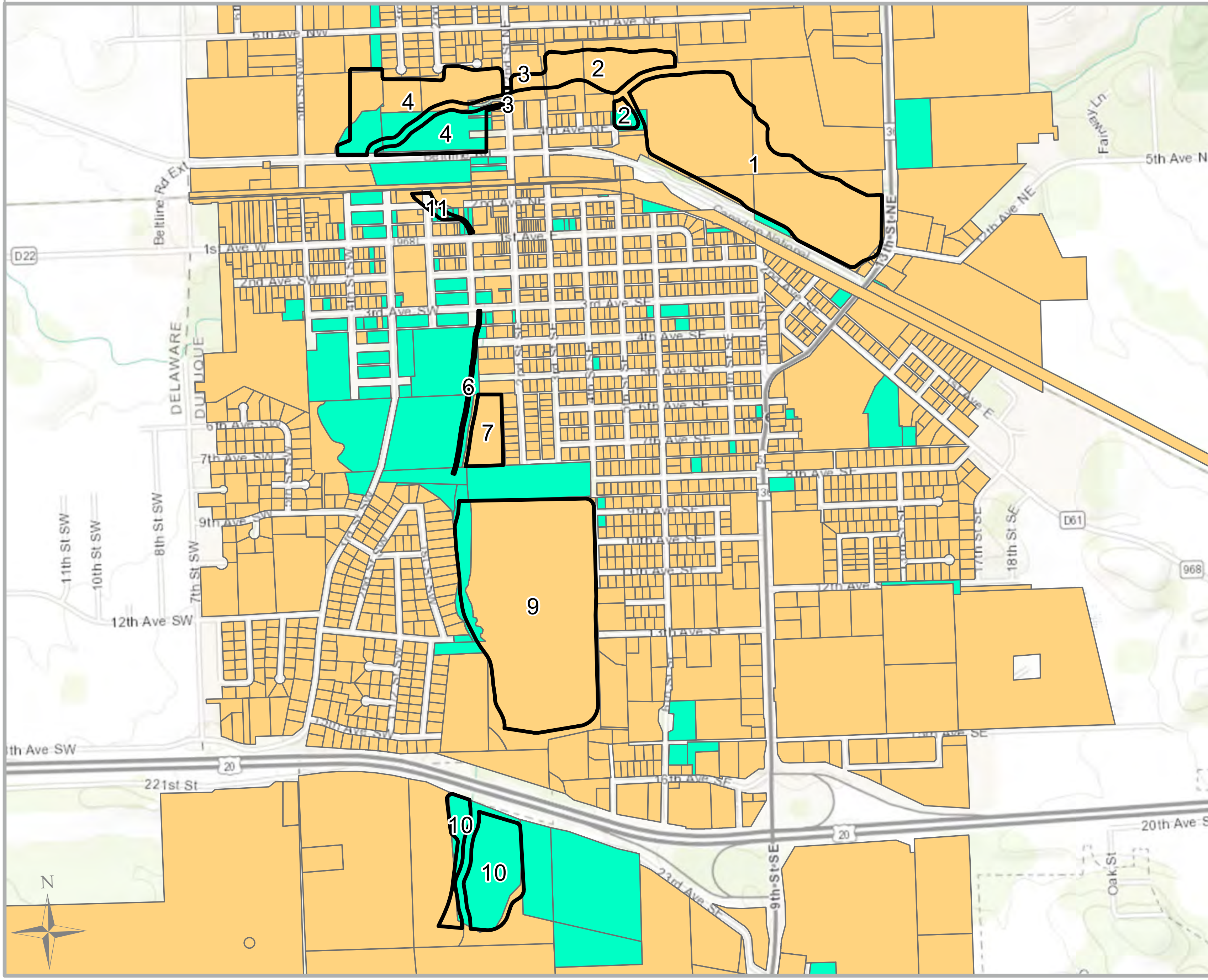
Flood Zone

- A - 1 PCT ANNUAL CHANCE FLOOD HAZARD
- AE - 1 PCT ANNUAL CHANCE FLOOD HAZARD
- AE - FLOODWAY
- AO, RIVERINE
- AH, RIVERINE
- 0.2 PCT ANNUAL CHANCE FLOOD HAZARD, RIVERINE
- 0.2 PCT ANNUAL CHANCE FLOOD HAZARD, PROTECTED BY LEVEE
- X AREA OF SPECIAL CONSIDERATION, RIVERINE
- X AREA OF SPECIAL CONSIDERATION, PROTECTED BY LEVEE
- D, AN AREA OF UNDETERMINED BUT POSSIBLE FLOOD HAZARDS
- X, AREAS DETERMINED TO BE OUTSIDE THE 0.2 PCT ANNUAL CHANCE FLOODPLAIN

0 500 1,000 2,000
Feet

Figure A5

Proposed Practice Locations and Property Owners



DESCRIPTION

Green Infrastructure Flood Mitigation Project Scoping Study
City of Dyersville
Dyersville, IA

Map Creator: Katie Goff

Service Layer Credits: Iowa DNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA
Coordinate System:NAD 1983 StatePlane Iowa North FIPS 1401 Feet
Date Exported: 11/20/2024
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Legend

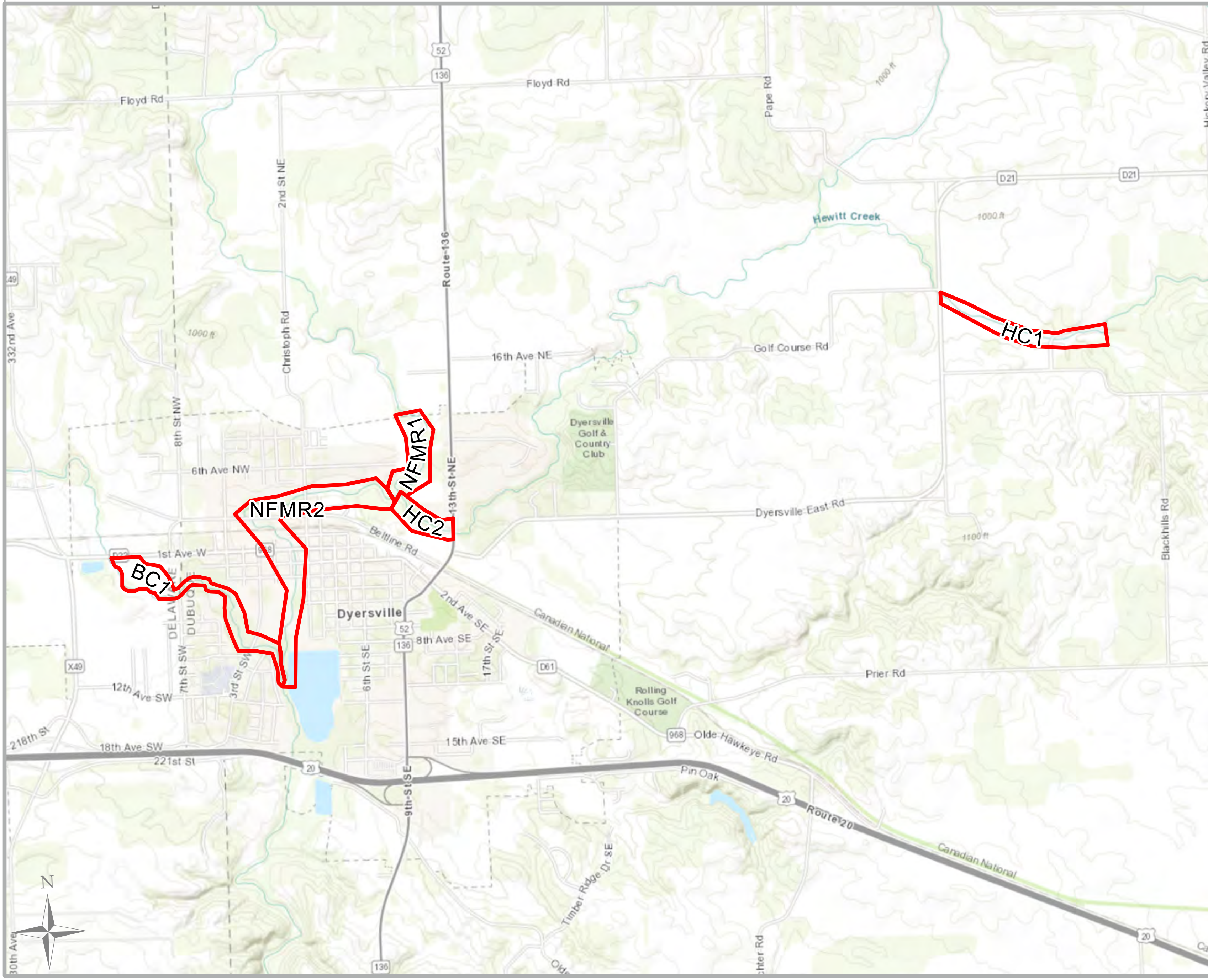
- Study Area Potential Projects
- Parcels Owned by City of Dyersville
- Parcels Owned by Private Owners

0 350 700 1,400
Feet

Appendix B

Stream Channel Classification Forms, BANCS Analysis

Figure B1
Stream Assessment Areas



DESCRIPTION

Green Infrastructure Flood Mitigation Project Scoping Study
City of Dyersville
Dyersville, IA

Map Creator: Katie Goff

Service Layer Credits: Iowa DNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA
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Date Exported: 11/21/2024
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Legend

Stream Assessment Areas

0 1,000 2,000 4,000
Feet

Figure B2

BEHI Values

DESCRIPTION

Green Infrastructure Flood Mitigation
Project Scoping Study
City of Dyersville
Dyersville, IA

Map Creator: Katie Goff

Service Layer Credits: Iowa DNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA, USDA NAIP, Iowa State University GIS Facility
Coordinate System:NAD 1983 StatePlane Iowa North FIPS 1401 Feet
Date Exported: 11/22/2024
File Path: Y:\Projects\Watershed\DYS_23010\GIS\Dyersville_BCA\BCA\

Legend

BEHI
- Extreme
- Very High
- High
- Medium
- Study Area Potential Projects
- Stream Centerlines

0 250 500 1,000
Feet

RIVERMORPH BEHI SUMMARY REPORT

River Name: Bear Creek
Reach Name: **BC1**

Table 1. Bank Identification Summary

Bank	Name
1	Extreme - moderate
2	High - High
3	High - moderate
4	Moderate - low
5	Moderate - moderate
6	Very high - extreme
7	Very high - low
8	Very high - moderate
9	Very high - very high
10	Very high - very low

Table 2. Predicted Annual Bank Erosion Rates

Bank	BEHI Numeric Rating	BEHI Adjective Rating	NBS Adjective Rating	Length ft	Loss cu yds/yr	Loss tons/yr
1	0	Extreme	Moderate	50	27.3148	35.5093
2	0	High	High	38	1.6607	2.159
3	0	High	Moderate	367	12.8314	16.6808
4	0	Moderate	Low	469	3.0746	3.9969
5	0	Moderate	Moderate	271	3.5531	4.619
6	0	Very High	Extreme	130	42.6111	55.3944
7	0	Very High	Low	103	13.5044	17.5558
8	0	Very High	Moderate	385	64.0226	83.2294
9	0	Very High	Very High	125	32.7778	42.6111
10	0	Very High	Very Low	229	21.0171	27.3222
Totals				2167	222.3676	289.0779

Total Reach Ln: 3894   Total Loss (tons/yr) per ft of Reach: 0.0742

RIVERMORPH BEHI SUMMARY REPORT

River Name: Hewitt Creek
Reach Name: HC2

Table 1. Bank Identification Summary

Bank	Name
1	Very high - high
2	Very high - moderate

Table 2. Predicted Annual Bank Erosion Rates

Bank	BEHI Numeric Rating	BEHI Adjective Rating	NBS Adjective Rating	Length ft	Loss cu yds/yr	Loss tons/yr
1	0	Very High	High	367	142.5319	185.2915
2	0	Very High	Moderate	163	47.1553	61.3019
Totals				530	189.6872	246.5934

Total Reach Ln: 1612   Total Loss (tons/yr) per ft of Reach: 0.1530

RIVERMORPH BEHI SUMMARY REPORT

River Name: North Fork Maquoketa River
Reach Name: NFMR1

Table 1. Bank Identification Summary

Bank	Name
1	Extreme - high
2	Very high - moderate

Table 2. Predicted Annual Bank Erosion Rates

Bank	BEHI Numeric Rating	BEHI Adjective Rating	NBS Adjective Rating	Length ft	Loss cu yds/yr	Loss tons/yr
1	0	Extreme	High	24	29.3867	38.2027
2	0	Very High	Moderate	117	27.521	35.7773
Totals				141	56.9077	73.98

Total Reach Ln: 1382   Total Loss (tons/yr) per ft of Reach: 0.0535

RIVERMORPH BEHI SUMMARY REPORT

River Name: North Fork Maquoketa River
Reach Name: NFMR2

Table 1. Bank Identification Summary

Bank	Name
1	High - extreme
2	High - high
3	High - moderate
4	High - very high
5	Moderate - moderate
6	Very high - high
7	Very high - very high

Table 2. Predicted Annual Bank Erosion Rates

Bank	BEHI Numeric Rating	BEHI Adjective Rating	NBS Adjective Rating	Length ft	Loss cu yds/yr	Loss tons/yr
1	0	High	Extreme	113	13.3926	17.4104
2	0	High	High	424	20.1007	26.131
3	0	High	Moderate	846	32.0853	41.7109
4	0	High	Very High	266	18.9156	24.5902
5	0	Moderate	Moderate	86	1.2231	1.59
6	0	Very High	High	119	27.6433	35.9362
7	0	Very High	Very High	263	74.8089	97.2516
Totals				2117	188.1695	244.6203

Total Reach Ln: 5032   Total Loss (tons/yr) per ft of Reach: 0.0486

RIVERMORPH STREAM CHANNEL CLASSIFICATION

River Name: Bear Creek
Reach Name: Reach 1 <-- This is not a Reference Reach
Drainage Area: 37.7 sq mi
State: Iowa
County: Dubuque
Latitude: 42.4822365
Longitude: -91.1339363
Survey Date: 10/10/2023

Classification Data

Valley Type:	U-AL-FD
Valley Slope:	0.0026 ft/ft
Number of Channels:	Single
Width:	42.08 ft
Mean Depth:	2.49 ft
Flood-Prone Width:	81.07 ft
Channel Materials D50:	6.4 mm
Water Surface Slope:	0.0019 ft/ft
Sinuosity:	1.37
Discharge:	443.975 cfs
Velocity:	4.236 fps
Cross Sectional Area:	104.81 sq ft
Entrenchment Ratio:	1.93
Width to Depth Ratio:	16.9
Rosgen Stream Classification:	B 4c

RIVERMORPH STREAM CHANNEL CLASSIFICATION

River Name: Hewitt Creek
Reach Name: HC1 <-- This is not a Reference Reach
Drainage Area: 4.31 sq mi
State: Iowa
County: Dubuque
Latitude: 42.49756
Longitude: -91.056235
Survey Date: 10/30/2023

Classification Data

Valley Type:	cboValley
Valley Slope:	0.0063 ft/ft
Number of Channels:	Single
Width:	14.55 ft
Mean Depth:	1.67 ft
Flood-Prone Width:	68.96 ft
Channel Materials D50:	2 mm
Water Surface Slope:	0.006 ft/ft
Sinuosity:	1.05
Discharge:	80.965 cfs
Velocity:	3.336 fps
Cross Sectional Area:	24.27 sq ft
Entrenchment Ratio:	4.74
Width to Depth Ratio:	8.71
Rosgen Stream Classification:	E 5

RIVERMORPH STREAM CHANNEL CLASSIFICATION

River Name: Hewitt Creek
Reach Name: HC2 <-- This is not a Reference Reach
Drainage Area: 37.7 sq mi
State: Iowa
County: Dubuque
Latitude: 42.4856008
Longitude: -91.1103558
Survey Date: 10/10/2023

Classification Data

Valley Type:	U-AL-FD
Valley Slope:	0.0020 ft/ft
Number of Channels:	Single
Width:	48.21 ft
Mean Depth:	2.41 ft
Flood-Prone Width:	86.73 ft
Channel Materials D50:	20.9 mm
Water Surface Slope:	0.0018 ft/ft
Sinuosity:	1.12
Discharge:	417.912 cfs
Velocity:	3.603 fps
Cross Sectional Area:	115.99 sq ft
Entrenchment Ratio:	1.8
Width to Depth Ratio:	20
Rosgen Stream Classification:	B 4c

RIVERMORPH STREAM CHANNEL CLASSIFICATION

River Name:	North Fork Maquoketa River
Reach Name:	NFMR1 <-- This is not a Reference Reach
Drainage Area:	80.1 sq mi
State:	Iowa
County:	Dubuque
Latitude:	42.4909804
Longitude:	-91.1124195
Survey Date:	10/09/2023

Classification Data

Valley Type:	U-AL-FD
Valley Slope:	0.0022 ft/ft
Number of Channels:	Single
Width:	49.75 ft
Mean Depth:	3.78 ft
Flood-Prone Width:	118.92 ft
Channel Materials D50:	6 mm
Water Surface Slope:	0.0018 ft/ft
Sinuosity:	1.22
Discharge:	776.425 cfs
Velocity:	4.133 fps
Cross Sectional Area:	187.86 sq ft
Entrenchment Ratio:	2.39
Width to Depth Ratio:	13.16
Rosgen Stream Classification:	C 4

RIVERMORPH STREAM CHANNEL CLASSIFICATION

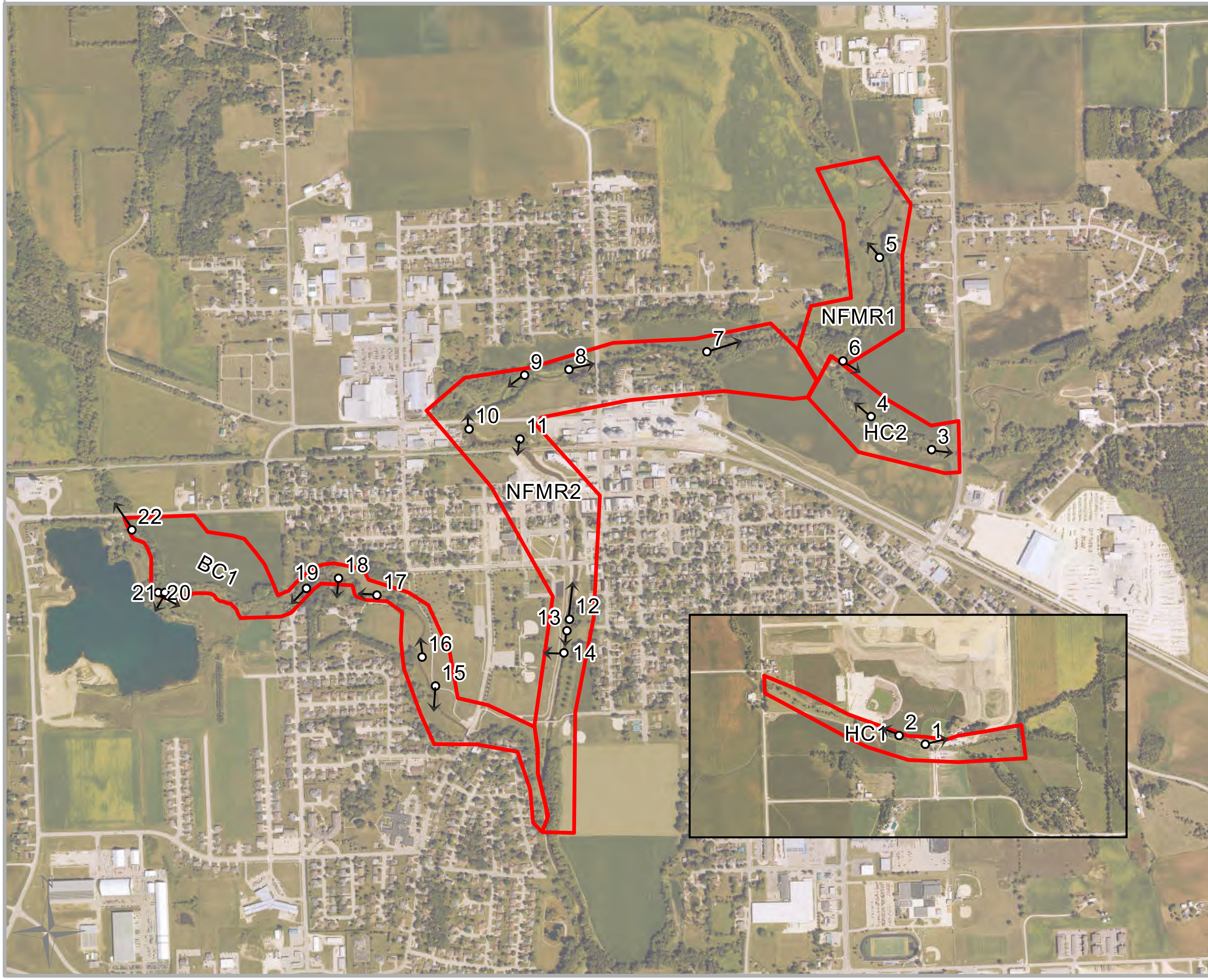
River Name: North Fork Maquoketa River
Reach Name: **NFMR2** <-- This is not a Reference Reach
Drainage Area: 122 sq mi
State: Iowa
County: Dubuque
Latitude: 42.487977
Longitude: -91.1242569
Survey Date: 10/09/2023

Classification Data

Valley Type:	U-AL-FD
Valley Slope:	0.0022 ft/ft
Number of Channels:	Single
Width:	118.52 ft
Mean Depth:	2.63 ft
Flood-Prone Width:	174.21 ft
Channel Materials D50:	1.5 mm
Water Surface Slope:	0.00198 ft/ft
Sinuosity:	1.09
Discharge:	1094.089 cfs
Velocity:	3.513 fps
Cross Sectional Area:	311.44 sq ft
Entrenchment Ratio:	1.47
Width to Depth Ratio:	45.06
Rosgen Stream Classification:	B 5c

Appendix C
Stream Photo Log

Figure C1
Photo Log Map



DESCRIPTION

Green Infrastructure Flood Mitigation
Project Scoping Study
City of Dyersville
Dyersville, IA

Map Creator: Katie Goff

Service Layer Credits: USDA NAIP, Iowa State University GIS Facility
Coordinate System:NAD 1983 StatePlane Iowa North FIPS 1401 Feet
Date Exported: 11/22/2024
File Path: Y:\Projects\Watershed\DYS_23010\GIS\Dyersville_BRIC\Dyersville BRIC Field Work\

Legend

Stream Assessment Areas
Photo point

0 437.5 875 1,750
Feet

Photo point 1: Hewitt Creek at Field of Dreams looking northeast.
Date taken: November 17, 2023

Photo point 2: Hewitt Creek at Field of Dreams looking west-northwest.
Date taken: November 17, 2023

Photo point 3: Hewitt Creek facing east towards 11st St NE bridge.
Date taken: October 10, 2023

Photo point 4: Hewitt Creek looking northwest towards confluence with North Fork Maquoketa River.
Date taken: October 10, 2023

Photo point 5: North Fork Maquoketa River looking northwest.
Date taken: October 10, 2023

Photo point 6: North Fork Maquoketa River looking east toward severely eroded bank.
Date taken: October 10, 2023

Photo point 7: North Fork Maquoketa River looking northeast. Deposition within floodplain visible on left, forming new bankfull channel. Invasive Japanese hops at right side of photo.
Date taken: October 10, 2023

Photo point 8: North Fork Maquoketa River looking East towards 2nd St NE bridge.
Date taken: October 9, 2023

Photo point 9: North Fork Maquoketa River looking southwest. Sandbar deposition on left side of photo indicates new bankfull channel formation. Eroded banks in background.
Date taken: October 9, 2023

Photo point 10: North Fork Maquoketa River, looking north beneath Beltline Rd bridge.
Date taken: October 9, 2023

Photo point 11: North Fork Maquoketa River & Canadian National Railway bridge looking southwest.
Date taken: October 9, 2023

Photo point 12: North Fork Maquoketa River & 3rd Ave bridge looking north.
Date taken: July 24, 2018

Photo point 13: North Fork Maquoketa River, looking south. Invasive Japanese knotweed lining right riverbank.
Date taken: July 24, 2018

Photo point 14: North Fork Maquoketa River looking west. Invasive Japanese knotweed dominates the incised river.
Date taken: July 24, 2018

Photo point 15: Bear Creek restoration sign. Restored creek and riparian corridor in background.
Date taken: July 11, 2023

Photo point 16: Bear Creek three years after restoration, looking north.
Date taken: July 11, 2023

Photo point 17: Bear Creek looking west. Invasive Japanese knotweed covering and otherwise unstable streambank.
Date taken: October 10, 2023

Photo point 18: Bear Creek looking south. Old pieces of concrete sidewalk used for bank stabilization.
Date taken: October 10, 2023

Photo point 19: Bear Creek looking southwest.
Date taken: October 10, 2023

Photo point 20: Bear Creek looking southeast. Severely eroded, overhanging bank.
Date taken: October 10, 2023

Photo point 21: Bear Creek looking southwest. Severely eroded bank shows degree of stream incision.
Date taken: October 10, 2023

Photo point 22: Bear Creek looking northwest towards 1st Ave bridge.
Date taken: October 10, 2023

Appendix D
Iowa River Restoration Toolbox

IOWA DEPARTMENT OF NATURAL RESOURCES

Project Information

BC1

1 Designer Name

Enter your full name

Reid Stamer

Enter your email address

rstamer@eocene.com

Enter your phone number (123)456-7890

319-451-7965

2 Stream name

Bear Creek

3 Project Location

Upstream Project Coordinates (Web Mercator)

X

-10145718.33

Y

5233807.763

Downstream Project Coordinates (Web Mercator)

X

-10144604.03

Y

5233430.049

4 County

Dubuque

5 Watersheds

HUC 8 watershed name - select from drop-down list

07060006 - Maquoketa

Select the 8 digit hydrologic unit code surrounding the project area

HUC 12 watershed name - select from drop down list

070600060602 - Bear Creek

Select the 12 digit hydrologic unit code surrounding the project area

6 Project Goals and Objectives

Address flooding impacts and riparian floodplain restoration associated with Building Resilient Infrastructure and Communities FEMA funding.

What are the concerns or problems?

downcutting
poor habitat options
lateral bank erosion

IOWA DEPARTMENT OF NATURAL RESOURCES

Watershed

7 Drainage Area (DA)

37.7 square miles

8 **Enter appropriate regional curve? Select from drop-down list.**

Watershed < 10% Impervious Cover Provisional Iowa Regional Curve

For User Defined enter the components of the formula y = **a** x ^{exp} below

Bankfull Cross Sectional Area

7.7275269	a
0.7496926	exp

Bankfull Discharge

19.6078073	a
0.8438092	exp

1. Provisional Iowa Regional Curves by Iowa State University, Tanner Bonham
2. Recommend basing % impervious cover on the entire upstream catchment using GIS or StreamStats data.

9 In what geomorphic region is the project site located? Select from drop-down list.

Iowan Surface

10 Flow Regime - Select from drop-down list.

perennial

Click button to See Line Art Drawing 1 (View 1) Flow Regime

11 Valley Type (broad level) - Select from drop-down list.

unconfined

12 Landuse - Select from drop-down list.

Has landuse in the watershed changed significantly in the last twenty years (i.e. cropland to urban, forest to cropland, etc.)?

no change

Click button to See Line Art Drawing 2 (View 2) Riparian Diagram

13 Reference Reach

Is a nearby reference reach of a stream with similar traits (alluvial, step-pool) and valley type available for comparison? Select from drop-down list. Note: Enter reference reach data in tabs "Reference A" & "Reference B".

No

If yes, please describe

Click button to See Line Art Drawing 3 (View 3) Survey Figure

14 Floodplain Impacts

Is the project area on a FEMA Flood Map? Select from drop-down list. For details, please visit the FEMA Map Service Center.

IOWA DEPARTMENT OF NATURAL RESOURCES

Site Geometry and Calculations

15 Stream Length (SL)

Distance along the center of the channel (equidistant from each edge of channel) from start to end of project limits

3894 feet

Click button to See Line Art Drawing 4 (View 4) Sinuosity

16 Valley Length (VL)

Along the “big picture” channel alignment not including meanders.

2737 feet

Click button to See Line Art Drawing 4 (View 4) Sinuosity

17 Valley Width

670 feet

Click button to See Line Art Drawing 4 (View 4) Sinuosity

18 Channel slope

(average bankfull slope)

0.19 %

Click button to See Line Art Drawing 5 (View 5) Longitudinal Profile

Click button to See Line Art Drawing 7 (View 7) Facet Terminology

19 Low Bank Height (LBH) (riffle)

5.87 feet

Click button to See Line Art Drawing 6 (View 6) Incision Ratio

20 Bankfull Width (W_{BKF}) (riffle)

Note: Site may have multiple riffles - choose most representative riffle.

42.08 feet

Click button to See Line Art Drawing 7 (View 7) Facet Terminology

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

21 Low Flow Depth (riffle)

Depth of low flow condition.

1.51 feet

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

22 Mean Bankfull Depth (d_{BKF}) (riffle)

2.49 feet

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

23 Maximum Bankfull Depth (d_{MAX}) (riffle)

3.73 feet

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

24 Maximum Pool Depth (d_{MAXP})

5.5 feet

Click button to See Line Art Drawing 5 (View 5) Longitudinal Profile

25 Width of Flood-Prone Area (W_{FPA})

81.1 feet

Click button to See Line Art Drawing 9 (View 9) Entrenchment Ratio

26 Average Pool to Pool Spacing (P_S)

204 feet

Click button to See Line Art Drawing 5 (View 5) Longitudinal Profile

27 Belt Width (W_{BLT})

440 feet

Click button to See Line Art Drawing 10 (View 10) Meander Terminology

28 What is the dominant BEHI Rating?

high

Click button to See Line Art Drawing 20 (View 20) BEHI Variables

29 What is the D_{50} of the reach?

For Bedrock enter 2048 mm

6.4 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

30 Bankfull discharge (Q_{BKF})

Validate with combination of field and desktop methods.

Bankfull discharge is less than the 2-year (50 percent) peak flow.

Method - select from drop down list	cfs
Manning	443
StreamStats Peak-Flow report	822

31 Bankfull discharge (Q_{BKF}) - Design

Use best judgement based on results listed above.

443 cfs

32 Is the stream made of a single channel or multiple channels? Select from drop down list.

single thread

Calculated Values

33	**Channel sinuosity** Click button to See Line Art Drawing 4 (View 4) Sinuosity	1.42
34	**Channel slope (average bankfull slope)** Click button to See Line Art Drawing 7 (View 7) Facet Terminology	0.1900 %
35	**Width to depth ratio** Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry	16.90
36	**Entrenchment Ratio (ER)** Click button to See Line Art Drawing 9 (View 9) Entrenchment Ratio	1.93
37	**Bankfull Cross Sectional Area (A_{BKF})** Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry	104.8 sq ft
38	**Bank Height ratio (BHR)** Click button to See Line Art Drawing 6 (View 6) Incision Ratio	1.57
39	**Pool Depth Ratio**	2.21
40	**Pool to Pool Spacing Ratio**	4.80
41	**Meander Width Ratio**	10.46
42	**Stream Type** Click button to See Line Art Drawing 12 (View 12) Rosgen Stream Types	B4c

IOWA DEPARTMENT OF NATURAL RESOURCES

Geology

43 What are the dominant bed materials? Select from drop-down list.

gravel (2 mm - 64 mm)

Click button to See Line Art Drawing 13 (View 13) Bed vs Bank

44 What are the dominant bank materials? Select from drop-down list.

silt/clay (<0.062 mm)

Click button to See Line Art Drawing 13 (View 13) Bed vs Bank

45 D_{50} riffle armor

7.51 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

46 D_{50} bar sample

6.4 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

47 D_{100} bar sample

167 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

IOWA DEPARTMENT OF NATURAL RESOURCES

Planform Stability

48 Has the proposed stream segment been mechanically straightened or dredged in the past? Select from drop-down list.

No

49 Does the proposed stream segment have man-made levees? Select from drop-down list.

No

50 Meander Pattern - Select from drop-down list.

irregular meanders

Click button to See Line Art Drawing 14 (View 14) Meander Patterns

51 Radius of Curvature (Rc)

Note: Site may have multiple Rc's - choose minimum Rc to be conservative.

37 ft

Click button to See Line Art Drawing 10 (View 10) Meander Terminology

52 Channel Path Change - Select from drop-down list.

Has a significant change occurred in the channel path?
Historical aerial photography may be reviewed from online resources such as the IOWA GeoData

No

Potential Issues (select most applicable from drop-down list).

Click button to See Line Art Drawing 15 (View 15) Concerns

Click button to See Line Art Drawing 21 (View 21) Lateral Erosion

53

Do any of these conditions exist - streambanks eroding at their base, bank overhangs, leaning trees, and/or recently exposed tree roots near the proposed site? Select from drop-down list.

Yes

54

Does the channel have distinct point bars and cut banks which alternate from side-to-side? Select from drop down list.

Point Bars

Click button to See Line Art Drawing 16 (View 16) Bar Types

55

Channel Constriction/Obstruction

Are there any channel constrictions, obstructions or flow deflectors, either natural or manmade, near the proposed

Yes

Bed Stability

56 **Is there significant lowering of the stream bed - Select from drop-down list.**

No

Click button to See Line Art Drawing 17 (View 17) Headcut

If yes, please describe.

Click button to See Line Art Drawing 15 (View 15) Concerns

57

Known Grade Control

Is there any known grade control techniques (known bedrock control, low-head dams, weirs, flumes, culverts, crossings etc.) within 4 miles downstream or 2 miles upstream of the proposed site? Select from drop-down list.

Yes

If so, are any undercut or have a vertical drop at the outlet? Select from drop-down list.

No

58

What is the dominant depositional pattern? Select from drop-down list.

Point Bars

Click button to See Line Art Drawing 16 (View 16) Bar Types

59

What is the current channel evolutionary stage? Select from drop-down list.

Stage V

Reference: Channel Evolution Model (Schumm and Parker 1973) modified (Simon and and Rinaldi 2006)

IOWA DEPARTMENT OF NATURAL RESOURCES

Habitat

60 **What is the dominant type of riparian landuse adjacent to the proposed site? Select from drop-down list.**

thin grass or tree buffer

61 **Minimum Buffer Width measured from outside edge of Belt Width? Select from drop-down list.**

Perennial Vegetation throughout Belt Width

Click button to See Line Art Drawing 2 (View 2) Riparian Diagram

62 **Approximate what percentage of stream banks have native vegetation growing on them?**

20-40%

63 **List dominant plant species found on stream banks and near floodplain**

reed canary grass, smooth brome, Eastern cottonwood

Click button to See Line Art Drawing 22 (View 22) Quantification of Riparian Vegetation

64 **How many feet above the low flow water surface does the vegetation appear to be successful?**

0 ft

65 **Wood Debris**

Is there large woody debris (greater than 6' long and 12" diameter) in the channel? Select from drop-down list.

Yes

Is it in significant enough quantity to cause debris jams? Select from drop-down list.

Yes

66 **Does the channel have a mix of substrate and cover (i.e. logs, low flow depths exceeding 4 feet, snags, undercut banks, boulders or cobbles, gravel or sand, submerged vegetation, root mats, etc.)?**

Yes

If yes, please describe.

tight curves with relatively deep pool, woody debris, gravel riffles

Click button to See Line Art Drawing 19 (View 19) Habitat Features

67 **What percentage of the stream is covered by the tree canopy? Select from drop-down list.**

26-50%

68 **Does the channel have a mix of velocity and depth patterns (i.e. slow-deep, slow-shallow, fast-deep and fast-shallow) and pool variability (i.e. large-shallow, large-deep, small-shallow and small-deep)? Select from drop-down list.**

Yes

69 **Are there known blockages to fish passage? Select from drop-down list.**

No

70 **Score Data**

Are there any known fish, habitat, or IBI score data for this stream within the project limits or a mile from the project? Select from drop-down list.

No

If yes, please describe.

71 **Species Concerns**

Is this stream known to have, or likely to have, important habitat supporting species of special conservation concern identified in Iowa DNR's State Wildlife Action Plan? To determine, contact Iowa DNR Environmental Review staff, provide the segment's UTM coordinates and ask for an environmental review prior to developing the project.

No

If yes, please describe. List species and potential project impacts (temporary and long-range).

IOWA DEPARTMENT OF NATURAL RESOURCES

Infrastructure

72 Potentially Affected Infrastructure

What infrastructure (roads, bridges, utility lines, public lands, wellheads, etc.) could potentially be negatively or positively affected by a project?

Please fill out table below.

Infrastructure Type	Position (Select from drop-down list)	Feet Away from Stream or Segment	Potential Negative Impacts	Potential Positive Impacts

IOWA DEPARTMENT OF NATURAL RESOURCES

Review Functional Design

The information contain herein is intended to inform practitioners and others, and define approriate technique for restoration. The information is not meant to represent a standard design method for any type of technique and shall not be used as such. This information neither replaces the need for site-specific engineering and/or landscape designs, nor precludes the use of information not included herein.

Note: Enter most representative value for each parameter.	**Existing Conditions**	**Design Conditions**
Bank Height Ratio	1.57	1.00
Entrenchment Ratio	1.93	1.93
Bankfull Cross Sectional Area	104.80	104.80
Bankfull Discharge Design	443.00	443.00
Regional Curves - Bankfull Cross Sectional Area	117.44	117.44
Regional Curves - Bankful Discharge	419.33	419.33
Bankfull Velocity	4.23	4.23
Schumm Channel Evolution Stage (Select from drop-down list)	Stage V	Stage VI
Dominant Bank Erosion Hazard Index (BEHI) Rating (Select from drop-down list)	high	low
Minimum Buffer Width (Measured from Outside Edge of Belt Width)	Perennial Vegetation throughout Belt Width	Perennial Vegetation >50 feet beyond Belt Width
Bankfull Width	42.08	42.08
Radius of Curvature	37.00	140.00
Meander Width Ratio	10.46	10.46
Pool to Pool Spacing Ratio	4.80	4.80
Pool Maximum Depth Ratio	2.21	2.21
Width to Depth Ratio	16.90	16.90
Water Surface Slope (%)	0.1900	0.1900
Bankfull Max Average Depth	3.73	3.73
Stream Type	B4c	B4c
Channel Length	3894.00	3894.00
Channel Bed Material (Select from drop-down list)	gravel (2 mm - 64 mm)	gravel (2 mm - 64 mm)
Is this stream a single channel or multiple thread channel	single thread	single thread
Presence of Levees (Select from drop-down list)	No	No
Presence of Nearby Infrastructure		

FUNCTIONAL	This parameter is "Functional" (light green); no adjustment is necessary
FUNCTIONAL - AT RISK	This parameter is "Functional - At Risk " (orange); should change this parameter by design to achieve a "Functional" (light green) performanace standard
NON - FUNCTIONAL	This parameter is "Non-Functional" (deep red); should change this parameter by design to achieve a "Functional" (light green) or "Functional At-Risk" (orange) performanace standard

For tighter Radius of Curvature/Bankfull Width Ratios (less than 3.5), consider using structures around bend.

IOWA DEPARTMENT OF NATURAL RESOURCES

Stream Restoration Technique Recommendations

Click "Calculate" button at right to populate "Recommendations" table below

Grade Control	
Rock Arch Rapids	0%
Cross Vane	88%
W-Weir	88%
Step-Pool Structure	0%
Rock & Log Riffle	92%
Grouted Grade Control	0%
Rock Constructed Riffle	92%

Vegetation Restoration	
Live Staking / Joint Planting	100%
Live Fascines	100%
Brush Layering	100%
Erosion Control Matting	100%
Sod Matting	100%

Riparian Buffering	
Restoration / Establishment	100%
Enhancement	100%
Preservation	100%

Bank and Floodplain Restoration	
Bank Sloping (5:1, 4:1, 3:1, 2:1)	100%
Bankfull Bench	100%
Floodplain Assemblages	100%
Levee Setback or Removal	100%
Multi-Stage Channel	100%
Oxbow	100%

Geomorphic Channel Design (GCD) - Will Require Reference Reach to Implement
Also requires additional survey and analysis

Geomorphic Channel Design (GCD) Practice - 0%	
A	0%
Aa+	0%
Ab	0%
B	0%
Ba	0%
Bc	0%
C	0%
Cb	0%
D	0%
DA	0%
E	0%
Eb	93%

Aquatic Habitat/Cover Feature	
Lunkers	92%
Boulder/Rock Clusters	100%
Locked Logs	100%

Large Woody Debris	92%
Root Wads	92%
Submerged Crib Wall	92%

Toe Protection/Stabilization

Toe Wood	88%
Stone Toe Protection	100%
Fabric Encapsulated Soil Lifts	100%
Log Vane with Boulder Hook	92%
Single & Double Wing Deflector	92%
Vegetated Banks	100%

Channel Definition Structure

Cut-Off Sills	92%
Engineered Log Jams	88%
Longitudinal Peaked Stone Toe	92%
Bendway Weirs	92%
Stream Barbs	92%
J-Hook Vane/Straight Vane	92%

Project Information

HC1

1 Designer Name

Enter your full name

Reid Stamer

Enter your email address

rstamer@eocene.com

Enter your phone number (123)456-7890

319-451-7965

2 Stream name

Hewitt Creek

3 Project Location

Upstream Project Coordinates (Web Mercator)

X

-10136333.71

Y

5235805.382

Downstream Project Coordinates (Web Mercator)

X

-10137211.02

Y

5236177.408

4 County

Dubuque

5 Watersheds

HUC 8 watershed name - select from drop-down list

07060006 - Maquoketa

Select the 8 digit hydrologic unit code surrounding the project area

HUC 12 watershed name - select from drop down list

070600060601 - Hewitt Creek

Select the 12 digit hydrologic unit code surrounding the project area

6 Project Goals and Objectives

Address flooding impacts and riparian floodplain restoration associated with Building Resilient Infrastructure and Communities FEMA funding.

What are the concerns or problems?

downcutting
poor habitat options
lateral bank erosion

IOWA DEPARTMENT OF NATURAL RESOURCES

Watershed

7 Drainage Area (DA)

4.31 square miles

8 **Enter appropriate regional curve? Select from drop-down list.**

Watershed < 10% Impervious Cover Provisional Iowa Regional Curve

For User Defined enter the components of the formula y = **a** x ^{exp} below

Bankfull Cross Sectional Area

7.7275269	a
0.7496926	exp

Bankfull Discharge

19.6078073	a
0.8438092	exp

1. Provisional Iowa Regional Curves by Iowa State University, Tanner Bonham
2. Recommend basing % impervious cover on the entire upstream catchment using GIS or StreamStats data.

9 **In what geomorphic region is the project site located? Select from drop-down list.**

Iowan Surface

10 Flow Regime - Select from drop-down list.

perennial

Click button to See Line Art Drawing 1 (View 1) Flow Regime

11 Valley Type (broad level) - Select from drop-down list.

unconfined

12 Landuse - Select from drop-down list.

Has landuse in the watershed changed significantly in the last twenty years (i.e. cropland to urban, forest to cropland, etc.)?

no change

Click button to See Line Art Drawing 2 (View 2) Riparian Diagram

13 Reference Reach

Is a nearby reference reach of a stream with similar traits (alluvial, step-pool) and valley type available for comparison? Select from drop-down list. Note: Enter reference reach data in tabs "Reference A" & "Reference B".

No

If yes, please describe

Click button to See Line Art Drawing 3 (View 3) Survey Figure

14 Floodplain Impacts

Is the project area on a FEMA Flood Map? Select from drop-down list. For details, please visit the
FEMA Map Service Center.

IOWA DEPARTMENT OF NATURAL RESOURCES

Site Geometry and Calculations

15 Stream Length (SL)

Distance along the center of the channel (equidistant from each edge of channel) from start to end of project limits

1386 feet

Click button to See Line Art Drawing 4 (View 4) Sinuosity

16 Valley Length (VL)

Along the "big picture" channel alignment not including meanders.

1362 feet

Click button to See Line Art Drawing 4 (View 4) Sinuosity

17 Valley Width

1083 feet

Click button to See Line Art Drawing 4 (View 4) Sinuosity

18 Channel slope

(average bankfull slope)

0.6 %

Click button to See Line Art Drawing 5 (View 5) Longitudinal Profile

Click button to See Line Art Drawing 7 (View 7) Facet Terminology

19 Low Bank Height (LBH) (riffle)

3.5 feet

Click button to See Line Art Drawing 6 (View 6) Incision Ratio

20 Bankfull Width (W_{BKF}) (riffle)

Note: Site may have multiple riffles - choose most representative riffle.

14.55 feet

Click button to See Line Art Drawing 7 (View 7) Facet Terminology

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

21 Low Flow Depth (riffle)

Depth of low flow condition.

1.6 feet

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

22 Mean Bankfull Depth (d_{BKF}) (riffle)

1.67 feet

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

23 Maximum Bankfull Depth (d_{MAX}) (riffle)

2.84 feet

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

24 Maximum Pool Depth (d_{MAXP})

3 feet

Click button to See Line Art Drawing 5 (View 5) Longitudinal Profile

25 Width of Flood-Prone Area (W_{FPA})

68.96 feet

Click button to See Line Art Drawing 9 (View 9) Entrenchment Ratio

26 Average Pool to Pool Spacing (P_S)

340 feet

Click button to See Line Art Drawing 5 (View 5) Longitudinal Profile

27 Belt Width (W_{BLT})

25 feet

Click button to See Line Art Drawing 10 (View 10) Meander Terminology

28 What is the dominant BEHI Rating?

moderate

Click button to See Line Art Drawing 20 (View 20) BEHI Variables

29 What is the D_{50} of the reach?

For Bedrock enter 2048 mm

2 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

30 Bankfull discharge (Q_{BKF})

Validate with combination of field and desktop methods.

Bankfull discharge is less than the 2-year (50 percent) peak flow.

Method - select from drop down list	cfs
Manning	81
StreamStats Peak-Flow report	

31 Bankfull discharge (Q_{BKF}) - Design

Use best judgement based on results listed above.

81 cfs

32 Is the stream made of a single channel or multiple channels? Select from drop down list.

single thread

Calculated Values

33	**Channel sinuosity** Click button to See Line Art Drawing 4 (View 4) Sinuosity	1.02
34	**Channel slope (average bankfull slope)** Click button to See Line Art Drawing 7 (View 7) Facet Terminology	0.6000 %
35	**Width to depth ratio** Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry	8.71
36	**Entrenchment Ratio (ER)** Click button to See Line Art Drawing 9 (View 9) Entrenchment Ratio	4.74
37	**Bankfull Cross Sectional Area (A_{BKF})** Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry	24.3 sq ft
38	**Bank Height ratio (BHR)** Click button to See Line Art Drawing 6 (View 6) Incision Ratio	1.23
39	**Pool Depth Ratio**	1.80
40	**Pool to Pool Spacing Ratio**	23.40
41	**Meander Width Ratio**	1.72
42	**Stream Type** Click button to See Line Art Drawing 12 (View 12) Rosgen Stream Types	E5

Geology

43 What are the dominant bed materials? Select from drop-down list.

gravel (2 mm - 64 mm)

Click button to See Line Art Drawing 13 (View 13) Bed vs Bank

44 What are the dominant bank materials? Select from drop-down list.

silt/clay (<0.062 mm)

Click button to See Line Art Drawing 13 (View 13) Bed vs Bank

45 D_{50} riffle armor

10 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

46 D_{50} bar sample

5 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

47 D_{100} bar sample

100 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

IOWA DEPARTMENT OF NATURAL RESOURCES

Planform Stability

48 Has the proposed stream segment been mechanically straightened or dredged in the past? Select from drop-down list.

Yes

49 Does the proposed stream segment have man-made levees? Select from drop-down list.

No

50 Meander Pattern - Select from drop-down list.

irregular meanders

Click button to See Line Art Drawing 14 (View 14) Meander Patterns

51 Radius of Curvature (Rc)

Note: Site may have multiple Rc's - choose minimum Rc to be conservative.

435 ft

Click button to See Line Art Drawing 10 (View 10) Meander Terminology

52 Channel Path Change - Select from drop-down list.

Has a significant change occurred in the channel path?
Historical aerial photography may be reviewed from online resources such as the IOWA GeoData

No

Potential Issues (select most applicable from drop-down list).

Click button to See Line Art Drawing 15 (View 15) Concerns

Click button to See Line Art Drawing 21 (View 21) Lateral Erosion

53

Do any of these conditions exist - streambanks eroding at their base, bank overhangs, leaning trees, and/or recently exposed tree roots near the proposed site? Select from drop-down list.

No

54

Does the channel have distinct point bars and cut banks which alternate from side-to-side? Select from drop down list.

None

Click button to See Line Art Drawing 16 (View 16) Bar Types

55

Channel Constriction/Obstruction

Are there any channel constrictions, obstructions or flow deflectors, either natural or manmade, near the proposed

No

IOWA DEPARTMENT OF NATURAL RESOURCES

Bed Stability

56 Is there significant lowering of the stream bed - Select from drop-down list.

No

Click button to See Line Art Drawing 17 (View 17) Headcut

If yes, please describe.

Click button to See Line Art Drawing 15 (View 15) Concerns

57

Known Grade Control

Is there any known grade control techniques (known bedrock control, low-head dams, weirs, flumes, culverts, crossings etc.) within 4 miles downstream or 2 miles upstream of the proposed site? Select from drop-down list.

Yes

If so, are any undercut or have a vertical drop at the outlet? Select from drop-down list.

No

58

What is the dominant depositional pattern? Select from drop-down list.

None

Click button to See Line Art Drawing 16 (View 16) Bar Types

59

What is the current channel evolutionary stage? Select from drop-down list.

Stage III

Reference: Channel Evolution Model (Schumm and Parker 1973) modified (Simon and and Rinaldi 2006)

IOWA DEPARTMENT OF NATURAL RESOURCES

Habitat

60 What is the dominant type of riparian landuse adjacent to the proposed site? Select from drop-down list.

thin grass or tree buffer

61 Minimum Buffer Width measured from outside edge of Belt Width? Select from drop-down list.

Perennial Vegetation 0 to 50 feet beyond Belt Width

Click button to See Line Art Drawing 2 (View 2) Riparian Diagram

62

Approximate what percentage of stream banks have native vegetation growing on them?

20-40%

63 List dominant plant species found on stream banks and near floodplain

reed canary grass, white mulberry, smooth brome, gray dogwood, goldenrod (sp.)

Click button to See Line Art Drawing 22 (View 22) Quantification of Riparian Vegetation

64 How many feet above the low flow water surface does the vegetation appear to be successful?

0 ft

65 Wood Debris

Is there large woody debris (greater than 6' long and 12" diameter) in the channel? Select from drop-down list.

No

Is it in significant enough quantity to cause debris jams? Select from drop-down list.

No

66 Does the channel have a mix of substrate and cover (i.e. logs, low flow depths exceeding 4 feet, snags, undercut banks, boulders or cobbles, gravel or sand, submerged vegetation, root mats, etc.)?

Yes

If yes, please describe.

cobble riffles, root mats

Click button to See Line Art Drawing 19 (View 19) Habitat Features

67

What percentage of the stream is covered by the tree canopy? Select from drop-down list.

26-50%

68 Does the channel have a mix of velocity and depth patterns (i.e. slow-deep, slow-shallow, fast-deep and fast-shallow) and pool variability (i.e. large-shallow, large-deep, small-shallow and small-deep)? Select from drop-down list.

Yes

69 Are there known blockages to fish passage? Select from drop-down list.

No

70 Score Data

Are there any known fish, habitat, or IBI score data for this stream within the project limits or a mile from the project? Select from drop-down list.

If yes, please describe.

71 Species Concerns

Is this stream known to have, or likely to have, important habitat supporting species of special conservation concern identified in Iowa DNR's State Wildlife Action Plan? To determine, contact Iowa DNR Environmental Review staff, provide the segment's UTM coordinates and ask for an environmental review prior to developing the project.

No

If yes, please describe. List species and potential project impacts (temporary and long-range).

IOWA DEPARTMENT OF NATURAL RESOURCES

Infrastructure

72 Potentially Affected Infrastructure

What infrastructure (roads, bridges, utility lines, public lands, wellheads, etc.) could potentially be negatively or positively affected by a project?

Please fill out table below.

Infrastructure Type	Position (Select from drop-down list)	Feet Away from Stream or Segment	Potential Negative Impacts	Potential Positive Impacts
road	along segment	33		

IOWA DEPARTMENT OF NATURAL RESOURCES

Review Functional Design

The information contain herein is intended to inform practitioners and others, and define approriate technique for restoration. The information is not meant to represent a standard design method for any type of technique and shall not be used as such. This information neither replaces the need for site-specific engineering and/or landscape designs, nor precludes the use of information not included herein.

Note: Enter most representative value for each parameter.	**Existing Conditions**	**Design Conditions**
Bank Height Ratio	1.23	1.00
Entrenchment Ratio	4.74	4.74
Bankfull Cross Sectional Area	24.30	24.30
Bankfull Discharge Design	81.00	81.00
Regional Curves - Bankfull Cross Sectional Area	23.10	23.10
Regional Curves - Bankful Discharge	67.27	67.27
Bankfull Velocity	3.33	3.33
Schumm Channel Evolution Stage (Select from drop-down list)	Stage III	Stage VI
Dominant Bank Erosion Hazard Index (BEHI) Rating (Select from drop-down list)	moderate	low
Minimum Buffer Width (Measured from Outside Edge of Belt Width)	Perennial Vegetation 0 to 50 feet beyond Belt Width	Perennial Vegetation >50 feet beyond Belt Width
Bankfull Width	14.55	17.00
Radius of Curvature	435.00	435.00
Meander Width Ratio	1.72	1.47
Pool to Pool Spacing Ratio	23.40	6.00
Pool Maximum Depth Ratio	1.80	1.80
Width to Depth Ratio	8.71	11.89
Water Surface Slope (%)	0.6000	0.4000
Bankfull Max Average Depth	2.84	2.84
Stream Type	E5	E5
Channel Length	1386.00	1386.00
Channel Bed Material (Select from drop-down list)	gravel (2 mm - 64 mm)	gravel (2 mm - 64 mm)
Is this stream a single channel or multiple thread channel	single thread	
Presence of Levees (Select from drop-down list)	No	No
Presence of Nearby Infrastructure	2.27	1.94

FUNCTIONAL	This parameter is "Functional" (light green); no adjustment is necessary
FUNCTIONAL - AT RISK	This parameter is "Functional - At Risk " (orange); should change this parameter by design to achieve a "Functional" (light green) performanace standard
NON - FUNCTIONAL	This parameter is "Non-Functional" (deep red); should change this parameter by design to achieve a "Functional" (light green) or "Functional At-Risk" (orange) performanace standard

For tighter Radius of Curvature/Bankfull Width Ratios (less than 3.5), consider using structures around bend.

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Stream Restoration Technique Recommendations

Click "Calculate" button at right to populate "Recommendations" table below

Grade Control	
Rock Arch Rapids	0%
Cross Vane	88%
W-Weir	85%
Step-Pool Structure	0%
Rock & Log Riffle	96%
Grouted Grade Control	0%
Rock Constructed Riffle	96%

Vegetation Restoration	
Live Staking / Joint Planting	96%
Live Fascines	96%
Brush Layering	96%
Erosion Control Matting	96%
Sod Matting	96%

Riparian Buffering	
Restoration / Establishment	96%
Enhancement	96%
Preservation	96%

Bank and Floodplain Restoration	
Bank Sloping (5:1, 4:1, 3:1, 2:1)	96%
Bankfull Bench	96%
Floodplain Assemblages	96%
Levee Setback or Removal	96%
Multi-Stage Channel	96%
Oxbow	96%

Geomorphic Channel Design (GCD) - Will Require Reference Reach to Implement Also requires additional survey and analysis	
Geomorphic Channel Design (GCD) Practice - 96%	
A	0%
Aa+	0%
Ab	0%
B	0%
Ba	0%
Bc	0%
C	0%
Cb	0%
D	0%
DA	0%
E	96%
Eb	93%

Aquatic Habitat/Cover Feature	
Lunkers	92%
Boulder/Rock Clusters	96%
Locked Logs	96%

Large Woody Debris	92%
Root Wads	92%
Submerged Crib Wall	92%

Toe Protection/Stabilization	
Toe Wood	88%
Stone Toe Protection	100%
Fabric Encapsulated Soil Lifts	100%
Log Vane with Boulder Hook	92%
Single & Double Wing Deflector	92%
Vegetated Banks	100%

Channel Definition Structure	
Cut-Off Sills	92%
Engineered Log Jams	88%
Longitudinal Peaked Stone Toe	88%
Bendway Weirs	92%
Stream Barbs	92%
J-Hook Vane/Straight Vane	88%

Project Information

HC2

1 Designer Name

Enter your full name

Reid Stamer

Enter your email address

rstamer@eocene.com

Enter your phone number (123)456-7890

319-451-7965

2 Stream name

Hewitt Creek

3 Project Location

Upstream Project Coordinates (Web Mercator)

X

-10142303.83

Y

5233966.789

Downstream Project Coordinates (Web Mercator)

X

-10142741

Y

5234309.834

4 County

Dubuque

5 Watersheds

HUC 8 watershed name - select from drop-down list

07060006 - Maquoketa

Select the 8 digit hydrologic unit code surrounding the project area

HUC 12 watershed name - select from drop down list

070600060601 - Hewitt Creek

Select the 12 digit hydrologic unit code surrounding the project area

6 Project Goals and Objectives

Address flooding impacts and riparian floodplain restoration associated with Building Resilient Infrastructure and Communities FEMA funding.

What are the concerns or problems?

downcutting
poor habitat options
lateral bank erosion

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Watershed

7 Drainage Area (DA)

35.7 square miles

8 Enter appropriate regional curve? Select from drop-down list.

Watershed < 10% Impervious Cover Provisional Iowa Regional Curve

For User Defined enter the components of the formula y = **a** x ^{exp} below

Bankfull Cross Sectional Area

7.7275269	a
0.7496926	exp

Bankfull Discharge

19.6078073	a
0.8438092	exp

1. Provisional Iowa Regional Curves by Iowa State University, Tanner Bonham
2. Recommend basing % impervious cover on the entire upstream catchment using GIS or StreamStats data.

9 In what geomorphic region is the project site located? Select from drop-down list.

Iowan Surface

10 Flow Regime - Select from drop-down list.

perennial

Click button to See Line Art Drawing 1 (View 1) Flow Regime

11 Valley Type (broad level) - Select from drop-down list.

unconfined

12 Landuse - Select from drop-down list.

Has landuse in the watershed changed significantly in the last twenty years (i.e. cropland to urban, forest to cropland, etc.)?

no change

Click button to See Line Art Drawing 2 (View 2) Riparian Diagram

13 Reference Reach

Is a nearby reference reach of a stream with similar traits (alluvial, step-pool) and valley type available for comparison? Select from drop-down list. Note: Enter reference reach data in tabs "Reference A" & "Reference B".

No

If yes, please describe

Click button to See Line Art Drawing 3 (View 3) Survey Figure

14 Floodplain Impacts

Is the project area on a FEMA Flood Map? Select from drop-down list. For details, please visit the FEMA Map Service Center.

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Site Geometry and Calculations

15 Stream Length (SL)

Distance along the center of the channel (equidistant from each edge of channel) from start to end of project limits

1612 feet

Click button to See Line Art Drawing 4 (View 4) Sinuosity

16 Valley Length (VL)

Along the “big picture” channel alignment not including meanders.

1466 feet

Click button to See Line Art Drawing 4 (View 4) Sinuosity

17 Valley Width

1816 feet

Click button to See Line Art Drawing 4 (View 4) Sinuosity

18 Channel slope

(average bankfull slope)

0.21 %

Click button to See Line Art Drawing 5 (View 5) Longitudinal Profile

Click button to See Line Art Drawing 7 (View 7) Facet Terminology

19 Low Bank Height (LBH) (riffle)

10.67 feet

Click button to See Line Art Drawing 6 (View 6) Incision Ratio

20 Bankfull Width (W_{BKF}) (riffle)

Note: Site may have multiple riffles - choose most representative riffle.

48.2 feet

Click button to See Line Art Drawing 7 (View 7) Facet Terminology

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

21 Low Flow Depth (riffle)

Depth of low flow condition.

0.47 feet

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

22 Mean Bankfull Depth (d_{BKF}) (riffle)

2.41 feet

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

23 Maximum Bankfull Depth (d_{MAX}) (riffle)

4.09 feet

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

24 Maximum Pool Depth (d_{MAXP})

6 feet

Click button to See Line Art Drawing 5 (View 5) Longitudinal Profile

25 Width of Flood-Prone Area (W_{FPA})

86.73 feet

Click button to See Line Art Drawing 9 (View 9) Entrenchment Ratio

26 Average Pool to Pool Spacing (P_S)

201 feet

Click button to See Line Art Drawing 5 (View 5) Longitudinal Profile

27 Belt Width (W_{BLT})

185 feet

Click button to See Line Art Drawing 10 (View 10) Meander Terminology

28 What is the dominant BEHI Rating?

very high

Click button to See Line Art Drawing 20 (View 20) BEHI Variables

29 What is the D_{50} of the reach?

For Bedrock enter 2048 mm

20.9 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

30 Bankfull discharge (Q_{BKF})

Validate with combination of field and desktop methods.

Bankfull discharge is less than the 2-year (50 percent) peak flow.

Method - select from drop down list	cfs
Manning	418
StreamStats Peak-Flow report	797

31 Bankfull discharge (Q_{BKF}) - Design

Use best judgement based on results listed above.

418 cfs

32 Is the stream made of a single channel or multiple channels? Select from drop down list.

single thread

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Calculated Values

33	**Channel sinuosity** Click button to See Line Art Drawing 4 (View 4) Sinuosity	1.10
34	**Channel slope (average bankfull slope)** Click button to See Line Art Drawing 7 (View 7) Facet Terminology	0.2100 %
35	**Width to depth ratio** Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry	20.00
36	**Entrenchment Ratio (ER)** Click button to See Line Art Drawing 9 (View 9) Entrenchment Ratio	1.80
37	**Bankfull Cross Sectional Area (A_{BKF})** Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry	116.2 sq ft
38	**Bank Height ratio (BHR)** Click button to See Line Art Drawing 6 (View 6) Incision Ratio	2.61
39	**Pool Depth Ratio**	2.49
40	**Pool to Pool Spacing Ratio**	4.20
41	**Meander Width Ratio**	3.84
42	**Stream Type** Click button to See Line Art Drawing 12 (View 12) Rosgen Stream Types	B4c

Geology

43 What are the dominant bed materials? Select from drop-down list.

gravel (2 mm - 64 mm)

Click button to See Line Art Drawing 13 (View 13) Bed vs Bank

44 What are the dominant bank materials? Select from drop-down list.

silt/clay (<0.062 mm)

Click button to See Line Art Drawing 13 (View 13) Bed vs Bank

45 D_{50} riffle armor

126.8 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

46 D_{50} bar sample

20.94 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

47 D_{100} bar sample

290 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

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Planform Stability

48 Has the proposed stream segment been mechanically straightened or dredged in the past? Select from drop-down list.

Yes

49 Does the proposed stream segment have man-made levees? Select from drop-down list.

No

50 Meander Pattern - Select from drop-down list.

irregular meanders

Click button to See Line Art Drawing 14 (View 14) Meander Patterns

51 Radius of Curvature (Rc)

Note: Site may have multiple Rc's - choose minimum Rc to be conservative.

52 ft

Click button to See Line Art Drawing 10 (View 10) Meander Terminology

52 Channel Path Change - Select from drop-down list.

Has a significant change occurred in the channel path?

Historical aerial photography may be reviewed from online resources such as the IOWA GeoData

Yes

Potential Issues (select most applicable from drop-down list).

lateral migration

Click button to See Line Art Drawing 15 (View 15) Concerns

Click button to See Line Art Drawing 21 (View 21) Lateral Erosion

53

Do any of these conditions exist - streambanks eroding at their base, bank overhangs, leaning trees, and/or recently exposed tree roots near the proposed site? Select from drop-down list.

Yes

54

Does the channel have distinct point bars and cut banks which alternate from side-to-side? Select from drop down list.

Point Bars

Click button to See Line Art Drawing 16 (View 16) Bar Types

55

Channel Constriction/Obstruction

Are there any channel constrictions, obstructions or flow deflectors, either natural or manmade, near the proposed

Yes

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Bed Stability

56 Is there significant lowering of the stream bed - Select from drop-down list.

No

Click button to See Line Art Drawing 17 (View 17) Headcut

If yes, please describe.

Click button to See Line Art Drawing 15 (View 15) Concerns

57

Known Grade Control

Is there any known grade control techniques (known bedrock control, low-head dams, weirs, flumes, culverts, crossings etc.) within 4 miles downstream or 2 miles upstream of the proposed site? Select from drop-down list.

Yes

If so, are any undercut or have a vertical drop at the outlet? Select from drop-down list.

No

58

What is the dominant depositional pattern? Select from drop-down list.

Point Bars

Click button to See Line Art Drawing 16 (View 16) Bar Types

59

What is the current channel evolutionary stage? Select from drop-down list.

Stage IV

Reference: Channel Evolution Model (Schumm and Parker 1973) modified (Simon and and Rinaldi 2006)

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Habitat

60 **What is the dominant type of riparian landuse adjacent to the proposed site? Select from drop-down list.**

thin grass or tree buffer

61 **Minimum Buffer Width measured from outside edge of Belt Width? Select from drop-down list.**

Perennial Vegetation 0 to 50 feet beyond Belt Width

Click button to See Line Art Drawing 2 (View 2) Riparian Diagram

62 **Approximate what percentage of stream banks have native vegetation growing on them?**

60-80%

63 **List dominant plant species found on stream banks and near floodplain**

reed canary grass, smooth brome, Eastern cottonwood

Click button to See Line Art Drawing 22 (View 22) Quantification of Riparian Vegetation

64 **How many feet above the low flow water surface does the vegetation appear to be successful?**

0 ft

65 **Wood Debris**

Is there large woody debris (greater than 6' long and 12" diameter) in the channel? Select from drop-down list.

Yes

Is it in significant enough quantity to cause debris jams? Select from drop-down list.

debris jams present

66 **Does the channel have a mix of substrate and cover (i.e. logs, low flow depths exceeding 4 feet, snags, undercut banks, boulders or cobbles, gravel or sand, submerged vegetation, root mats, etc.)?**

Yes

If yes, please describe.

gravel and sand, beaver dam present as of 11/2023

Click button to See Line Art Drawing 19 (View 19) Habitat Features

67 **What percentage of the stream is covered by the tree canopy? Select from drop-down list.**

1-25%

68 **Does the channel have a mix of velocity and depth patterns (i.e. slow-deep, slow-shallow, fast-deep and fast-shallow) and pool variability (i.e. large-shallow, large-deep, small-shallow and small-deep)? Select from drop-down list.**

Yes

69 **Are there known blockages to fish passage? Select from drop-down list.**

No

70 **Score Data**

Are there any known fish, habitat, or IBI score data for this stream within the project limits or a mile from the project? Select from drop-down list.

No

If yes, please describe.

71 **Species Concerns**

Is this stream known to have, or likely to have, important habitat supporting species of special conservation concern identified in Iowa DNR's State Wildlife Action Plan? To determine, contact Iowa DNR Environmental Review staff, provide the segment's UTM coordinates and ask for an environmental review prior to developing the project.

No

If yes, please describe. List species and potential project impacts (temporary and long-range).

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Infrastructure

72 Potentially Affected Infrastructure

What infrastructure (roads, bridges, utility lines, public lands, wellheads, etc.) could potentially be negatively or positively affected by a project?

Please fill out table below.

Infrastructure Type	Position (Select from drop-down list)	Feet Away from Stream or Segment	Potential Negative Impacts	Potential Positive Impacts

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Note: Enter most representative value for each parameter.	**Existing Conditions**	**Design Conditions**
Bank Height Ratio	2.61	1.00
Entrenchment Ratio	1.80	10.00
Bankfull Cross Sectional Area	116.20	116.20
Bankfull Discharge Design	418.00	418.00
Regional Curves - Bankfull Cross Sectional Area	112.74	112.74
Regional Curves - Bankful Discharge	400.48	400.48
Bankfull Velocity	3.60	3.60
Schumm Channel Evolution Stage (Select from drop-down list)	Stage IV	Stage VI
Dominant Bank Erosion Hazard Index (BEHI) Rating (Select from drop-down list)	very high	low
Minimum Buffer Width (Measured from Outside Edge of Belt Width)	Perennial Vegetation 0 to 50 feet beyond Belt Width	Perennial Vegetation >50 feet beyond Belt Width
Bankfull Width	48.20	48.20
Radius of Curvature	52.00	150.00
Meander Width Ratio	3.84	3.84
Pool to Pool Spacing Ratio	4.20	4.20
Pool Maximum Depth Ratio	2.49	2.49
Width to Depth Ratio	20.00	19.99
Water Surface Slope (%)	0.2100	0.2100
Bankfull Max Average Depth	4.09	4.09
Stream Type	B4c	C4
Channel Length	1612.00	1612.00
Channel Bed Material (Select from drop-down list)	gravel (2 mm - 64 mm)	gravel (2 mm - 64 mm)
Is this stream a single channel or multiple thread channel	single thread	single thread
Presence of Levees (Select from drop-down list)	No	No
Presence of Nearby Infrastructure		

FUNCTIONAL	This parameter is "Functional" (light green); no adjustment is necessary
FUNCTIONAL - AT RISK	This parameter is "Functional - At Risk " (orange); should change this parameter by design to achieve a "Functional" (light green) performanace standard
NON - FUNCTIONAL	This parameter is "Non-Functional" (deep red); should change this parameter by design to achieve a "Functional" (light green) or "Functional At-Risk" (orange) performanace standard

For tighter Radius of Curvature/Bankfull Width Ratios (less than 3.5), consider using structures around bend.

Stream Restoration Technique Recommendations

Click "Calculate" button at right to populate "Recommendations" table below

Grade Control	
Rock Arch Rapids	0%
Cross Vane	88%
W-Weir	88%
Step-Pool Structure	0%
Rock & Log Riffle	92%
Grouted Grade Control	0%
Rock Constructed Riffle	92%
Vegetation Restoration	
Live Staking / Joint Planting	92%
Live Fascines	92%
Brush Layering	92%
Erosion Control Matting	92%
Sod Matting	92%
Riparian Buffering	
Restoration / Establishment	100%
Enhancement	100%
Preservation	100%
Bank and Floodplain Restoration	
Bank Sloping (5:1, 4:1, 3:1, 2:1)	100%
Bankfull Bench	100%
Floodplain Assemblages	100%
Levee Setback or Removal	100%
Multi-Stage Channel	100%
Oxbow	100%
Geomorphic Channel Design (GCD) - Will Require Reference Reach to Implement	
Also requires additional survey and analysis	
Geomorphic Channel Design (GCD) Practice - 96%	
A	0%
Aa+	0%
Ab	0%
B	0%
Ba	0%
Bc	0%
C	96%
Cb	0%
D	0%
DA	0%
E	0%
Eb	93%
Aquatic Habitat/Cover Feature	
Lunkers	88%
Boulder/Rock Clusters	100%
Locked Logs	96%

Large Woody Debris	88%
Root Wads	88%
Submerged Crib Wall	88%

Toe Protection/Stabilization	
Toe Wood	85%
Stone Toe Protection	100%
Fabric Encapsulated Soil Lifts	100%
Log Vane with Boulder Hook	92%
Single & Double Wing Deflector	92%
Vegetated Banks	100%

Channel Definition Structure	
Cut-Off Sills	88%
Engineered Log Jams	85%
Longitudinal Peaked Stone Toe	92%
Bendway Weirs	92%
Stream Barbs	88%
J-Hook Vane/Straight Vane	92%

IOWA DEPARTMENT OF NATURAL RESOURCES

Project Information

NFMR1

1 Designer Name

Enter your full name

Reid Stamer

Enter your email address

rstamer@eocene.com

Enter your phone number (123)456-7890

319-451-7965

2 Stream name

North Fork Maquoketa River

3 Project Location

Upstream Project Coordinates (Web Mercator)

X

-10142603.03

Y

5234840.842

Downstream Project Coordinates (Web Mercator)

X

-10142767.8

Y

5234353.204

4 County

Dubuque

5 Watersheds

HUC 8 watershed name - select from drop-down list

07060006 - Maquoketa

Select the 8 digit hydrologic unit code surrounding the project area

HUC 12 watershed name - select from drop down list

070600060603 - Coffee Creek-North Fork Maquoketa River

Select the 12 digit hydrologic unit code surrounding the project area

6 Project Goals and Objectives

Address flooding impacts and riparian floodplain restoration associated with Building Resilient Infrastructure and Communities FEMA funding.

What are the concerns or problems?

downcutting
poor habitat options
lateral bank erosion

IOWA DEPARTMENT OF NATURAL RESOURCES

Watershed

7 Drainage Area (DA)

80.1 square miles

8 Enter appropriate regional curve? Select from drop-down list.

Watershed < 10% Impervious Cover Provisional Iowa Regional Curve

For User Defined enter the components of the formula y = **a** x ^{exp} below

Bankfull Cross Sectional Area

7.7275269	a
0.7496926	exp

Bankfull Discharge

19.6078073	a
0.8438092	exp

1. Provisional Iowa Regional Curves by Iowa State University, Tanner Bonham
2. Recommend basing % impervious cover on the entire upstream catchment using GIS or StreamStats data.

9 In what geomorphic region is the project site located? Select from drop-down list.

Iowan Surface

10 Flow Regime - Select from drop-down list.

perennial

Click button to See Line Art Drawing 1 (View 1) Flow Regime

11 Valley Type (broad level) - Select from drop-down list.

unconfined

12 Landuse - Select from drop-down list.

Has landuse in the watershed changed significantly in the last twenty years (i.e. cropland to urban, forest to cropland, etc.)?

no change

Click button to See Line Art Drawing 2 (View 2) Riparian Diagram

13 Reference Reach

Is a nearby reference reach of a stream with similar traits (alluvial, step-pool) and valley type available for comparison? Select from drop-down list. Note: Enter reference reach data in tabs "Reference A" & "Reference B".

No

If yes, please describe

Click button to See Line Art Drawing 3 (View 3) Survey Figure

14 Floodplain Impacts

Is the project area on a FEMA Flood Map? Select from drop-down list. For details, please visit the FEMA Map Service Center.

Site Geometry and Calculations

15 Stream Length (SL)

Distance along the center of the channel (equidistant from each edge of channel) from start to end of project limits

1382 feet

Click button to See Line Art Drawing 4 (View 4) Sinuosity

16 Valley Length (VL)

Along the “big picture” channel alignment not including meanders.

1245 feet

Click button to See Line Art Drawing 4 (View 4) Sinuosity

17 Valley Width

690 feet

Click button to See Line Art Drawing 4 (View 4) Sinuosity

18 Channel slope

(average bankfull slope)

0.18 %

Click button to See Line Art Drawing 5 (View 5) Longitudinal Profile
Click button to See Line Art Drawing 7 (View 7) Facet Terminology

19 Low Bank Height (LBH) (riffle)

8.74 feet

Click button to See Line Art Drawing 6 (View 6) Incision Ratio

20 Bankfull Width (W_{BKF}) (riffle)

Note: Site may have multiple riffles - choose most representative riffle.

49.75 feet

Click button to See Line Art Drawing 7 (View 7) Facet Terminology

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

21 Low Flow Depth (riffle)

Depth of low flow condition.

0.5 feet

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

22 Mean Bankfull Depth (d_{BKF}) (riffle)

3.78 feet

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

23 Maximum Bankfull Depth (d_{MAX}) (riffle)

4.86 feet

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

24 Maximum Pool Depth (d_{MAXP})

6.5 feet

Click button to See Line Art Drawing 5 (View 5) Longitudinal Profile

25 Width of Flood-Prone Area (W_{FPA})

119 feet

Click button to See Line Art Drawing 9 (View 9) Entrenchment Ratio

26 Average Pool to Pool Spacing (P_S)

510 feet

Click button to See Line Art Drawing 5 (View 5) Longitudinal Profile

27 Belt Width (W_{BLT})

395 feet

Click button to See Line Art Drawing 10 (View 10) Meander Terminology

28 What is the dominant BEHI Rating?

moderate

Click button to See Line Art Drawing 20 (View 20) BEHI Variables

29 What is the D_{50} of the reach?

For Bedrock enter 2048 mm

6 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

30 Bankfull discharge (Q_{BKF})

Validate with combination of field and desktop methods.

Bankfull discharge is less than the 2-year (50 percent) peak flow.

Method - select from drop down list	cfs
Manning	776
StreamStats Peak-Flow report	1240

31 Bankfull discharge (Q_{BKF}) - Design

Use best judgement based on results listed above.

776 cfs

32 Is the stream made of a single channel or multiple channels? Select from drop down list.

single thread

Calculated Values

33	**Channel sinuosity** Click button to See Line Art Drawing 4 (View 4) Sinuosity	1.11
34	**Channel slope (average bankfull slope)** Click button to See Line Art Drawing 7 (View 7) Facet Terminology	0.1800 %
35	**Width to depth ratio** Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry	13.16
36	**Entrenchment Ratio (ER)** Click button to See Line Art Drawing 9 (View 9) Entrenchment Ratio	2.39
37	**Bankfull Cross Sectional Area (A_{BKF})** Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry	188.1 sq ft
38	**Bank Height ratio (BHR)** Click button to See Line Art Drawing 6 (View 6) Incision Ratio	1.80
39	**Pool Depth Ratio**	1.72
40	**Pool to Pool Spacing Ratio**	10.30
41	**Meander Width Ratio**	7.94
42	**Stream Type** Click button to See Line Art Drawing 12 (View 12) Rosgen Stream Types	C4

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Geology

43 What are the dominant bed materials? Select from drop-down list.

gravel (2 mm - 64 mm)

Click button to See Line Art Drawing 13 (View 13) Bed vs Bank

44 What are the dominant bank materials? Select from drop-down list.

silt/clay (<0.062 mm)

Click button to See Line Art Drawing 13 (View 13) Bed vs Bank

45 D_{50} riffle armor

107.49 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

46 D_{50} bar sample

6 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

47 D_{100} bar sample

420 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

IOWA DEPARTMENT OF NATURAL RESOURCES

Planform Stability

48 Has the proposed stream segment been mechanically straightened or dredged in the past? Select from drop-down list.

Yes

49 Does the proposed stream segment have man-made levees? Select from drop-down list.

No

50 Meander Pattern - Select from drop-down list.

regular meanders

Click button to See Line Art Drawing 14 (View 14) Meander Patterns

51 Radius of Curvature (Rc)

Note: Site may have multiple Rc's - choose minimum Rc to be conservative.

142 ft

Click button to See Line Art Drawing 10 (View 10) Meander Terminology

52 Channel Path Change - Select from drop-down list.

Has a significant change occurred in the channel path?

Historical aerial photography may be reviewed from online resources such as the IOWA GeoData

Yes

Potential Issues (select most applicable from drop-down list).

lateral migration

Click button to See Line Art Drawing 15 (View 15) Concerns

Click button to See Line Art Drawing 21 (View 21) Lateral Erosion

53

Do any of these conditions exist - streambanks eroding at their base, bank overhangs, leaning trees, and/or recently exposed tree roots near the proposed site? Select from drop-down list.

Yes

54

Does the channel have distinct point bars and cut banks which alternate from side-to-side? Select from drop down list.

None

Click button to See Line Art Drawing 16 (View 16) Bar Types

55

Channel Constriction/Obstruction

Are there any channel constrictions, obstructions or flow deflectors, either natural or manmade, near the proposed

No

Bed Stability

56 Is there significant lowering of the stream bed - Select from drop-down list.

No

Click button to See Line Art Drawing 17 (View 17) Headcut

If yes, please describe.

Click button to See Line Art Drawing 15 (View 15) Concerns

57

Known Grade Control

Is there any known grade control techniques (known bedrock control, low-head dams, weirs, flumes, culverts, crossings etc.) within 4 miles downstream or 2 miles upstream of the proposed site? Select from drop-down list.

Yes

If so, are any undercut or have a vertical drop at the outlet? Select from drop-down list.

No

58

What is the dominant depositional pattern? Select from drop-down list.

None

Click button to See Line Art Drawing 16 (View 16) Bar Types

59

What is the current channel evolutionary stage? Select from drop-down list.

Stage IV

Reference: Channel Evolution Model (Schumm and Parker 1973) modified (Simon and and Rinaldi 2006)

IOWA DEPARTMENT OF NATURAL RESOURCES

Habitat

60 **What is the dominant type of riparian landuse adjacent to the proposed site? Select from drop-down list.**

thin grass or tree buffer

61 **Minimum Buffer Width measured from outside edge of Belt Width? Select from drop-down list.**

Perennial Vegetation throughout Belt Width

Click button to See Line Art Drawing 2 (View 2) Riparian Diagram

62 **Approximate what percentage of stream banks have native vegetation growing on them?**

40-60%

63 **List dominant plant species found on stream banks and near floodplain**

reed canary grass, smooth brome, Eastern cottonwood

Click button to See Line Art Drawing 22 (View 22) Quantification of Riparian Vegetation

64 **How many feet above the low flow water surface does the vegetation appear to be successful?**

0 ft

65 **Wood Debris**

Is there large woody debris (greater than 6' long and 12" diameter) in the channel? Select from drop-down list.

No

Is it in significant enough quantity to cause debris jams? Select from drop-down list.

No

66 **Does the channel have a mix of substrate and cover (i.e. logs, low flow depths exceeding 4 feet, snags, undercut banks, boulders or cobbles, gravel or sand, submerged vegetation, root mats, etc.)?**

No

If yes, please describe.

Click button to See Line Art Drawing 19 (View 19) Habitat Features

67 **What percentage of the stream is covered by the tree canopy? Select from drop-down list.**

26-50%

68 Does the channel have a mix of velocity and depth patterns (i.e. slow-deep, slow-shallow, fast-deep and fast-shallow) and pool variability (i.e. large-shallow, large-deep, small-shallow and small-deep)? Select from drop-down list.

No

69 Are there known blockages to fish passage? Select from drop-down list.

No

70 Score Data

Are there any known fish, habitat, or IBI score data for this stream within the project limits or a mile from the project? Select from drop-down list.

No

If yes, please describe.

71 Species Concerns

Is this stream known to have, or likely to have, important habitat supporting species of special conservation concern identified in Iowa DNR's State Wildlife Action Plan? To determine, contact Iowa DNR Environmental Review staff, provide the segment's UTM coordinates and ask for an environmental review prior to developing the project.

No

If yes, please describe. List species and potential project impacts (temporary and long-range).

IOWA DEPARTMENT OF NATURAL RESOURCES

Infrastructure

72 **Potentially Affected Infrastructure**

What infrastructure (roads, bridges, utility lines, public lands, wellheads, etc.) could potentially be negatively or positively affected by a project?

Please fill out table below.

Infrastructure Type	Position (Select from drop-down list)	Feet Away from Stream or Segment	Potential Negative Impacts	Potential Positive Impacts

IOWA DEPARTMENT OF NATURAL RESOURCES

Review Functional Design

The information contain herein is intended to inform practitioners and others, and define approriate technique for restoration. The information is not meant to represent a standard design method for any type of technique and shall not be used as such. This information neither replaces the need for site-specific engineering and/or landscape designs, nor precludes the use of information not included herein.

Note: Enter most representative value for each parameter.	**Existing Conditions**	**Design Conditions**
Bank Height Ratio	1.80	1.00
Entrenchment Ratio	2.39	2.39
Bankfull Cross Sectional Area	188.10	188.10
Bankfull Discharge Design	776.00	776.00
Regional Curves - Bankfull Cross Sectional Area	206.62	206.62
Regional Curves - Bankful Discharge	792.01	792.01
Bankfull Velocity	4.13	4.13
Schumm Channel Evolution Stage (Select from drop-down list)	Stage IV	Stage VI
Dominant Bank Erosion Hazard Index (BEHI) Rating (Select from drop-down list)	moderate	low
Minimum Buffer Width (Measured from Outside Edge of Belt Width)	Perennial Vegetation throughout Belt Width	Perennial Vegetation >50 feet beyond Belt Width
Bankfull Width	49.75	60.00
Radius of Curvature	142.00	180.00
Meander Width Ratio	7.94	6.58
Pool to Pool Spacing Ratio	10.30	6.00
Pool Maximum Depth Ratio	1.72	1.72
Width to Depth Ratio	13.16	19.14
Water Surface Slope (%)	0.1800	0.1800
Bankfull Max Average Depth	4.86	4.86
Stream Type	C4	C4
Channel Length	1382.00	1382.00
Channel Bed Material (Select from drop-down list)	gravel (2 mm - 64 mm)	gravel (2 mm - 64 mm)
Is this stream a single channel or multiple thread channel	single thread	single thread
Presence of Levees (Select from drop-down list)	No	No
Presence of Nearby Infrastructure		

FUNCTIONAL	This parameter is "Functional" (light green); no adjustment is necessary
FUNCTIONAL - AT RISK	This parameter is "Functional - At Risk " (orange); should change this parameter by design to achieve a "Functional" (light green) performanace standard
NON - FUNCTIONAL	This parameter is "Non-Functional" (deep red); should change this parameter by design to achieve a "Functional" (light green) or "Functional At-Risk" (orange) performanace standard

For tighter Radius of Curvature/Bankfull Width Ratios (less than 3.5), consider using structures around bend.

IOWA DEPARTMENT OF NATURAL RESOURCES

Stream Restoration Technique Recommendations

Click "Calculate" button at right to populate "Recommendations" table below

Grade Control	
Rock Arch Rapids	0%
Cross Vane	0%
W-Weir	96%
Step-Pool Structure	0%
Rock & Log Riffle	100%
Grouted Grade Control	0%
Rock Constructed Riffle	100%

Vegetation Restoration	
Live Staking / Joint Planting	92%
Live Fascines	92%
Brush Layering	92%
Erosion Control Matting	92%
Sod Matting	92%

Riparian Buffering	
Restoration / Establishment	100%
Enhancement	100%
Preservation	100%

Bank and Floodplain Restoration	
Bank Sloping (5:1, 4:1, 3:1, 2:1)	100%
Bankfull Bench	100%
Floodplain Assemblages	100%
Levee Setback or Removal	100%
Multi-Stage Channel	100%
Oxbow	100%

Geomorphic Channel Design (GCD) - Will Require Reference Reach to Implement Also requires additional survey and analysis	
Geomorphic Channel Design (GCD) Practice - 96%	
A	0%
Aa+	0%
Ab	0%
B	0%
Ba	0%
Bc	0%
C	96%
Cb	0%
D	0%
DA	0%
E	0%
Eb	93%

Aquatic Habitat/Cover Feature	
Lunkers	96%
Boulder/Rock Clusters	100%
Locked Logs	96%

Large Woody Debris	96%
Root Wads	96%
Submerged Crib Wall	96%

Toe Protection/Stabilization	
Toe Wood	92%
Stone Toe Protection	100%
Fabric Encapsulated Soil Lifts	100%
Log Vane with Boulder Hook	100%
Single & Double Wing Deflector	100%
Vegetated Banks	100%

Channel Definition Structure	
Cut-Off Sills	96%
Engineered Log Jams	92%
Longitudinal Peaked Stone Toe	100%
Bendway Weirs	100%
Stream Barbs	96%
J-Hook Vane/Straight Vane	100%

IOWA DEPARTMENT OF NATURAL RESOURCES

Project Information

NFMR2

1 Designer Name

Enter your full name

Reid Stamer

Enter your email address

rstamer@eocene.com

Enter your phone number (123)456-7890

319-451-7965

2 Stream name

North Fork Maquoketa River

3 Project Location

Upstream Project Coordinates (Web Mercator)

X

-10142823.88

Y

5234352.54

Downstream Project Coordinates (Web Mercator)

X

-10144075.91

Y

5234067.278

4 County

Dubuque

5 Watersheds

HUC 8 watershed name - select from drop-down list

07060006 - Maquoketa

Select the 8 digit hydrologic unit code surrounding the project area

HUC 12 watershed name - select from drop down list

070600060603 - Coffee Creek-North Fork Maquoketa River

Select the 12 digit hydrologic unit code surrounding the project area

6 Project Goals and Objectives

Address flooding impacts and riparian floodplain restoration associated with Building Resilient Infrastructure and Communities FEMA funding.

What are the concerns or problems?

downcutting
poor habitat options
lateral bank erosion

IOWA DEPARTMENT OF NATURAL RESOURCES

Watershed

7 Drainage Area (DA)

122 square miles

8 Enter appropriate regional curve? Select from drop-down list.

Watershed < 10% Impervious Cover Provisional Iowa Regional Curve

For User Defined enter the components of the formula y = **a** x ^{exp} below

Bankfull Cross Sectional Area

7.7275269 a
0.7496926 exp

Bankfull Discharge

19.6078073 a
0.8438092 exp

1. Provisional Iowa Regional Curves by Iowa State University, Tanner Bonham
2. Recommend basing % impervious cover on the entire upstream catchment using GIS or StreamStats data.

9 In what geomorphic region is the project site located? Select from drop-down list.

Iowan Surface

10 Flow Regime - Select from drop-down list.

perennial

Click button to See Line Art Drawing 1 (View 1) Flow Regime

11 Valley Type (broad level) - Select from drop-down list.

unconfined

12 Landuse - Select from drop-down list.

Has landuse in the watershed changed significantly in the last twenty years (i.e. cropland to urban, forest to cropland, etc.)?

no change

Click button to See Line Art Drawing 2 (View 2) Riparian Diagram

13 Reference Reach

Is a nearby reference reach of a stream with similar traits (alluvial, step-pool) and valley type available for comparison? Select from drop-down list. Note: Enter reference reach data in tabs "Reference A" & "Reference B".

No

If yes, please describe

Click button to See Line Art Drawing 3 (View 3) Survey Figure

14 Floodplain Impacts

Is the project area on a FEMA Flood Map? Select from drop-down list. For details, please visit the FEMA Map Service Center.

IOWA DEPARTMENT OF NATURAL RESOURCES

Site Geometry and Calculations

15 Stream Length (SL)

Distance along the center of the channel (equidistant from each edge of channel) from start to end of project limits

5032 feet

Click button to See Line Art Drawing 4 (View 4) Sinuosity

16 Valley Length (VL)

Along the "big picture" channel alignment not including meanders.

3838 feet

Click button to See Line Art Drawing 4 (View 4) Sinuosity

17 Valley Width

1257 feet

Click button to See Line Art Drawing 4 (View 4) Sinuosity

18 Channel slope

(average bankfull slope)

0.198 %

Click button to See Line Art Drawing 5 (View 5) Longitudinal Profile

Click button to See Line Art Drawing 7 (View 7) Facet Terminology

19 Low Bank Height (LBH) (riffle)

6.41 feet

Click button to See Line Art Drawing 6 (View 6) Incision Ratio

20 Bankfull Width (W_{BKF}) (riffle)

Note: Site may have multiple riffles - choose most representative riffle.

146.8 feet

Click button to See Line Art Drawing 7 (View 7) Facet Terminology

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

21 Low Flow Depth (riffle)

Depth of low flow condition.

0.85 feet

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

22 Mean Bankfull Depth (d_{BKF}) (riffle)

2.67 feet

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

23 Maximum Bankfull Depth (d_{MAX}) (riffle)

5.33 feet

Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry

24 Maximum Pool Depth (d_{MAXP})

4.26 feet

Click button to See Line Art Drawing 5 (View 5) Longitudinal Profile

25 Width of Flood-Prone Area (W_{FPA})

203.1 feet

Click button to See Line Art Drawing 9 (View 9) Entrenchment Ratio

26 Average Pool to Pool Spacing (P_S)

419 feet

Click button to See Line Art Drawing 5 (View 5) Longitudinal Profile

27 Belt Width (W_{BLT})

260 feet

Click button to See Line Art Drawing 10 (View 10) Meander Terminology

28 What is the dominant BEHI Rating?

high

Click button to See Line Art Drawing 20 (View 20) BEHI Variables

29 What is the D_{50} of the reach?

For Bedrock enter 2048 mm

1.5 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

30 Bankfull discharge (Q_{BKF})

Validate with combination of field and desktop methods.

Bankfull discharge is less than the 2-year (50 percent) peak flow.

Method - select from drop down list	cfs
Manning	1094
StreamStats Peak-Flow report	1570

31 Bankfull discharge (Q_{BKF}) - Design

Use best judgement based on results listed above.

1094 cfs

32 Is the stream made of a single channel or multiple channels? Select from drop down list.

single thread

Calculated Values

33	**Channel sinuosity** Click button to See Line Art Drawing 4 (View 4) Sinuosity	1.31
34	**Channel slope (average bankfull slope)** Click button to See Line Art Drawing 7 (View 7) Facet Terminology	0.1980 %
35	**Width to depth ratio** Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry	54.98
36	**Entrenchment Ratio (ER)** Click button to See Line Art Drawing 9 (View 9) Entrenchment Ratio	1.38
37	**Bankfull Cross Sectional Area (A_{BKF})** Click button to See Line Art Drawing 8 (View 8) Cross Section Geometry	392.0 sq ft
38	**Bank Height ratio (BHR)** Click button to See Line Art Drawing 6 (View 6) Incision Ratio	1.20
39	**Pool Depth Ratio**	1.60
40	**Pool to Pool Spacing Ratio**	2.90
41	**Meander Width Ratio**	1.77
42	**Stream Type** Click button to See Line Art Drawing 12 (View 12) Rosgen Stream Types	F5

IOWA DEPARTMENT OF NATURAL RESOURCES

Geology

43 What are the dominant bed materials? Select from drop-down list.

sand (0.062 mm - <2 mm)

Click button to See Line Art Drawing 13 (View 13) Bed vs Bank

44 What are the dominant bank materials? Select from drop-down list.

silt/clay (<0.062 mm)

Click button to See Line Art Drawing 13 (View 13) Bed vs Bank

45 D_{50} riffle armor

mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

46 D_{50} bar sample

1.46 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

47 D_{100} bar sample

123 mm

Click button to See Line Art Drawing 11 (View 11) Pebble Counts

IOWA DEPARTMENT OF NATURAL RESOURCES

Planform Stability

48 Has the proposed stream segment been mechanically straightened or dredged in the past? Select from drop-down list.

No

49 Does the proposed stream segment have man-made levees? Select from drop-down list.

No

50 Meander Pattern - Select from drop-down list.

irregular meanders

Click button to See Line Art Drawing 14 (View 14) Meander Patterns

51 Radius of Curvature (Rc)

Note: Site may have multiple Rc's - choose minimum Rc to be conservative.

78 ft

Click button to See Line Art Drawing 10 (View 10) Meander Terminology

52 Channel Path Change - Select from drop-down list.

Has a significant change occurred in the channel path?
Historical aerial photography may be reviewed from online resources such as the IOWA GeoData

No

Potential Issues (select most applicable from drop-down list).

Click button to See Line Art Drawing 15 (View 15) Concerns

Click button to See Line Art Drawing 21 (View 21) Lateral Erosion

53

Do any of these conditions exist - streambanks eroding at their base, bank overhangs, leaning trees, and/or recently exposed tree roots near the proposed site? Select from drop-down list.

Yes

54

Does the channel have distinct point bars and cut banks which alternate from side-to-side? Select from drop down list.

Point Bars

Click button to See Line Art Drawing 16 (View 16) Bar Types

55

Channel Constriction/Obstruction

Are there any channel constrictions, obstructions or flow deflectors, either natural or manmade, near the proposed

Yes

Bed Stability

56 Is there significant lowering of the stream bed - Select from drop-down list.

No

Click button to See Line Art Drawing 17 (View 17) Headcut

If yes, please describe.

Click button to See Line Art Drawing 15 (View 15) Concerns

57

Known Grade Control

Is there any known grade control techniques (known bedrock control, low-head dams, weirs, flumes, culverts, crossings etc.) within 4 miles downstream or 2 miles upstream of the proposed site? Select from drop-down list.

Yes

If so, are any undercut or have a vertical drop at the outlet? Select from drop-down list.

No

58

What is the dominant depositional pattern? Select from drop-down list.

Point Bars

Click button to See Line Art Drawing 16 (View 16) Bar Types

59

What is the current channel evolutionary stage? Select from drop-down list.

Stage V

Reference: Channel Evolution Model (Schumm and Parker 1973) modified (Simon and and Rinaldi 2006)

IOWA DEPARTMENT OF NATURAL RESOURCES

Habitat

60 What is the dominant type of riparian landuse adjacent to the proposed site? Select from drop-down list.

thin grass or tree buffer

61 Minimum Buffer Width measured from outside edge of Belt Width? Select from drop-down list.

Perennial Vegetation throughout Belt Width

Click button to See Line Art Drawing 2 (View 2) Riparian Diagram

62 Approximate what percentage of stream banks have native vegetation growing on them?

20-40%

63 List dominant plant species found on stream banks and near floodplain

reed canary grass, smooth brome, Eastern cottonwood

Click button to See Line Art Drawing 22 (View 22) Quantification of Riparian Vegetation

64 How many feet above the low flow water surface does the vegetation appear to be successful?

0 ft

65 Wood Debris

Is there large woody debris (greater than 6' long and 12" diameter) in the channel? Select from drop-down list.

Yes

Is it in significant enough quantity to cause debris jams? Select from drop-down list.

No

66 Does the channel have a mix of substrate and cover (i.e. logs, low flow depths exceeding 4 feet, snags, undercut banks, boulders or cobbles, gravel or sand, submerged vegetation, root mats, etc.)?

Yes

If yes, please describe.

some logs; bed primarily sand with some gravel component

Click button to See Line Art Drawing 19 (View 19) Habitat Features

67 What percentage of the stream is covered by the tree canopy? Select from drop-down list.

1-25%

68 Does the channel have a mix of velocity and depth patterns (i.e. slow-deep, slow-shallow, fast-deep and fast-shallow) and pool variability (i.e. large-shallow, large-deep, small-shallow and small-deep)? Select from drop-down list.

Yes

69 Are there known blockages to fish passage? Select from drop-down list.

No

70 Score Data

Are there any known fish, habitat, or IBI score data for this stream within the project limits or a mile from the project? Select from drop-down list.

No

If yes, please describe.

71 Species Concerns

Is this stream known to have, or likely to have, important habitat supporting species of special conservation concern identified in Iowa DNR's State Wildlife Action Plan? To determine, contact Iowa DNR Environmental Review staff, provide the segment's UTM coordinates and ask for an environmental review prior to developing the project.

No

If yes, please describe. List species and potential project impacts (temporary and long-range).

IOWA DEPARTMENT OF NATURAL RESOURCES

Infrastructure

72 Potentially Affected Infrastructure

What infrastructure (roads, bridges, utility lines, public lands, wellheads, etc.) could potentially be negatively or positively affected by a project?

Please fill out table below.

Infrastructure Type	Position (Select from drop-down list)	Feet Away from Stream or Segment	Potential Negative Impacts	Potential Positive Impacts

IOWA DEPARTMENT OF NATURAL RESOURCES

Review Functional Design

The information contain herein is intended to inform practitioners and others, and define approriate technique for restoration. The information is not meant to represent a standard design method for any type of technique and shall not be used as such. This information neither replaces the need for site-specific engineering and/or landscape designs, nor precludes the use of information not included herein.

Note: Enter most representative value for each parameter.	**Existing Conditions**	**Design Conditions**
Bank Height Ratio	1.20	1.00
Entrenchment Ratio	1.38	5.00
Bankfull Cross Sectional Area	392.00	392.00
Bankfull Discharge Design	1094.00	1094.00
Regional Curves - Bankfull Cross Sectional Area	283.25	283.25
Regional Curves - Bankful Discharge	1129.58	1129.58
Bankfull Velocity	2.79	2.79
Schumm Channel Evolution Stage (Select from drop-down list)	Stage V	Stage VI
Dominant Bank Erosion Hazard Index (BEHI) Rating (Select from drop-down list)	high	low
Minimum Buffer Width (Measured from Outside Edge of Belt Width)	Perennial Vegetation throughout Belt Width	Perennial Vegetation >50 feet beyond Belt Width
Bankfull Width	146.80	100.00
Radius of Curvature	78.00	300.00
Meander Width Ratio	1.77	2.60
Pool to Pool Spacing Ratio	2.90	2.90
Pool Maximum Depth Ratio	1.60	1.60
Width to Depth Ratio	54.98	25.51
Water Surface Slope (%)	0.1980	0.1980
Bankfull Max Average Depth	5.33	5.33
Stream Type	F5	C5
Channel Length	5032.00	5032.00
Channel Bed Material (Select from drop-down list)	sand (0.062 mm - <2 mm)	sand (0.062 mm - <2 mm)
Is this stream a single channel or multiple thread channel	single thread	single thread
Presence of Levees (Select from drop-down list)	No	No
Presence of Nearby Infrastructure		

FUNCTIONAL	This parameter is "Functional" (light green); no adjustment is necessary
FUNCTIONAL - AT RISK	This parameter is "Functional - At Risk " (orange); should change this parameter by design to achieve a "Functional" (light green) performanace standard
NON - FUNCTIONAL	This parameter is "Non-Functional" (deep red); should change this parameter by design to achieve a "Functional" (light green) or "Functional At-Risk" (orange) performanace standard

For tighter Radius of Curvature/Bankfull Width Ratios (less than 3.5), consider using structures around bend.

IOWA DEPARTMENT OF NATURAL RESOURCES

Stream Restoration Technique Recommendations

Click "Calculate" button at right to populate "Recommendations" table below

Grade Control	
Rock Arch Rapids	0%
Cross Vane	0%
W-Weir	88%
Step-Pool Structure	0%
Rock & Log Riffle	92%
Grouted Grade Control	0%
Rock Constructed Riffle	92%

Vegetation Restoration	
Live Staking / Joint Planting	100%
Live Fascines	100%
Brush Layering	100%
Erosion Control Matting	100%
Sod Matting	100%

Riparian Buffering	
Restoration / Establishment	100%
Enhancement	100%
Preservation	100%

Bank and Floodplain Restoration	
Bank Sloping (5:1, 4:1, 3:1, 2:1)	100%
Bankfull Bench	100%
Floodplain Assemblages	100%
Levee Setback or Removal	100%
Multi-Stage Channel	100%
Oxbow	100%

Geomorphic Channel Design (GCD) - Will Require Reference Reach to Implement Also requires additional survey and analysis	
Geomorphic Channel Design (GCD) Practice - 96%	
A	0%
Aa+	0%
Ab	0%
B	0%
Ba	0%
Bc	0%
C	96%
Cb	0%
D	0%
DA	0%
E	0%
Eb	93%

Aquatic Habitat/Cover Feature	
Lunkers	92%
Boulder/Rock Clusters	100%
Locked Logs	100%

Large Woody Debris	92%
Root Wads	92%
Submerged Crib Wall	92%

Toe Protection/Stabilization	
Toe Wood	88%
Stone Toe Protection	100%
Fabric Encapsulated Soil Lifts	100%
Log Vane with Boulder Hook	92%
Single & Double Wing Deflector	92%
Vegetated Banks	100%

Channel Definition Structure	
Cut-Off Sills	92%
Engineered Log Jams	88%
Longitudinal Peaked Stone Toe	92%
Bendway Weirs	92%
Stream Barbs	92%
J-Hook Vane/Straight Vane	92%

Appendix E
State-Listed Threatened and Endangered Species: Delaware and Dubuque Counties

Common Name	Scientific Name	Class	State Status
Bald Eagle	*Haliaeetus leucocephalus*	BIRDS	S
Barn Owl	*Tyto alba*	BIRDS	E
King Rail	*Rallus elegans*	BIRDS	E
Pugnose Minnow	*Opsopoeodus emiliae*	FISH	S
Weed Shiner	*Notropis texanus*	FISH	E
Butterfly	*Ellipsaria lineolata*	FRESHWATER MUSSELS	T
Creek Heelsplitter	*Lasmigona compressa*	FRESHWATER MUSSELS	T
Creeper	*Strophitus undulatus*	FRESHWATER MUSSELS	T
Cylindrical Papershell	*Anodontoides ferussacianus*	FRESHWATER MUSSELS	T
Ellipse	*Venustaconcha ellipsiformis*	FRESHWATER MUSSELS	T
Higgin's-eye Pearly Mussel	*Lampsilis higginsii*	FRESHWATER MUSSELS	E
Pistolgrip	*Tritogonia verrucosa*	FRESHWATER MUSSELS	E
Purple Wartyback	*Cyclonaias tuberculata*	FRESHWATER MUSSELS	T
Round Pigtoe	*Pleurobema sintoxia*	FRESHWATER MUSSELS	E
Slippershell Mussel	*Alasmidonta viridis*	FRESHWATER MUSSELS	E
Leonard's Skipper	*Hesperia leonardus*	INSECTS	S
Wild Indigo Dusky Wing	*Erynnis baptisiae*	INSECTS	S
Indiana Bat	*Myotis sodalis*	MAMMALS	E
Northern Long-eared Bat	*Myotis septentrionalis*	MAMMALS	
Southern Flying Squirrel	*Glaucomys volans*	MAMMALS	S
Spotted Skunk	*Spilogale putorius*	MAMMALS	E
Alderleaf Buckthorn	*Rhamnus alnifolia*	PLANTS (DICOTS)	S
American Speedwell	*Veronica americana*	PLANTS (DICOTS)	S
Canada Plum	*Prunus nigra*	PLANTS (DICOTS)	E
Cutleaf Water-milfoil	*Myriophyllum pinnatum*	PLANTS (DICOTS)	S
False Mermaid-weed	*Floerkea proserpinacoides*	PLANTS (DICOTS)	E
Fineberry Hawthorn	*Crataegus chrysocarpa*	PLANTS (DICOTS)	S
Golden Saxifrage	*Chrysosplenium iowense*	PLANTS (DICOTS)	T
Grape-stemmed Clematis	*Clematis occidentalis*	PLANTS (DICOTS)	S
Green Violet	*Hybanthus concolor*	PLANTS (DICOTS)	T
Hill's Thistle	*Cirsium hillii*	PLANTS (DICOTS)	S
Jeweled Shooting Star	*Dodecatheon amethystinum*	PLANTS (DICOTS)	T
Kidney-leaf White Violet	*Viola renifolia*	PLANTS (DICOTS)	T
Limestone Rockcress	*Arabis divaricarpa*	PLANTS (DICOTS)	S
Low Bindweed	*Calystegia spithamaea*	PLANTS (DICOTS)	S
Mountain Maple	*Acer spicatum*	PLANTS (DICOTS)	S
Muskroot	*Adoxa moschatellina*	PLANTS (DICOTS)	S
Narrowleaf Pinweed	*Lechea intermedia*	PLANTS (DICOTS)	T
Northern Black Currant	*Ribes hudsonianum*	PLANTS (DICOTS)	T
Northern Monkshood	*Aconitum noveboracense*	PLANTS (DICOTS)	T
Pale False Foxglove	*Agalinis skinneriana*	PLANTS (DICOTS)	E
Partridge Berry	*Mitchella repens*	PLANTS (DICOTS)	T

Pearly Everlasting	*Anaphalis margaritacea*	PLANTS (DICOTS)	S
Pinesap	*Monotropa hypopithys*	PLANTS (DICOTS)	T
Prairie Dock	*Silphium terebinthinaceum*	PLANTS (DICOTS)	S
Prickly Rose	*Rosa acicularis*	PLANTS (DICOTS)	E
Purple Angelica	*Angelica atropurpurea*	PLANTS (DICOTS)	S
Rock Sandwort	*Minuartia michauxii*	PLANTS (DICOTS)	S
Rough Bedstraw	*Galium asprellum*	PLANTS (DICOTS)	S
Rough Buttonweed	*Diodia teres*	PLANTS (DICOTS)	S
Scarlet Hawthorn	*Crataegus coccinea*	PLANTS (DICOTS)	S
Shadbush	*Amelanchier sanguinea*	PLANTS (DICOTS)	S
Spreading Hawthorn	*Crataegus disperma*	PLANTS (DICOTS)	S
Summer Grape	*Vitis aestivalis*	PLANTS (DICOTS)	S
Twinleaf	*Jeffersonia diphylla*	PLANTS (DICOTS)	T
Yellow Monkey Flower	*Mimulus glabratus*	PLANTS (DICOTS)	T
Back's Sedge	*Carex backii*	PLANTS (MONOCOTS)	S
Bog Bluegrass	*Poa paludigena*	PLANTS (MONOCOTS)	S
Carey Sedge	*Carex careyana*	PLANTS (MONOCOTS)	S
Field Sedge	*Carex conoidea*	PLANTS (MONOCOTS)	S
Glomerate Sedge	*Carex aggregata*	PLANTS (MONOCOTS)	S
Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	PLANTS (MONOCOTS)	S
Hidden Sedge	*Carex umbellata*	PLANTS (MONOCOTS)	S
Hooker's Orchid	*Platanthera hookeri*	PLANTS (MONOCOTS)	T
Mountain Ricegrass	*Oryzopsis asperifolia*	PLANTS (MONOCOTS)	S
Nodding Onion	*Allium cernuum*	PLANTS (MONOCOTS)	T
Oval Ladies'-tresses	*Spiranthes ovalis*	PLANTS (MONOCOTS)	T
Richardson Sedge	*Carex richardsonii*	PLANTS (MONOCOTS)	S
Rosy Twisted Stalk	*Streptopus roseus*	PLANTS (MONOCOTS)	T
Slender Sedge	*Carex tenera*	PLANTS (MONOCOTS)	S
Slim-leaved Panic Grass	*Dichanthelium linearifolium*	PLANTS (MONOCOTS)	T
Spotted Coralroot	*Corallorhiza maculata*	PLANTS (MONOCOTS)	T
Yellow Trout-lily	*Erythronium americanum*	PLANTS (MONOCOTS)	T
Crowfoot Clubmoss	*Lycopodium digitatum*	PLANTS (PTERIODOPHYTES)	S
Dwarf Scouring-rush	*Equisetum scirpoides*	PLANTS (PTERIODOPHYTES)	S
Glandular Wood Fern	*Dryopteris intermedia*	PLANTS (PTERIODOPHYTES)	T
Leathery Grape Fern	*Botrychium multifidum*	PLANTS (PTERIODOPHYTES)	T
Ledge Spikemoss	*Selaginella rupestris*	PLANTS (PTERIODOPHYTES)	S
Limestone Oak Fern	*Gymnocarpium robertianum*	PLANTS (PTERIODOPHYTES)	S
Marginal Shield Fern	*Dryopteris marginalis*	PLANTS (PTERIODOPHYTES)	T
Oak Fern	*Gymnocarpium dryopteris*	PLANTS (PTERIODOPHYTES)	T
Purple Cliff-brake Fern	*Pellaea atropurpurea*	PLANTS (PTERIODOPHYTES)	E
Tree Clubmoss	*Lycopodium dendroideum*	PLANTS (PTERIODOPHYTES)	T

Ornate Box Turtle	*Terrapene ornata*	REPTILES	T
Bluff Vertigo	*Vertigo meramecensis*	SNAILS	E
Frigid Ambersnail	*Catinella gelida*	SNAILS	E
Iowa Pleistocene Snail	*Discus macclintocki*	SNAILS	E
Midwest Pleistocene Vertigo	*Vertigo hubrichti hubrichti*	SNAILS	T
Variable Pleistocene Vertigo	*Vertigo hubrichti variabilis*	SNAILS	T
Henslow's Sparrow	*Ammodramus henslowii*	BIRDS	T
Red-shouldered Hawk	*Buteo lineatus*	BIRDS	E
American Brook Lamprey	*Lampetra appendix*	FISH	T
Black Redhorse	*Moxostoma duquesnei*	FISH	T
Blacknose Shiner	*Notropis heterolepis*	FISH	T
Least Darter	*Etheostoma microperca*	FISH	E
Plains Pocket Mouse	*Perognathus flavescens*	MAMMALS	E
Bunchberry	*Cornus canadensis*	PLANTS (DICOTS)	T
Earleaf Foxglove	*Tomanthera auriculata*	PLANTS (DICOTS)	S
Kitten Tails	*Besseya bullii*	PLANTS (DICOTS)	T
One-sided Pyrola	*Pyrola secunda*	PLANTS (DICOTS)	T
Prairie Bush Clover	*Lespedeza leptostachya*	PLANTS (DICOTS)	T
Ricebutton Aster	*Aster dumosus*	PLANTS (DICOTS)	E
Sage Willow	*Salix candida*	PLANTS (DICOTS)	S
Sand Cherry	*Prunus pumila*	PLANTS (DICOTS)	S
Shining Willow	*Salix lucida*	PLANTS (DICOTS)	T
Shrubby Cinquefoil	*Potentilla fruticosa*	PLANTS (DICOTS)	T
Small Sundrops	*Oenothera perennis*	PLANTS (DICOTS)	T
Sweet Indian Plantain	*Cacalia suaveolens*	PLANTS (DICOTS)	T
Toothcup	*Rotala ramosior*	PLANTS (DICOTS)	S
Valerian	*Valeriana edulis*	PLANTS (DICOTS)	S
Violet	*Viola macloskeyi*	PLANTS (DICOTS)	S
Wooly Milkweed	*Asclepias lanuginosa*	PLANTS (DICOTS)	T
Dry-spike Sedge	*Carex foenea*	PLANTS (MONOCOTS)	S
Intermediate Sedge	*Carex media*	PLANTS (MONOCOTS)	S
Meadow Bluegrass	*Poa wolfii*	PLANTS (MONOCOTS)	S
Northern Panic-grass	*Dichanthelium boreale*	PLANTS (MONOCOTS)	E
Showy Lady's Slipper	*Cypripedium reginae*	PLANTS (MONOCOTS)	T
Slender Fimbry	*Fimbristylis autumnalis*	PLANTS (MONOCOTS)	S
Smith Bulrush	*Scirpus smithii*	PLANTS (MONOCOTS)	S
Soft Rush	*Juncus effusus*	PLANTS (MONOCOTS)	S
Tall Cotton Grass	*Eriophorum angustifolium*	PLANTS (MONOCOTS)	S
Cinnamon Fern	*Osmunda cinnamomea*	PLANTS (PTERIODOPHYTES)	E
Long Beechfern	*Thelypteris phegopteris*	PLANTS (PTERIODOPHYTES)	E
Northern Adder's-tongue	*Ophioglossum pusillum*	PLANTS (PTERIODOPHYTES)	S
Prairie Moonwort	*Botrychium campestre*	PLANTS (PTERIODOPHYTES)	S
Rock Clubmoss	*Lycopodium porophilum*	PLANTS (PTERIODOPHYTES)	T

Royal Fern	*Osmunda regalis*	PLANTS (PTERIODOPHYTES)	T
Woodland Horsetail	*Equisetum sylvaticum*	PLANTS (PTERIODOPHYTES)	T
Blanding's Turtle	*Emydoidea blandingii*	REPTILES	T
Wood Turtle	*Clemmys insculpta*	REPTILES	E

Count of State Status	Column Labels				
Row Labels	**E**	**S**	**T**	**(blank)**	**Grand Total**
BIRDS	3	1	1		5
FISH	2	1	3		6
FRESHWATER MUSSELS	4		6		10
INSECTS		2			2
MAMMALS	3	1			4
PLANTS (DICOTS)	5	26	20		51
PLANTS (MONOCOTS)	1	17	8		26
PLANTS (PTERIODOPHYTES)	3	6	8		17
REPTILES	1		2		3
SNAILS	3		2		5
Grand Total	**25**	**54**	**50**		**129**

Appendix F
IPaC Official Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Illinois-Iowa Ecological Services Field Office
Illinois & Iowa Ecological Services Field Office
1511 47th Ave
Moline, IL 61265-7022
Phone: (309) 757-5800 Fax: (309) 757-5807

In Reply Refer To: 10/21/2024 18:30:10 UTC
Project Code: 2025-0008776
Project Name: Dyersville FEMA BRIC Scoping Study

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The attached species list identifies federally threatened, endangered, proposed and candidate species that may occur within the boundary of your proposed project or may be affected by your proposed project. The list also includes designated critical habitat, if present, within your proposed project area or affected by your project. This list is provided to you as the initial step of the consultation process required under section 7(c) of the Endangered Species Act, also referred to as Section 7 Consultation.

Under 50 CFR 402.12(e) (the regulations that implement Section 7 of the Endangered Species Act) **the accuracy of this species list should be verified after 90 days**. This verification can be completed formally or informally. You may verify the list by visiting the ECOSPHERE Information for Planning and Consultation (IPaC) website https://ipac.ecosphere.fws.gov at regular intervals during project planning and implementation and completing the same process you used to receive the attached list.

Section 7 Consultation

Section 7 of the Endangered Species Act of 1973 requires that actions authorized, funded, or carried out by Federal agencies not jeopardize federally threatened or endangered species or adversely modify designated critical habitat. To fulfill this mandate, Federal agencies (or their designated non-federal representative) must consult with the U.S. Fish and Wildlife Service (Service) if they determine their project “may affect” listed species or designated critical habitat. Under the ESA, it is the responsibility of the Federal action agency or its designated representative to determine if a proposed action may affect endangered, threatened, or proposed species, or designated critical habitat, and if so, to consult with the Service further. Similarly, it is the responsibility of the Federal action agency or project proponent, not the Service to make "no effect" determinations. If you determine that your proposed action will have no effect on threatened or endangered species or their respective designated critical habitat, you do not need to seek concurrence with the Service.

Note: For some species or projects, IPaC will present you with *Determination Keys*. You may be able to use one or more Determination Keys to conclude consultation on your action.

Technical Assistance for Listed Species

1. For assistance in determining if suitable habitat for listed, candidate, or proposed species occurs within your project area or if species may be affected by project activities, you can obtain information on the species life history, species status, current range, and other documents by selecting the species from the thumbnails or list view and visiting the species profile page.

No Effect Determinations for Listed Species

1. If there are *no* species or designated critical habitats on the Endangered Species portion of the species list: conclude "no species and no critical habitat present" and document your finding in your project records. No consultation under ESA section 7(a)(2) is required if the action would result in no effects to listed species or critical habitat. Maintain a copy of this letter and IPaC official species list for your records.
2. If any species or designated critical habitat are listed as potentially present in the **action area** of the proposed project the project proponents are responsible for determining if the proposed action will have “no effect” on any federally listed species or critical habitat. No effect, with respect to species, means that no individuals of a species will be exposed to any consequence of a federal action or that they will not respond to such exposure.
3. If the species habitat is not present within the action area or current data (surveys) for the species in the action area are negative: conclude “no species habitat or species present” and document your finding in your project records. For example, if the project area is located entirely within a “developed area” (an area that is already graveled/paved or supports structures and the only vegetation is limited to frequently mowed grass or conventional landscaping, is located within an existing maintained facility yard, or is in cultivated cropland conclude no species habitat present. Be careful when assessing actions that affect: 1) rights-of-ways that contains natural or semi-natural vegetation despite periodic mowing or other management; structures that have been known to support listed species (example: bridges), and 2) surface water or groundwater. Several species inhabit rights-of-ways, and you should carefully consider effects to surface water or groundwater, which often extend outside of a project’s immediate footprint.
4. Adequacy of Information & Surveys - Agencies may base their determinations on the best evidence that is available or can be developed during consultation. Agencies must give the benefit of any doubt to the species when there are any inadequacies in the information. Inadequacies may include uncertainty in any step of the analysis. To provide adequate information on which to base a determination, it may be appropriate to conduct surveys to determine whether listed species or their habitats are present in the action area. Please contact our office for more information or see the survey guidelines that the Service has made available in IPaC.

May Effect Determinations for Listed Species

1. If the species habitat is present within the action area and survey data is unavailable or inconclusive: assume the species is present or plan and implement surveys and interpret results in coordination with our office. If assuming species present or surveys for the species are positive continue with the may affect determination process. May affect, with respect to a species, is the appropriate conclusion when a species might be exposed to a consequence of a federal action and could respond to that exposure. For critical habitat, ‘may affect’ is the appropriate conclusion if the action area overlaps with mapped areas of critical habitat and an essential physical or biological feature may be exposed to a consequence of a federal action and could change in response to that exposure.
2. Identify stressors or effects to the species and to the essential physical and biological features of critical habitat that overlaps with the action area. Consider all consequences of the action and assess the potential for each life stage of the species that occurs in the action area to be exposed to the stressors. Deconstruct the action into its component parts to be sure that you do not miss any part of the action that could cause effects to the species or physical and biological features of critical habitat. Stressors that affect species’ resources may have consequences even if the species is not present when the project is implemented.
3. If no listed or proposed species will be exposed to stressors caused by the action, a ‘no effect’ determination may be appropriate – be sure to separately assess effects to critical habitat, if any overlaps with the action

area. If you determined that the proposed action or other activities that are caused by the proposed action may affect a species or critical habitat, the next step is to describe the manner in which they will respond or be altered. Specifically, to assess whether the species/critical habitat is "not likely to be adversely affected" or "likely to be adversely affected."

4. Determine how the habitat or the resource will respond to the proposed action (for example, changes in habitat quality, quantity, availability, or distribution), and assess how the species is expected to respond to the effects to its habitat or other resources. Critical habitat analyses focus on how the proposed action will affect the physical and biological features of the critical habitat in the action area. If there will be only beneficial effects or the effects of the action are expected to be insignificant or discountable, conclude "may affect, not likely to adversely affect" and submit your finding and supporting rationale to our office and request concurrence.
5. If you cannot conclude that the effects of the action will be wholly beneficial, insignificant, or discountable, check IPaC for species-specific Section 7 guidance and conservation measures to determine whether there are any measures that may be implemented to avoid or minimize the negative effects. If you modify your proposed action to include conservation measures, assess how inclusion of those measures will likely change the effects of the action. If you cannot conclude that the effects of the action will be wholly beneficial, insignificant, or discountable, contact our office for assistance.
6. Letters with requests for consultation or correspondence about your project should include the Consultation Tracking Number in the header. Electronic submission is preferred.

For additional information on completing Section 7 Consultation including a Glossary of Terms used in the Section 7 Process, information requirements for completing Section 7, and example letters visit the Midwest Region Section 7 Consultations website at: https://www.fws.gov/office/midwest-region-headquarters/midwest-section-7-technical-assistance.
You may find more specific information on completing Section 7 on communication towers and transmission lines on the following websites:

- Incidental Take Beneficial Practices: Power Lines - https://www.fws.gov/story/incidental-take-beneficial-practices-power-lines
- Recommended Best Practices for Communication Tower Design, Siting, Construction, Operation, Maintenance, and Decommissioning. - https://www.fws.gov/media/recommended-best-practices-communication-tower-design-siting-construction-operation

Tricolored Bat Update

On September 14, 2022, the Service published a proposal in the Federal Register to list the tricolored bat (Perimyotis subflavus) as endangered under the Endangered Species Act (ESA). The Service has up to 12-months from the date the proposal published to make a final determination, either to list the tricolored bat under the Act or to withdraw the proposal. The Service determined the bat faces extinction primarily due to the rangewide impacts of white-nose syndrome (WNS), a deadly fungal disease affecting cave-dwelling bats across North America. Because tricolored bat populations have been greatly reduced due to WNS, surviving bat populations are now more vulnerable to other stressors such as human disturbance and habitat loss. Species proposed for listing are not afforded protection under the ESA; however, as soon as a listing becomes effective (typically 30 days after publication of the final rule in the Federal Register), the prohibitions against jeopardizing its continued existence and “take” will apply. Therefore, if your future or existing project has the potential to adversely affect tricolored bats after the potential new listing goes into effect, we recommend that the effects of the project on tricolored bat and their habitat be analyzed to determine whether authorization under ESA section 7 or 10 is necessary. Projects with an existing section 7 biological opinion may require reinitiation of consultation, and projects with an existing section 10 incidental take permit may require an amendment to provide uninterrupted authorization for covered activities. Contact our office for assistance.

Other Trust Resources and Activities

Bald and Golden Eagles
Although no longer protected under the Endangered Species Act, be aware that bald eagles are protected under the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act, as are golden eagles. Projects affecting these species may require measures to avoid harming eagles or may require a permit. If your project is near an eagle nest or winter roost area, please contact our office for further coordination. For more information on permits and other eagle information visit our website https://www.fws.gov/library/collections/bald-and-golden-eagle-management.
We appreciate your concern for threatened and endangered species. Please feel free to contact our office with questions or for additional information.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Illinois-Iowa Ecological Services Field Office
Illinois & Iowa Ecological Services Field Office
1511 47th Ave
Moline, IL 61265-7022
(309) 757-5800

PROJECT SUMMARY

Project Code: 2025-0008776
Project Name: Dyersville FEMA BRIC Scoping Study
Project Type: Federal Grant / Loan Related
Project Description: Feasibility study for FEMA BRIC flood mitigation activities.
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@42.5483983,-91.10917463970891,14z

Counties: Clayton , Delaware , and Dubuque counties, Iowa

ENDANGERED SPECIES ACT SPECIES

There is a total of 10 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

BIRDS

NAME	STATUS
Whooping Crane *Grus americana* Population: U.S.A. (AL, AR, CO, FL, GA, ID, IL, IN, IA, KY, LA, MI, MN, MS, MO, NC, NM, OH, SC, TN, UT, VA, WI, WV, western half of WY) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/758	Experimental Population, Non-Essential

CLAMS

NAME	STATUS
Higgins Eye (pearlymussel) *Lampsilis higginsii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5428	Endangered
Salamander Mussel *Simpsonaias ambigua* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6208	Proposed Endangered
Sheepnose Mussel *Plethobasus cyphyus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6903	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate
Western Regal Fritillary *Argynnis idalia occidentalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/12017	Proposed Threatened

FLOWERING PLANTS

NAME	STATUS
Eastern Prairie Fringed Orchid *Platanthera leucophaea* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/601	Threatened
Northern Wild Monkshood *Aconitum noveboracense* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1450	Threatened

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

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1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are likely bald eagles present in your project area. For additional information on bald eagles, refer to Bald Eagle Nesting and Sensitivity to Human Activity

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE

SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds elsewhere

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence ( )

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season ( )

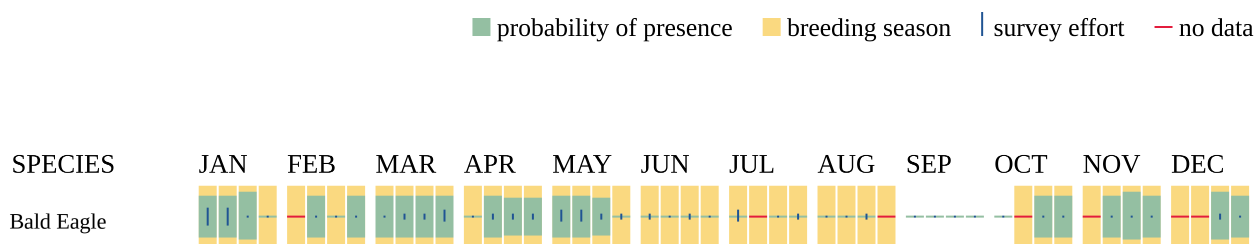
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)

A week is marked as having no data if there were no survey events for that week.



Non-BCC
Vulnerable

Golden Eagle
Non-BCC
Vulnerable

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31

NAME	BREEDING SEASON
Black-billed Cuckoo *Coccyzus erythropthalmus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9454	Breeds May 20 to Jul 31
Canada Warbler *Cardellina canadensis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9643	Breeds May 20 to Aug 10
Cerulean Warbler *Setophaga cerulea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/2974	Breeds Apr 21 to Jul 20
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Eastern Whip-poor-will *Antrostomus vociferus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10678	Breeds May 1 to Aug 20
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds elsewhere
Golden-winged Warbler *Vermivora chrysoptera* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
Kentucky Warbler *Geothlypis formosa* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9443	Breeds Apr 20 to Aug 20
Prothonotary Warbler *Protonotaria citrea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31

NAME	BREEDING SEASON
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Wood Thrush *Hylocichla mustelina* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

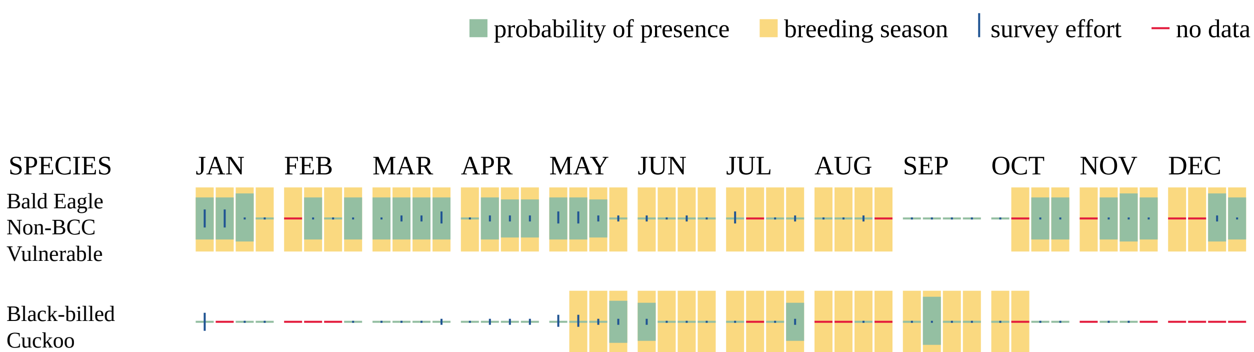
Probability of Presence ( )

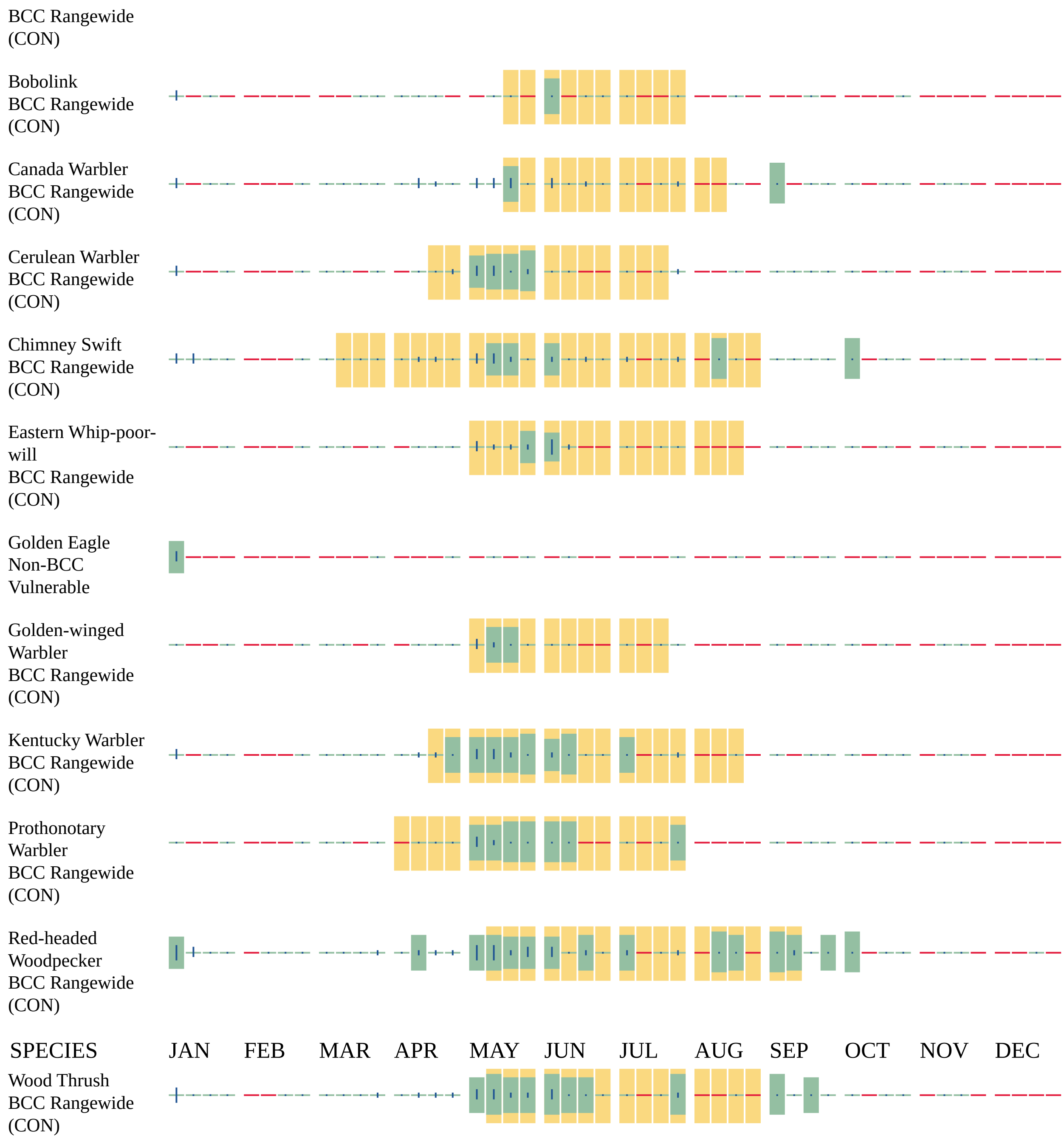
Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season ( )
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.





Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

WETLAND INFORMATION WAS NOT AVAILABLE WHEN THIS SPECIES LIST WAS GENERATED. PLEASE VISIT HTTPS://WWW.FWS.GOV/WETLANDS/DATA/MAPPER.HTML OR CONTACT THE FIELD OFFICE FOR FURTHER INFORMATION.

IPAC USER CONTACT INFORMATION

Agency: Dyersville city
Name: Reid Stamer
Address: 108 E 7th St Suite 2
City: Coralville
State: IA
Zip: 52241
Email rstamer@impact7g.com
Phone: 3193582542

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Emergency Management Agency

Appendix G

BCA Inputs, Toolkit Report and 1-D Steady-State Profile With Existing and Proposed Conditions

BCA Inputs

Project Configuration
- **Project Title:** Practice identifier and title
- **Project Location:** Street Address, Latitude, and Longitude
- **Property Structure Type:** Residential or Non-Residential
- **Hazard Type:** Riverine Flood
- **Mitigation Action Type:** Floodplain and Stream Restoration
- **Property Title:** Mitigation Action Type with Project Location
- **Damage and Frequency Relationship based on:** Modeled Damages

Cost Estimation
- **Discount Rate (%):** 3.1% (Default Value: YES)
- **Enter the Project Useful Life (years):** 30 (based on toolkit guidance)
- **Enter the Initial Project Cost ($):** Varies (based on engineering cost estimate)
- **Enter the Number of Maintenance Years:** 30 (Default Value: YES)
- **Enter the Annual Maintenance Costs ($):** Varies (based on size and scope of project)
- **Total Mitigation Project Cost ($):** Calculated

Hazard Probability Parameters – Flood
- **Enter the Lowest Floor Elevation of the Property (ft):** Varies (based on vehicle survey)
- **Enter the Streambed Elevation at the Property Location (ft):** Varies (based on HEC-RAS)
- **Enter below the Recurrence Interval, corresponding Water Surface Elevation, and Discharges:** 5-, 10-, 25-, and 100-yr events; varied elevations and varied discharges. Based on HEC-RAS modeled profiles, and StreamStats discharge data.

Building Information
- **Residential:**
  - **Building Use:** One story, or Two or More Stories. (based on assessor data)
  - **Does the Building have a Basement (Yes or No):** Varies (based on assessor data)
  - **Does the Building have an Active NFIP Policy (Yes or No):** No (assumed due to lack of data)
- **Non-Residential:**
  - **Building Use:** COM2, COM8, and REL1. (based on assessor data)
  - **Building Type:** Warehouse-Non-Refrig, Recreation, or Religious Facilities (based on assessor data)
  - **Is the Building Located Outside a Hundred-Year Flood Zone (Yes or No):** No (based on FEMA flood hazard map)
  - **Is the Building Engineered (Yes or No):** No (assumed due to lack of data)
  - **Does the Building have an Active NFIP Policy (Yes or No):** No (assumed due to lack of data)

Standard Benefits – Building
- **Select Damage Curve (Non-Residential):** Default Value
- **Select Damage Curve (Residential):** USACE Generic
- **Enter the First Floor Area (sq. ft.):** Varies (based on assessor data)
- **Enter Building Size (sq. ft.):** Varies (based on assessor data)
- **Building Replacement Value (BVR) ($/sq. ft.):** 100 (Default Value: YES)
- **BRV Distributional Weight Multiplier:** 1.1
- **Total Building Replacement Value ($):** Calculated

Demolition Threshold (%): 50 (Default Value: YES)
Expected Annual Losses due to Building Damages before Mitigation ($): Calculated
Expected Annual Losses due to Building Damages after Mitigation ($): Calculated
Expected Annual Benefits – Building ($): Calculated

Standard Benefits – Contents

Enter Contents Value ($): Varies (Default Value: YES)
Are the Utilities Elevated (Residential): No (assumed due to lack of data)
Expected Annual Losses due to Content Damages before Mitigation ($): Calculated
Expected Annual Losses due to Content Damages after Mitigation ($): Calculated
Expected Annual Benefits – Content ($): Calculated

Standard Benefits – Displacement

Monthly Cost of Temporary Space ($/sq.ft./month) (Non-Residential): Default Value
One-time Displacement Cost ($/sq. ft.) (Non-Residential): Default Value
Current Federal Lodging Per Diem ($/night) (Residential): Default Value
Current Federal Meals Per Diem ($/day) (Residential): Default Value
Enter the Number of Building Residents (Residential): 2 (assumed based on census data showing average people per household in Iowa is 2.40)
Total Displacement Cost ($) (Residential): Calculated
Expected Annual Losses due to Displacement Damages before Mitigation ($): Calculated
Expected Annual Losses due to Displacement Damages after Mitigation ($): Calculated
Expected Annual Losses – Displacement ($): Calculated

Standard Benefits – Loss of Function/Loss of Income (Non-Residential)

Annual Operating Budget ($): Varies (based on estimated budgets by structure size)
Loss of Function ($/day): Calculated
Expected Annual Losses due to Loss of Function/Loss of income before mitigation ($): Calculated
Expected Annual Losses due to Loss of Function/Loss of income after mitigation ($): Calculated
Expected Annual Benefits – Loss of Function/Loss of Income ($): Calculated

Standard Benefits – Volunteer Costs (Non-Residential & Residential)

Number of Volunteers Required: 0 (assumed due to lack of data)
Enter the Number of Days Lodging for Volunteers: 0 (assumed due to lack of data)
Enter the Per-Person Cost of Lodging for a Volunteer ($): Calculated
Expected Annual Volunteer Benefits ($): Calculated

Standard Benefits – Ecosystem Services (Non-Residential & Residential)

Total Project Area (acres of sq. ft.): Varies
Enter the percent land use of the project area below:

- **Urban Green Open Space (%)**
- **Rural Green Open Space (%)**
- **Riparian (%)**
- **Coastal Wetlands (%)**
- **Inland Wetlands (%)**
- **Forests (%)**
- **Coral Reefs (%)**
- **Shellfish Reefs (%)**
- **Beaches and Dunes (%)**

Expected Annual Ecosystem Services Benefits ($): Calculated

Additional Benefits – Social (Residential)

How many of the # Resident(s) work: 1 (assumed based on census data)

Expected Annual Social Benefits ($): Calculated

Benefit-Cost Summary (Non-Residential & Residential)

Discount Rate (%): Calculated

Total Standard Mitigation Benefits ($): Calculated

Total Mitigation Project Benefits ($): Calculated

Total Mitigation Project Cost ($): Calculated

Benefit-Cost Ratio – Standard: Calculated

Benefit-Cost Ratio – Standard + Social: Calculated

Input parameters differ for Property Acquisition Mitigation Action Type, and they are as follows:

Project Configuration

Project Title: Practice identifier and title

Project Location: Street Address, Latitude, and Longitude

Property Structure Type: Residential or Non-Residential

Hazard Type: Riverine Flood

Mitigation Action Type: Acquisition

Property Title: Mitigation Action Type with Project Location

Damage and Frequency Relationship based on: Modeled Damages

Cost Estimation

Discount Rate (%): 3.1% (Default Value: YES)

Enter the Project Useful Life (years): 100 (Default Value: YES)

Enter the Initial Project Cost ($): Varies (based on assessor data)

Enter the Number of Maintenance Years: 100 (Default Value: YES)

Enter the Annual Maintenance Costs ($): 5000 (approximation)

Total Mitigation Project Cost ($): Calculated

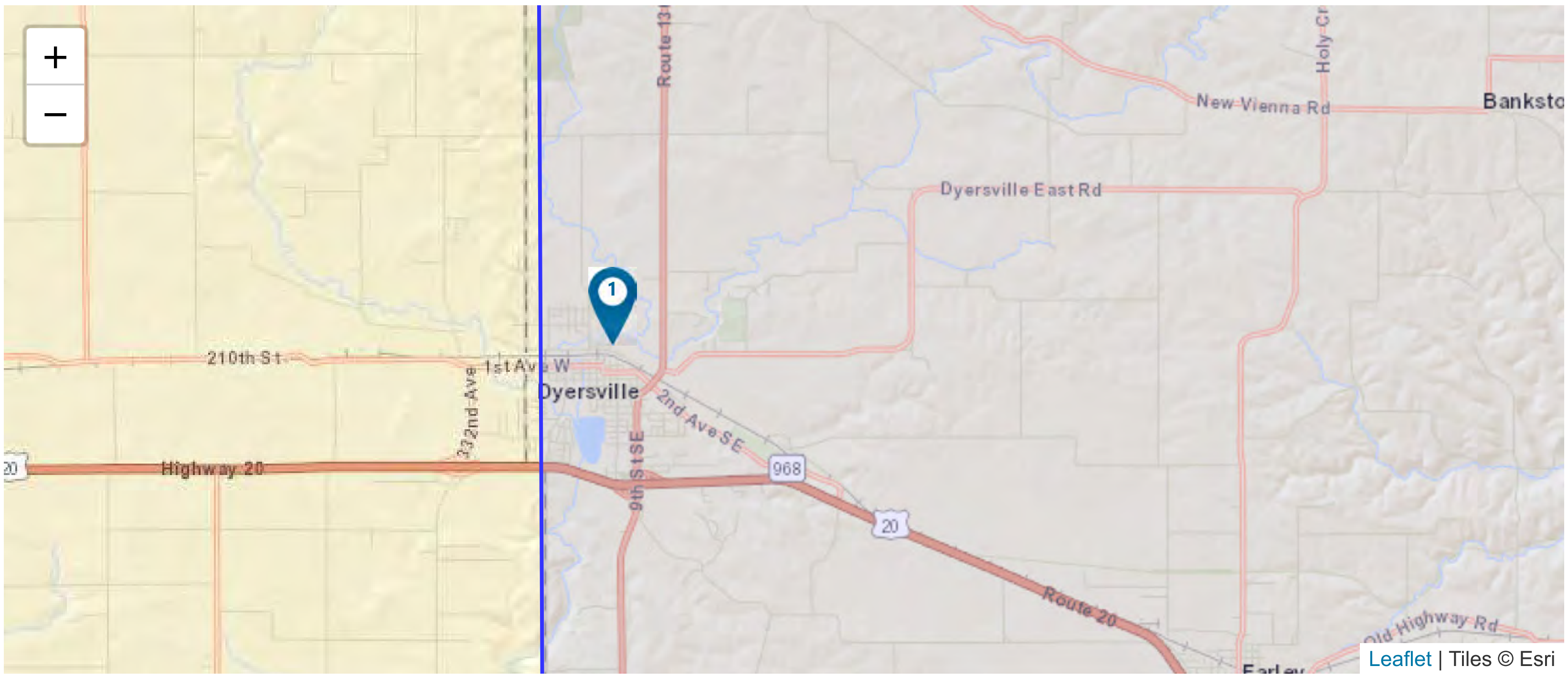
FEMA

Benefit-Cost Calculator

V.6.0 (Build 20241018.1218 | Release Notes)

Benefit-Cost Analysis

Project Name: NF-01 Upstream Flood Detention



Map Marker ▲	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
1	Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 35,892,746	$ 18,842,990	1.90
TOTAL (SELECTED)					**$ 35,892,746**	**$ 18,842,990**	**1.90**
TOTAL					**$ 35,892,746**	**$ 18,842,990**	**1.90**

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48719098627902, -91.1186640109488
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$18,456,000
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$20,000

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	940.84
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	937.37	938.11	4300	5005
10	939.34	940.41	6290	7322
25	941.6	942.79	9310	10837
100	944.23	944.91	13200	15365

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	937.27	938	4215	4906
10	939.27	940.33	6200	7217
25	941.52	942.72	9215	10726
100	944.22	944.89	13200	15365

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-8.42	1.11	$ 0	$ 0	$ 0	$ 0
-5.29	2	$ 0	$ 0	$ 0	$ 0
-2.58	4.78	$ 0	$ 0	$ 0	$ 0
-2	5.98	$ 56	$ 0	$ 0	$ 0
-1.24	8	$ 45	$ 0	$ 0	$ 0
-0.6	10.34	$ 50	$ 0	$ 0	$ 0
0	13.21	$ 243	$ 0	$ 0	$ 0
0.99	20	$ 562	$ 461	$ 116	$ 60
1.8	28.21	$ 105	$ 85	$ 21	$ 12
1.94	30	$ 467	$ 385	$ 93	$ 58
2.6	40	$ 567	$ 484	$ 117	$ 78
3.53	60	$ 186	$ 160	$ 39	$ 27
3.88	70	$ 147	$ 127	$ 35	$ 22
4.18	80	$ 40	$ 35	$ 11	$ 6
4.27	83.18	$ 78	$ 68	$ 22	$ 12
4.44	90	$ 580	$ 515	$ 171	$ 99
6.24	200	$ 180	$ 163	$ 58	$ 34
7.13	300	$ 96	$ 87	$ 32	$ 19
7.79	400	$ 660	$ 310	$ 147	$ 0
Total ($)		$ 4,063	$ 2,879	$ 861	$ 428

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-8.54	1.11	$ 0	$ 0	$ 0	$ 0
-5.41	2	$ 0	$ 0	$ 0	$ 0
-2.7	4.79	$ 0	$ 0	$ 0	$ 0
-2	6.21	$ 48	$ 0	$ 0	$ 0
-1.32	8	$ 44	$ 0	$ 0	$ 0
Total ($)		$ 3,978	$ 2,837	$ 852	$ 420

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-0.67	10.34	$ 54	$ 0	$ 0	$ 0
0	13.67	$ 212	$ 0	$ 0	$ 0
0.92	20	$ 526	$ 431	$ 110	$ 56
1.72	28.06	$ 111	$ 90	$ 22	$ 13
1.88	30	$ 458	$ 377	$ 91	$ 56
2.55	40	$ 560	$ 477	$ 115	$ 77
3.48	60	$ 184	$ 158	$ 39	$ 27
3.84	70	$ 147	$ 126	$ 35	$ 22
4.14	80	$ 50	$ 43	$ 14	$ 8
4.26	84	$ 68	$ 59	$ 19	$ 11
4.41	90	$ 580	$ 514	$ 171	$ 99
6.23	200	$ 180	$ 163	$ 58	$ 34
7.15	300	$ 96	$ 87	$ 32	$ 19
7.81	400	$ 660	$ 310	$ 147	$ 0
Total ($)		$ 3,978	$ 2,837	$ 852	$ 420

Building Information

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	COM2: Commercial - Wholesale Trade
Building is outside hundred-year flood area:	No
Building Type:	Warehouse-Non-Refrig
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Depth Damage Curve:	Warehouse, Non-Refrig (Default) Use Default:Yes
Building Size (sq.ft):	2,400
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$4,063
Expected Annual Losses due to Building Damages after Mitigation:	$3,978
Expected Annual Benefits - Building:	$85

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.5	1,320	0	0	0.5	1,320	0	0
-1	0.5	1,320	0	0	0.5	1,320	0	0
0	1.1	2,904.00	0	0	1.1	2,904.00	0	0
1	11.8	31,152.00	0	0	11.8	31,152.00	0	0
2	19.9	52,535.99	0	0	19.9	52,535.99	0	0
3	25.4	67,056	0	0	25.4	67,056	0	0
4	31.4	82,896	0	0	31.4	82,896	0	0
5	34.2	90,288.00	0	0	34.2	90,288.00	0	0
6	39	102,960	0	0	39	102,960	0	0
7	41.8	110,351.99	0	0	41.8	110,351.99	0	0
8	45.7	120,648.00	0	0	45.7	120,648.00	0	0
9	50.4	264,000	0	0	50.4	264,000	0	0
10	51.7	264,000	0	0	51.7	264,000	0	0
11	51.7	264,000	0	0	51.7	264,000	0	0
12	51.7	264,000	0	0	51.7	264,000	0	0
13	51.7	264,000	0	0	51.7	264,000	0	0
14	51.7	264,000	0	0	51.7	264,000	0	0
15	51.7	264,000	0	0	51.7	264,000	0	0
16	51.7	264,000	0	0	51.7	264,000	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Expected Annual Losses due to Content Damages before Mitigation:	$2,879
Expected Annual Losses due to Content Damages after Mitigation:	$2,837
Expected Annual Benefits - Content:	$43

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	21	26,056.8	21	26,056.8
2	34	42,187.2	34	42,187.2
3	47	58,317.6	47	58,317.6
4	57	70,725.6	57	70,725.6
5	66	81,892.8	66	81,892.8
6	74	91,819.2	74	91,819.2
7	81	100,504.8	81	100,504.8
8	88	109,190.4	88	109,190.4
9	92	114,153.6	92	114,153.6
10	94	116,635.2	94	116,635.2
11	94	116,635.2	94	116,635.2
12	94	116,635.2	94	116,635.2
13	94	116,635.2	94	116,635.2
14	94	116,635.2	94	116,635.2
15	94	116,635.2	94	116,635.2
16	94	116,635.2	94	116,635.2

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	0.64	Use Default:Yes
One-Time Displacement Cost ($/sq.ft):	1.28	Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$861	
Expected Annual Losses due to Displacement Damages after Mitigation:	$852	
Expected Annual Losses - Displacement:	$9	

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	3,598.02	45	3,598.02
2	90	7,196.05	90	7,196.05
3	135	10,794.08	135	10,794.08
4	180	18,936.98	180	18,936.98
5	225	23,671.23	225	23,671.23
6	270	28,405.47	270	28,405.47
7	315	33,139.72	315	33,139.72
8	360	46,963.72	360	46,963.72
9	405	52,834.19	405	52,834.19
10	450	58,704.65	450	58,704.65
11	450	58,704.65	450	58,704.65
12	450	22,724.38	450	22,724.38
13	450	22,724.38	450	22,724.38
14	450	22,724.38	450	22,724.38
15	450	22,724.38	450	22,724.38
16	450	22,724.38	450	22,724.38

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Annual Operating Budget:	$25,000
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$428
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$420
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$7

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	3,082.19	45	3,082.19
2	90	6,164.38	90	6,164.38
3	135	9,246.57	135	9,246.57
4	180	12,328.76	180	12,328.76
5	225	15,410.95	225	15,410.95
6	270	18,493.15	270	18,493.15
7	315	21,575.34	315	21,575.34
8	360	24,657.53	360	24,657.53
9	405	27,739.72	405	27,739.72
10	450	30,821.91	450	30,821.91
11	450	30,821.91	450	30,821.91
12	450	30,821.91	450	30,821.91
13	450	30,821.91	450	30,821.91
14	450	30,821.91	450	30,821.91
15	450	30,821.91	450	30,821.91
16	450	30,821.91	450	30,821.91

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Total Project Area (acres):	65
Percentage of Urban Green Open Space:	40.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	60.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$1,854,827

Benefits-Costs Summary

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$35,892,746
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$35,892,746
Total Mitigation Project Cost:	$18,842,990
Benefit Cost Ratio - Standard:	1.90
Benefit Cost Ratio - Standard + Social:	1.90

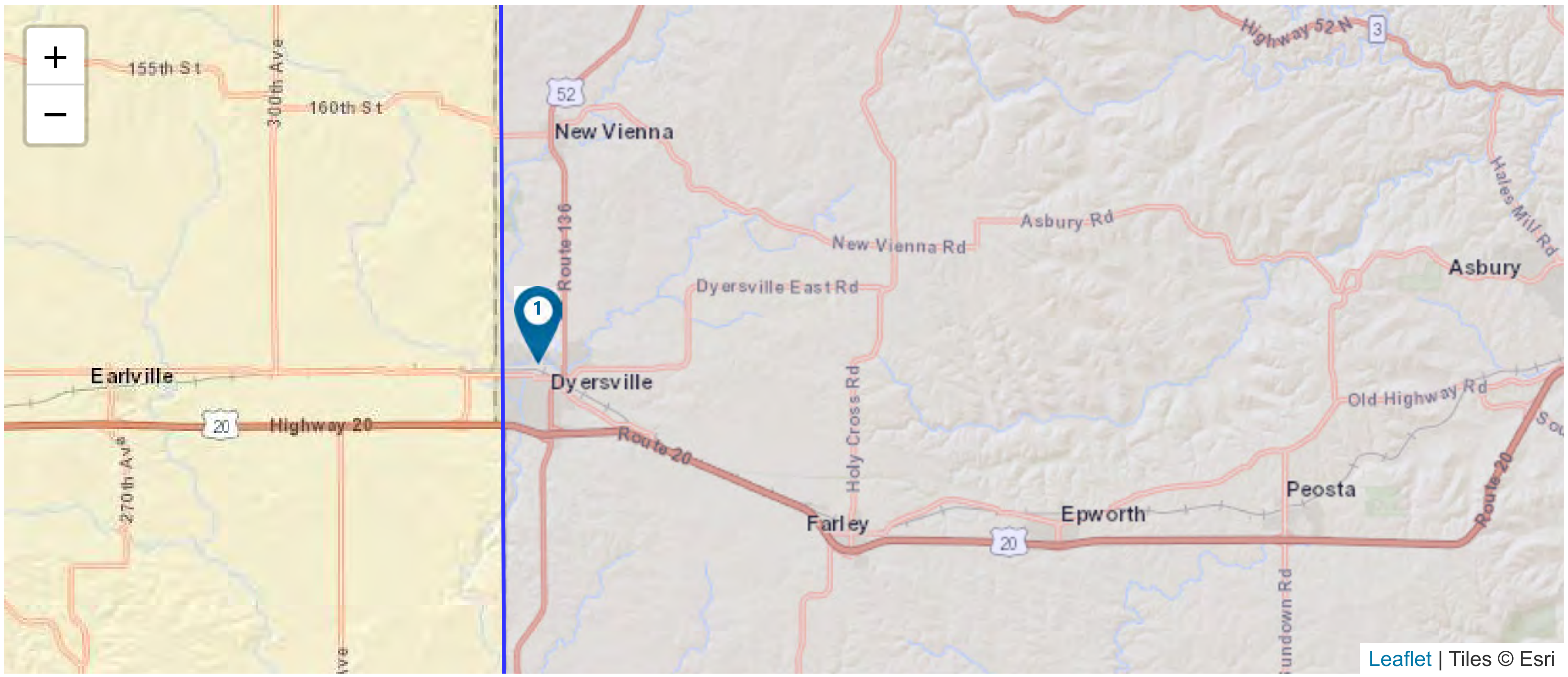
FEMA

Benefit-Cost Calculator

V.6.0 (Build 20241018.1218 | Release Notes)

Benefit-Cost Analysis

Project Name: NF-02 Floodplain Excavation East of 2nd Street



Map Marker ▲	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
1	Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 7,212,655	$ 5,065,747	1.42
TOTAL (SELECTED)					**$ 7,212,655**	**$ 5,065,747**	**1.42**
TOTAL					**$ 7,212,655**	**$ 5,065,747**	**1.42**

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48719098627902, -91.1186640109488
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$4,969,000
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$5,000

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	940.84
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	937.37	938.11	4300	5005
10	939.34	940.41	6290	7322
25	941.6	942.79	9310	10837
100	944.23	944.91	13200	15365

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	936.94	937.63	4300	5005
10	938.85	940.01	6290	7322
25	941.13	942.47	9310	10837
100	944.05	944.66	13200	15365

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-8.42	1.11	$ 0	$ 0	$ 0	$ 0
-5.29	2	$ 0	$ 0	$ 0	$ 0
-2.58	4.78	$ 0	$ 0	$ 0	$ 0
-2	5.98	$ 56	$ 0	$ 0	$ 0
-1.24	8	$ 45	$ 0	$ 0	$ 0
-0.6	10.34	$ 50	$ 0	$ 0	$ 0
0	13.21	$ 243	$ 0	$ 0	$ 0
0.99	20	$ 562	$ 461	$ 116	$ 60
1.8	28.21	$ 105	$ 85	$ 21	$ 12
1.94	30	$ 467	$ 385	$ 93	$ 58
2.6	40	$ 567	$ 484	$ 117	$ 78
3.53	60	$ 186	$ 160	$ 39	$ 27
3.88	70	$ 147	$ 127	$ 35	$ 22
4.18	80	$ 40	$ 35	$ 11	$ 6
4.27	83.18	$ 78	$ 68	$ 22	$ 12
4.44	90	$ 580	$ 515	$ 171	$ 99
6.24	200	$ 180	$ 163	$ 58	$ 34
7.13	300	$ 96	$ 87	$ 32	$ 19
7.79	400	$ 660	$ 310	$ 147	$ 0
Total ($)		$ 4,063	$ 2,879	$ 861	$ 428

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-8.92	1.11	$ 0	$ 0	$ 0	$ 0
-5.81	2	$ 0	$ 0	$ 0	$ 0
-3.05	4.78	$ 0	$ 0	$ 0	$ 0
-2	7.09	$ 21	$ 0	$ 0	$ 0
-1.68	8	$ 37	$ 0	$ 0	$ 0
Total ($)		$ 3,636	$ 2,639	$ 805	$ 385

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-1	10.34	$ 63	$ 0	$ 0	$ 0
0	15.51	$ 112	$ 0	$ 0	$ 0
0.63	20	$ 423	$ 340	$ 97	$ 43
1.46	28.21	$ 90	$ 73	$ 18	$ 10
1.61	30	$ 418	$ 342	$ 84	$ 49
2.3	40	$ 531	$ 449	$ 108	$ 70
3.26	60	$ 176	$ 152	$ 37	$ 25
3.63	70	$ 142	$ 122	$ 30	$ 21
3.95	80	$ 39	$ 34	$ 9	$ 6
4.04	83.18	$ 76	$ 66	$ 21	$ 12
4.22	90	$ 572	$ 504	$ 166	$ 96
6.11	200	$ 179	$ 161	$ 57	$ 34
7.07	300	$ 95	$ 87	$ 32	$ 19
7.75	400	$ 660	$ 310	$ 147	$ 0
Total ($)		$ 3,636	$ 2,639	$ 805	$ 385

Building Information

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	COM2: Commercial - Wholesale Trade
Building is outside hundred-year flood area:	No
Building Type:	Warehouse-Non-Refrig
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Depth Damage Curve:	Warehouse, Non-Refrig (Default) Use Default:Yes
Building Size (sq.ft):	2,400
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$4,063
Expected Annual Losses due to Building Damages after Mitigation:	$3,636
Expected Annual Benefits - Building:	$427

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.5	1,320	0	0	0.5	1,320	0	0
-1	0.5	1,320	0	0	0.5	1,320	0	0
0	1.1	2,904.00	0	0	1.1	2,904.00	0	0
1	11.8	31,152.00	0	0	11.8	31,152.00	0	0
2	19.9	52,535.99	0	0	19.9	52,535.99	0	0
3	25.4	67,056	0	0	25.4	67,056	0	0
4	31.4	82,896	0	0	31.4	82,896	0	0
5	34.2	90,288.00	0	0	34.2	90,288.00	0	0
6	39	102,960	0	0	39	102,960	0	0
7	41.8	110,351.99	0	0	41.8	110,351.99	0	0
8	45.7	120,648.00	0	0	45.7	120,648.00	0	0
9	50.4	264,000	0	0	50.4	264,000	0	0
10	51.7	264,000	0	0	51.7	264,000	0	0
11	51.7	264,000	0	0	51.7	264,000	0	0
12	51.7	264,000	0	0	51.7	264,000	0	0
13	51.7	264,000	0	0	51.7	264,000	0	0
14	51.7	264,000	0	0	51.7	264,000	0	0
15	51.7	264,000	0	0	51.7	264,000	0	0
16	51.7	264,000	0	0	51.7	264,000	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Expected Annual Losses due to Content Damages before Mitigation:	$2,879
Expected Annual Losses due to Content Damages after Mitigation:	$2,639
Expected Annual Benefits - Content:	$240

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	21	26,056.8	21	26,056.8
2	34	42,187.2	34	42,187.2
3	47	58,317.6	47	58,317.6
4	57	70,725.6	57	70,725.6
5	66	81,892.8	66	81,892.8
6	74	91,819.2	74	91,819.2
7	81	100,504.8	81	100,504.8
8	88	109,190.4	88	109,190.4
9	92	114,153.6	92	114,153.6
10	94	116,635.2	94	116,635.2
11	94	116,635.2	94	116,635.2
12	94	116,635.2	94	116,635.2
13	94	116,635.2	94	116,635.2
14	94	116,635.2	94	116,635.2
15	94	116,635.2	94	116,635.2
16	94	116,635.2	94	116,635.2

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	0.64	Use Default:Yes
One-Time Displacement Cost ($/sq.ft):	1.28	Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$861	
Expected Annual Losses due to Displacement Damages after Mitigation:	$805	
Expected Annual Losses - Displacement:	$56	

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	3,598.02	45	3,598.02
2	90	7,196.05	90	7,196.05
3	135	10,794.08	135	10,794.08
4	180	18,936.98	180	18,936.98
5	225	23,671.23	225	23,671.23
6	270	28,405.47	270	28,405.47
7	315	33,139.72	315	33,139.72
8	360	46,963.72	360	46,963.72
9	405	52,834.19	405	52,834.19
10	450	58,704.65	450	58,704.65
11	450	58,704.65	450	58,704.65
12	450	22,724.38	450	22,724.38
13	450	22,724.38	450	22,724.38
14	450	22,724.38	450	22,724.38
15	450	22,724.38	450	22,724.38
16	450	22,724.38	450	22,724.38

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Annual Operating Budget:	$25,000
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$428
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$385
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$43

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	3,082.19	45	3,082.19
2	90	6,164.38	90	6,164.38
3	135	9,246.57	135	9,246.57
4	180	12,328.76	180	12,328.76
5	225	15,410.95	225	15,410.95
6	270	18,493.15	270	18,493.15
7	315	21,575.34	315	21,575.34
8	360	24,657.53	360	24,657.53
9	405	27,739.72	405	27,739.72
10	450	30,821.91	450	30,821.91
11	450	30,821.91	450	30,821.91
12	450	30,821.91	450	30,821.91
13	450	30,821.91	450	30,821.91
14	450	30,821.91	450	30,821.91
15	450	30,821.91	450	30,821.91
16	450	30,821.91	450	30,821.91

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Total Project Area (acres):	10
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	100.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$371,990

Benefits-Costs Summary

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

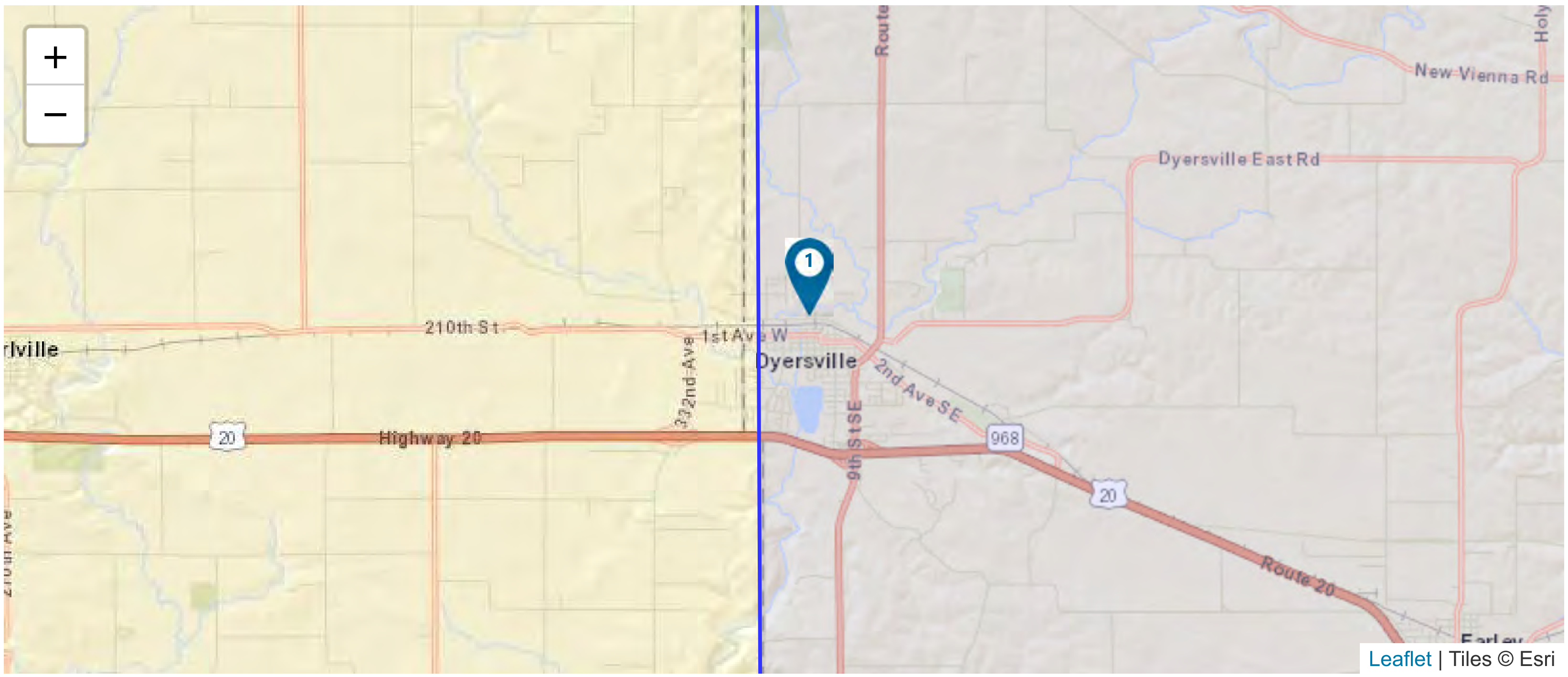
Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$7,212,655
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$7,212,655
Total Mitigation Project Cost:	$5,065,747
Benefit Cost Ratio - Standard:	1.42
Benefit Cost Ratio - Standard + Social:	1.42

Benefit-Cost Calculator

V.6.0 (Build 20241018.1218 | Release Notes)

Benefit-Cost Analysis

Project Name: NF-03 2nd Street Bridge Modification



Map Marker ▲	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
1	Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 180,882	$ 288,747	0.63
TOTAL (SELECTED)					**$ 180,882**	**$ 288,747**	**0.63**
TOTAL					**$ 180,882**	**$ 288,747**	**0.63**

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48704597935409, -91.1222050297643
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$192,000
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$5,000

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	942.92
Use Default Recurrence Intervals:	Use Defau *No*
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	935.41	936.22	5590	6507
10	937.56	938.91	8140	9475
25	940.27	941.69	12000	13968
100	943.42	944.19	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	935.24	936.07	5590	6507
10	937.4	938.62	8140	9475
25	939.97	941.27	12000	13968
100	942.85	943.64	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-12.51	1.11	$ 0	$ 0	$ 0	$ 0
-9.42	2	$ 0	$ 0	$ 0	$ 0
-6.51	4.79	$ 0	$ 0	$ 0	$ 0
-5	8	$ 0	$ 0	$ 0	$ 0
-4.24	10.33	$ 0	$ 0	$ 0	$ 0
-2.39	20	$ 0	$ 0	$ 0	$ 0
-2	23.14	$ 44	$ 0	$ 0	$ 0
-1.44	28.12	$ 13	$ 0	$ 0	$ 0
-1.26	30	$ 61	$ 0	$ 0	$ 0
-0.45	40	$ 42	$ 0	$ 0	$ 0
0	47.47	$ 150	$ 0	$ 0	$ 0
0.65	60	$ 273	$ 222	$ 63	$ 25
1.08	70	$ 283	$ 234	$ 59	$ 28
1.46	80	$ 95	$ 77	$ 19	$ 10
1.58	83.48	$ 171	$ 139	$ 34	$ 18
1.79	90	$ 1,669	$ 1,388	$ 384	$ 203
4.04	200	$ 633	$ 557	$ 179	$ 94
5.21	300	$ 353	$ 317	$ 107	$ 58
6.04	400	$ 2,853	$ 1,341	$ 634	$ 0
Total ($)		$ 6,640	$ 4,274	$ 1,479	$ 434

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-12.46	1.11	$ 0	$ 0	$ 0	$ 0
-9.46	2	$ 0	$ 0	$ 0	$ 0
-6.66	4.79	$ 0	$ 0	$ 0	$ 0
-5.23	8	$ 0	$ 0	$ 0	$ 0
-4.53	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 5,711	$ 3,620	$ 1,270	$ 319

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2.76	20	$ 0	$ 0	$ 0	$ 0
-2	26.71	$ 11	$ 0	$ 0	$ 0
-1.86	28.12	$ 13	$ 0	$ 0	$ 0
-1.69	30	$ 49	$ 0	$ 0	$ 0
-0.92	40	$ 66	$ 0	$ 0	$ 0
0	57.08	$ 16	$ 0	$ 0	$ 0
0.13	60	$ 113	$ 71	$ 43	$ 8
0.54	70	$ 174	$ 139	$ 43	$ 15
0.89	80	$ 67	$ 55	$ 15	$ 6
1	83.48	$ 125	$ 104	$ 26	$ 12
1.2	90	$ 1,336	$ 1,129	$ 279	$ 151
3.32	200	$ 568	$ 494	$ 137	$ 79
4.42	300	$ 322	$ 286	$ 93	$ 49
5.2	400	$ 2,853	$ 1,341	$ 634	$ 0
Total ($)		$ 5,711	$ 3,620	$ 1,270	$ 319

Building Information

Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	COM2: Commercial - Wholesale Trade
Building is outside hundred-year flood area:	No
Building Type:	Warehouse-Non-Refrig
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040

Depth Damage Curve:	Warehouse, Non-Refrig (Default) Use Default:Yes
Building Size (sq.ft):	10,374
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$6,640
Expected Annual Losses due to Building Damages after Mitigation:	$5,711
Expected Annual Benefits - Building:	$929

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.5	5,705.7	0	0	0.5	5,705.7	0	0
-1	0.5	5,705.7	0	0	0.5	5,705.7	0	0
0	1.1	12,552.54	0	0	1.1	12,552.54	0	0
1	11.8	134,654.52	0	0	11.8	134,654.52	0	0
2	19.9	227,086.86	0	0	19.9	227,086.86	0	0
3	25.4	289,849.56	0	0	25.4	289,849.56	0	0
4	31.4	358,317.95	0	0	31.4	358,317.95	0	0
5	34.2	390,269.88	0	0	34.2	390,269.88	0	0
6	39	445,044.6	0	0	39	445,044.6	0	0
7	41.8	476,996.51	0	0	41.8	476,996.51	0	0
8	45.7	521,500.98	0	0	45.7	521,500.98	0	0
9	50.4	1,141,140	0	0	50.4	1,141,140	0	0
10	51.7	1,141,140	0	0	51.7	1,141,140	0	0
11	51.7	1,141,140	0	0	51.7	1,141,140	0	0
12	51.7	1,141,140	0	0	51.7	1,141,140	0	0
13	51.7	1,141,140	0	0	51.7	1,141,140	0	0
14	51.7	1,141,140	0	0	51.7	1,141,140	0	0
15	51.7	1,141,140	0	0	51.7	1,141,140	0	0
16	51.7	1,141,140	0	0	51.7	1,141,140	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Expected Annual Losses due to Content Damages before Mitigation:	$4,274
Expected Annual Losses due to Content Damages after Mitigation:	$3,620
Expected Annual Benefits - Content:	$655

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	21	112,630.51	21	112,630.51
2	34	182,354.17	34	182,354.17
3	47	252,077.82	47	252,077.82
4	57	305,711.40	57	305,711.40
5	66	353,981.62	66	353,981.62
6	74	396,888.49	74	396,888.49
7	81	434,431.99	81	434,431.99
8	88	471,975.50	88	471,975.50
9	92	493,428.93	92	493,428.93
10	94	504,155.65	94	504,155.65
11	94	504,155.65	94	504,155.65
12	94	504,155.65	94	504,155.65
13	94	504,155.65	94	504,155.65
14	94	504,155.65	94	504,155.65
15	94	504,155.65	94	504,155.65
16	94	504,155.65	94	504,155.65

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	0.64 Use Default:Yes
One-Time Displacement Cost ($/sq.ft):	1.28 Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$1,479
Expected Annual Losses due to Displacement Damages after Mitigation:	$1,270
Expected Annual Losses - Displacement:	$209

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	15,552.47	45	15,552.47
2	90	31,104.94	90	31,104.94
3	135	46,657.42	135	46,657.42
4	180	81,855.12	180	81,855.12
5	225	102,318.90	225	102,318.90
6	270	122,782.68	270	122,782.68
7	315	143,246.46	315	143,246.46
8	360	203,000.70	360	203,000.70
9	405	228,375.79	405	228,375.79
10	450	253,750.88	450	253,750.88
11	450	253,750.88	450	253,750.88
12	450	98,226.14	450	98,226.14
13	450	98,226.14	450	98,226.14
14	450	98,226.14	450	98,226.14
15	450	98,226.14	450	98,226.14
16	450	98,226.14	450	98,226.14

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040

Annual Operating Budget:	$100,000
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$434
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$319
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$115

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	12,328.76	45	12,328.76
2	90	24,657.53	90	24,657.53
3	135	36,986.30	135	36,986.30
4	180	49,315.06	180	49,315.06
5	225	61,643.83	225	61,643.83
6	270	73,972.60	270	73,972.60
7	315	86,301.36	315	86,301.36
8	360	98,630.13	360	98,630.13
9	405	110,958.90	405	110,958.90
10	450	123,287.67	450	123,287.67
11	450	123,287.67	450	123,287.67
12	450	123,287.67	450	123,287.67
13	450	123,287.67	450	123,287.67
14	450	123,287.67	450	123,287.67
15	450	123,287.67	450	123,287.67
16	450	123,287.67	450	123,287.67

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040

Total Project Area (acres):	0.2
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	100.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$7,440

Benefits-Costs Summary

Floodplain and Stream Restoration @ 324 3rd St NE, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$180,882
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$180,882
Total Mitigation Project Cost:	$288,747
Benefit Cost Ratio - Standard:	0.63
Benefit Cost Ratio - Standard + Social:	0.63

FEMA

Benefit-Cost Calculator

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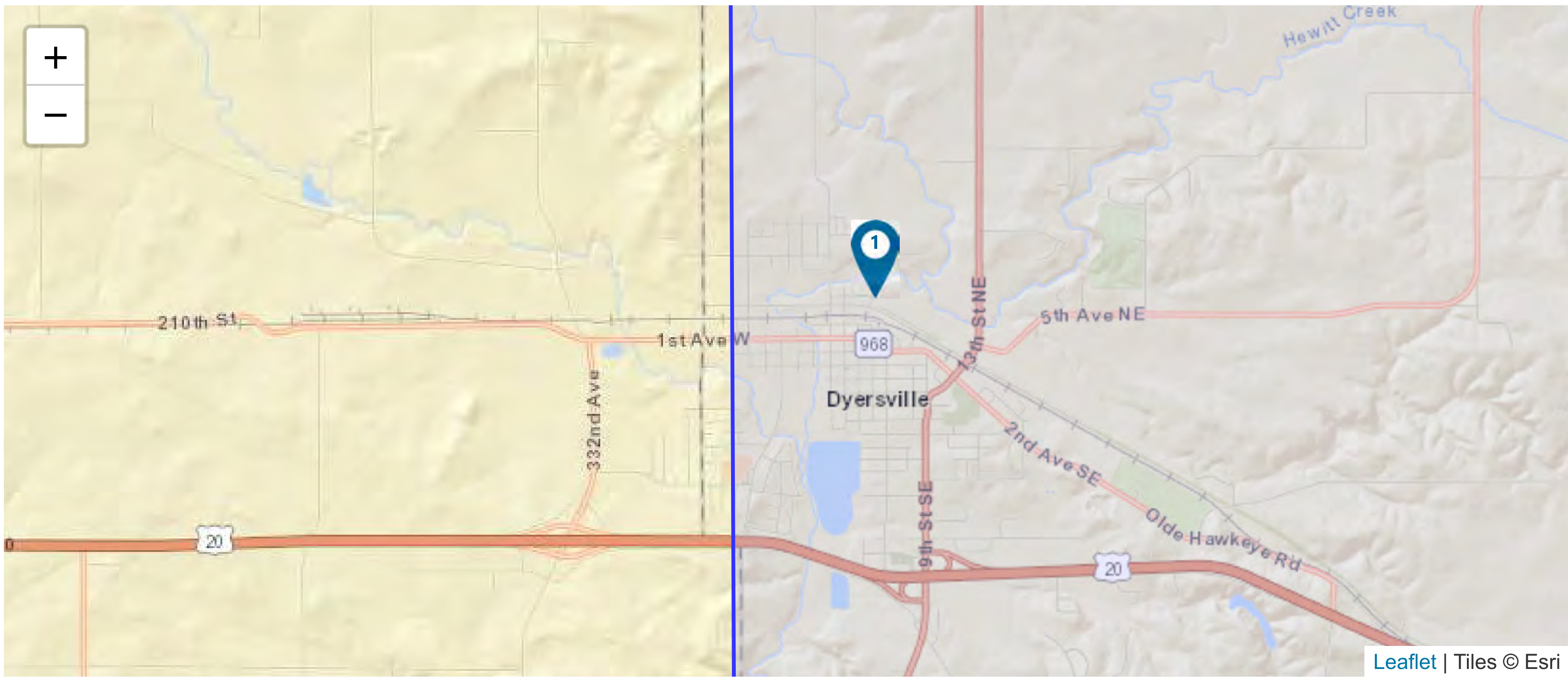
Benefit-Cost Analysis

Project Name: NF-04 Floodplain Excavation West of 2nd Street Bridge



Map Marker ▲	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
1	Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 15,843,216	$ 10,616,194	1.49
TOTAL (SELECTED)					**$ 15,843,216**	**$ 10,616,194**	**1.49**
TOTAL					**$ 15,843,216**	**$ 10,616,194**	**1.49**

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48719098627902, -91.1186640109488
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$10,384,000
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$12,000

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	940.84
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	937.37	938.11	4300	5005
10	939.34	940.41	6290	7322
25	941.6	942.79	9310	10837
100	944.23	944.91	13200	15365

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	937.14	937.9	4300	5005
10	939.17	940.22	6290	7322
25	941.4	942.62	9310	10837
100	944.06	944.75	13200	15365

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-8.42	1.11	$ 0	$ 0	$ 0	$ 0
-5.29	2	$ 0	$ 0	$ 0	$ 0
-2.58	4.78	$ 0	$ 0	$ 0	$ 0
-2	5.98	$ 56	$ 0	$ 0	$ 0
-1.24	8	$ 45	$ 0	$ 0	$ 0
-0.6	10.34	$ 50	$ 0	$ 0	$ 0
0	13.21	$ 243	$ 0	$ 0	$ 0
0.99	20	$ 562	$ 461	$ 116	$ 60
1.8	28.21	$ 105	$ 85	$ 21	$ 12
1.94	30	$ 467	$ 385	$ 93	$ 58
2.6	40	$ 567	$ 484	$ 117	$ 78
3.53	60	$ 186	$ 160	$ 39	$ 27
3.88	70	$ 147	$ 127	$ 35	$ 22
4.18	80	$ 40	$ 35	$ 11	$ 6
4.27	83.18	$ 78	$ 68	$ 22	$ 12
4.44	90	$ 580	$ 515	$ 171	$ 99
6.24	200	$ 180	$ 163	$ 58	$ 34
7.13	300	$ 96	$ 87	$ 32	$ 19
7.79	400	$ 660	$ 310	$ 147	$ 0
Total ($)		$ 4,063	$ 2,879	$ 861	$ 428

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-8.61	1.11	$ 0	$ 0	$ 0	$ 0
-5.5	2	$ 0	$ 0	$ 0	$ 0
-2.8	4.78	$ 0	$ 0	$ 0	$ 0
-2	6.46	$ 39	$ 0	$ 0	$ 0
-1.44	8	$ 42	$ 0	$ 0	$ 0
Total ($)		$ 3,835	$ 2,748	$ 831	$ 403

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-0.78	10.34	$ 58	$ 0	$ 0	$ 0
0	14.29	$ 172	$ 0	$ 0	$ 0
0.81	20	$ 492	$ 401	$ 106	$ 51
1.62	28.21	$ 97	$ 79	$ 19	$ 11
1.76	30	$ 440	$ 362	$ 88	$ 53
2.43	40	$ 546	$ 463	$ 112	$ 74
3.37	60	$ 180	$ 155	$ 38	$ 26
3.72	70	$ 144	$ 123	$ 34	$ 21
4.02	80	$ 40	$ 34	$ 11	$ 6
4.12	83.18	$ 77	$ 67	$ 21	$ 12
4.3	90	$ 574	$ 506	$ 167	$ 97
6.11	200	$ 179	$ 161	$ 57	$ 34
7.03	300	$ 95	$ 86	$ 32	$ 19
7.68	400	$ 660	$ 310	$ 147	$ 0
Total ($)		$ 3,835	$ 2,748	$ 831	$ 403

Building Information

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	COM2: Commercial - Wholesale Trade
Building is outside hundred-year flood area:	No
Building Type:	Warehouse-Non-Refrig
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Depth Damage Curve:	Warehouse, Non-Refrig (Default) Use Default:Yes
Building Size (sq.ft):	2,400
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$4,063
Expected Annual Losses due to Building Damages after Mitigation:	$3,835
Expected Annual Benefits - Building:	$228

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.5	1,320	0	0	0.5	1,320	0	0
-1	0.5	1,320	0	0	0.5	1,320	0	0
0	1.1	2,904.00	0	0	1.1	2,904.00	0	0
1	11.8	31,152.00	0	0	11.8	31,152.00	0	0
2	19.9	52,535.99	0	0	19.9	52,535.99	0	0
3	25.4	67,056	0	0	25.4	67,056	0	0
4	31.4	82,896	0	0	31.4	82,896	0	0
5	34.2	90,288.00	0	0	34.2	90,288.00	0	0
6	39	102,960	0	0	39	102,960	0	0
7	41.8	110,351.99	0	0	41.8	110,351.99	0	0
8	45.7	120,648.00	0	0	45.7	120,648.00	0	0
9	50.4	264,000	0	0	50.4	264,000	0	0
10	51.7	264,000	0	0	51.7	264,000	0	0
11	51.7	264,000	0	0	51.7	264,000	0	0
12	51.7	264,000	0	0	51.7	264,000	0	0
13	51.7	264,000	0	0	51.7	264,000	0	0
14	51.7	264,000	0	0	51.7	264,000	0	0
15	51.7	264,000	0	0	51.7	264,000	0	0
16	51.7	264,000	0	0	51.7	264,000	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Expected Annual Losses due to Content Damages before Mitigation:	$2,879
Expected Annual Losses due to Content Damages after Mitigation:	$2,748
Expected Annual Benefits - Content:	$132

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	21	26,056.8	21	26,056.8
2	34	42,187.2	34	42,187.2
3	47	58,317.6	47	58,317.6
4	57	70,725.6	57	70,725.6
5	66	81,892.8	66	81,892.8
6	74	91,819.2	74	91,819.2
7	81	100,504.8	81	100,504.8
8	88	109,190.4	88	109,190.4
9	92	114,153.6	92	114,153.6
10	94	116,635.2	94	116,635.2
11	94	116,635.2	94	116,635.2
12	94	116,635.2	94	116,635.2
13	94	116,635.2	94	116,635.2
14	94	116,635.2	94	116,635.2
15	94	116,635.2	94	116,635.2
16	94	116,635.2	94	116,635.2

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	0.64	Use Default:Yes
One-Time Displacement Cost ($/sq.ft):	1.28	Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$861	
Expected Annual Losses due to Displacement Damages after Mitigation:	$831	
Expected Annual Losses - Displacement:	$30	

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	3,598.02	45	3,598.02
2	90	7,196.05	90	7,196.05
3	135	10,794.08	135	10,794.08
4	180	18,936.98	180	18,936.98
5	225	23,671.23	225	23,671.23
6	270	28,405.47	270	28,405.47
7	315	33,139.72	315	33,139.72
8	360	46,963.72	360	46,963.72
9	405	52,834.19	405	52,834.19
10	450	58,704.65	450	58,704.65
11	450	58,704.65	450	58,704.65
12	450	22,724.38	450	22,724.38
13	450	22,724.38	450	22,724.38
14	450	22,724.38	450	22,724.38
15	450	22,724.38	450	22,724.38
16	450	22,724.38	450	22,724.38

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Annual Operating Budget:	$25,000
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$428
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$403
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$25

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	3,082.19	45	3,082.19
2	90	6,164.38	90	6,164.38
3	135	9,246.57	135	9,246.57
4	180	12,328.76	180	12,328.76
5	225	15,410.95	225	15,410.95
6	270	18,493.15	270	18,493.15
7	315	21,575.34	315	21,575.34
8	360	24,657.53	360	24,657.53
9	405	27,739.72	405	27,739.72
10	450	30,821.91	450	30,821.91
11	450	30,821.91	450	30,821.91
12	450	30,821.91	450	30,821.91
13	450	30,821.91	450	30,821.91
14	450	30,821.91	450	30,821.91
15	450	30,821.91	450	30,821.91
16	450	30,821.91	450	30,821.91

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Total Project Area (acres):	22
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	100.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$818,378

Benefits-Costs Summary

Floodplain and Stream Restoration @ 430 4th Ave NE, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$15,843,216
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$15,843,216
Total Mitigation Project Cost:	$10,616,194
Benefit Cost Ratio - Standard:	1.49
Benefit Cost Ratio - Standard + Social:	1.49

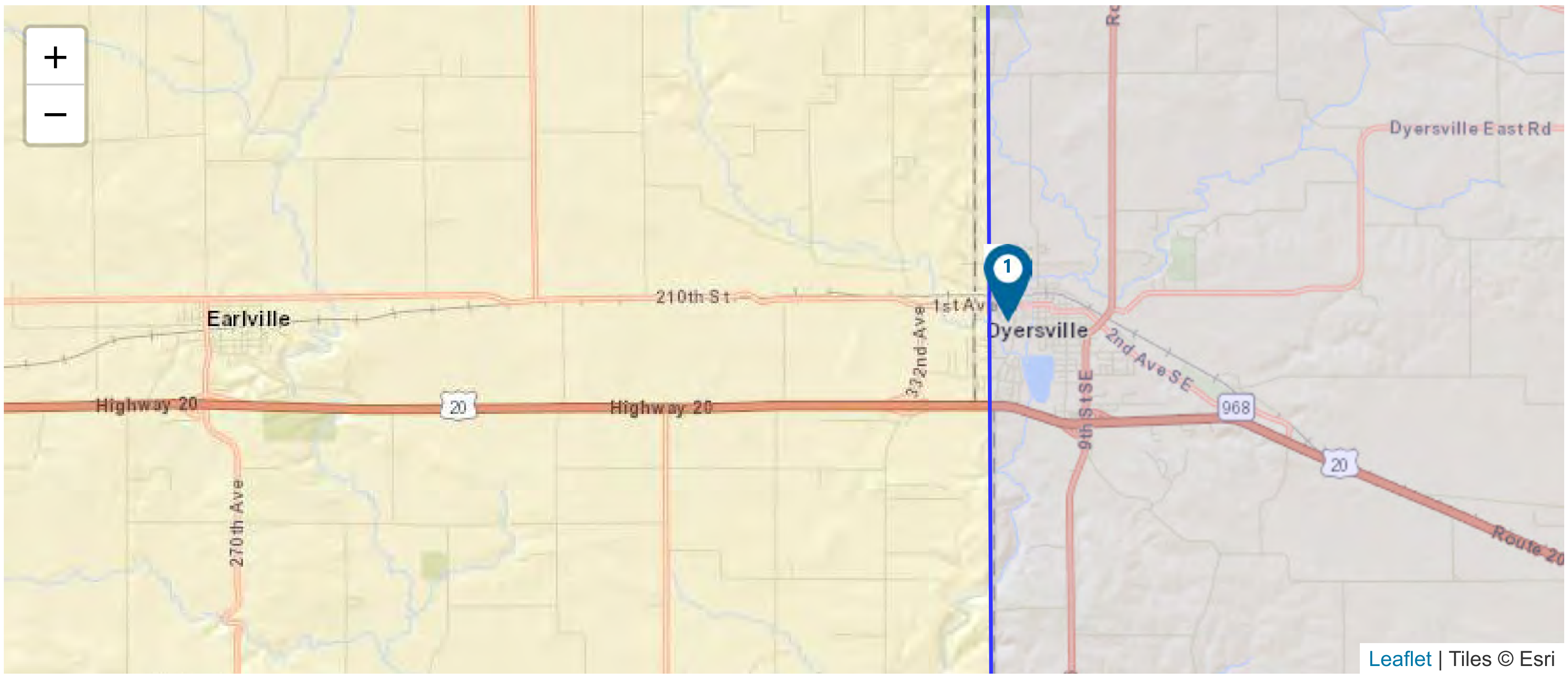
FEMA

Benefit-Cost Calculator

V.6.0 (Build 20241018.1218 | Release Notes)

Benefit-Cost Analysis

Project Name: NF-06 Excavation at Westside Park



Map Marker ▲	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
1	Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 227,332	$ 1,054,121	0.22
TOTAL (SELECTED)					**$ 227,332**	**$ 1,054,121**	**0.22**
TOTAL					**$ 227,332**	**$ 1,054,121**	**0.22**

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.482204005346716, -91.12827998172877
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$909,000
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$7,500

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	936.06
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.36	931.82	5590	6507
10	932.62	933.38	8140	9475
25	934.11	934.99	12000	13968
100	936.03	936.44	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.25	931.71	5590	6507
10	932.51	933.27	8140	9475
25	933.99	934.87	12000	13968
100	935.9	936.31	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-8.8	1.11	$ 0	$ 0	$ 0	$ 0
-6.22	2	$ 0	$ 0	$ 0	$ 0
-4.17	4.79	$ 0	$ 0	$ 0	$ 0
-3.19	8	$ 0	$ 0	$ 0	$ 0
-2.76	10.33	$ 0	$ 0	$ 0	$ 0
-2	16.31	$ 152	$ 122	$ 0	$ 0
-1.67	20	$ 223	$ 169	$ 0	$ 0
-1.14	28.12	$ 38	$ 28	$ 0	$ 0
-1.04	30	$ 152	$ 108	$ 0	$ 0
-0.59	40	$ 173	$ 118	$ 0	$ 0
0.01	60	$ 2	$ 2	$ 0	$ 0
0	60.39	$ 52	$ 34	$ 0	$ 0
0.21	70	$ 43	$ 28	$ 5	$ 0
0.41	80	$ 13	$ 8	$ 2	$ 0
0.47	83.48	$ 22	$ 14	$ 4	$ 0
0.57	90	$ 174	$ 107	$ 56	$ 0
1.69	200	$ 56	$ 33	$ 30	$ 0
2.24	300	$ 30	$ 17	$ 19	$ 0
2.63	400	$ 312	$ 312	$ 187	$ 0
Total ($)		$ 1,441	$ 1,100	$ 302	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-8.9	1.11	$ 0	$ 0	$ 0	$ 0
-6.3	2	$ 0	$ 0	$ 0	$ 0
-4.28	4.79	$ 0	$ 0	$ 0	$ 0
-3.31	8	$ 0	$ 0	$ 0	$ 0
-2.86	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 1,351	$ 1,039	$ 287	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2	17.54	$ 92	$ 75	$ 0	$ 0
-1.79	20	$ 215	$ 166	$ 0	$ 0
-1.26	28.12	$ 36	$ 27	$ 0	$ 0
-1.16	30	$ 147	$ 106	$ 0	$ 0
-0.73	40	$ 168	$ 115	$ 0	$ 0
-0.12	60	$ 33	$ 22	$ 0	$ 0
0	65.88	$ 20	$ 13	$ 0	$ 0
0.09	70	$ 42	$ 27	$ 3	$ 0
0.28	80	$ 13	$ 8	$ 1	$ 0
0.34	83.48	$ 21	$ 14	$ 3	$ 0
0.45	90	$ 170	$ 105	$ 47	$ 0
1.56	200	$ 54	$ 32	$ 28	$ 0
2.11	300	$ 30	$ 17	$ 18	$ 0
2.5	400	$ 312	$ 312	$ 187	$ 0
Total ($)		$ 1,351	$ 1,039	$ 287	$ 0

Building Information

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Building Type:	Two or More Stories
Foundation Type:	
Building Has Basement:	**Yes**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Depth Damage Curve:	USACE Generic Use Default:Yes
Building Size (sq.ft):	1,134
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$1,441
Expected Annual Losses due to Building Damages after Mitigation:	$1,351
Expected Annual Benefits - Building:	$90

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	10.2	12,723.48	0	0	10.2	12,723.48	0	0
-1	13.9	17,338.86	0	0	13.9	17,338.86	0	0
0	17.9	22,328.46	0	0	17.9	22,328.46	0	0
1	22.3	27,817.02	0	0	22.3	27,817.02	0	0
2	27	33,679.8	0	0	27	33,679.8	0	0
3	31.9	39,792.06	0	0	31.9	39,792.06	0	0
4	36.9	46,029.06	0	0	36.9	46,029.06	0	0
5	41.9	52,266.06	0	0	41.9	52,266.06	0	0
6	46.9	58,503.06	0	0	46.9	58,503.06	0	0
7	51.8	124,740	0	0	51.8	124,740	0	0
8	56.4	124,740	0	0	56.4	124,740	0	0
9	60.8	124,740	0	0	60.8	124,740	0	0
10	64.8	124,740	0	0	64.8	124,740	0	0
11	68.4	124,740	0	0	68.4	124,740	0	0
12	71.4	124,740	0	0	71.4	124,740	0	0
13	73.7	124,740	0	0	73.7	124,740	0	0
14	75.4	124,740	0	0	75.4	124,740	0	0
15	76.4	124,740	0	0	76.4	124,740	0	0
16	76.4	124,740	0	0	76.4	124,740	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Utilities Elevated:	**No**
Expected Annual Losses due to Content Damages before Mitigation:	$1,100
Expected Annual Losses due to Content Damages after Mitigation:	$1,039
Expected Annual Benefits - Content:	$61

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	8.4	10,478.16	8.4	10,478.16
-1	10.1	12,598.74	10.1	12,598.74
0	11.9	14,844.06	11.9	14,844.06
1	13.8	17,214.12	13.8	17,214.12
2	15.7	19,584.18	15.7	19,584.18
3	17.7	22,078.98	17.7	22,078.98
4	19.8	24,698.52	19.8	24,698.52
5	22	27,442.80	22	27,442.80
6	24.3	30,311.82	24.3	30,311.82
7	26.7	33,305.58	26.7	33,305.58
8	29.1	36,299.34	29.1	36,299.34
9	31.7	39,542.58	31.7	39,542.58
10	34.4	42,910.56	34.4	42,910.56
11	37.2	46,403.28	37.2	46,403.28
12	40	49,896.00	40	49,896.00
13	43	53,638.20	43	53,638.20
14	46.1	57,505.14	46.1	57,505.14
15	49.3	61,496.82	49.3	61,496.82
16	52.6	65,613.24	52.6	65,613.24

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Lodging Per Diem:	$107	Use Default:Yes
Meals Per Diem:	$59	Use Default:Yes
Population Affected:	2	
Duration of Displacement (days):	365	Use Default:Yes
Total Residential Displacement Cost:	$205	
Expected Annual Losses due to Displacement Damages before mitigation:	$302	
Expected Annual Losses due to Displacement Damages after Mitigation:	$287	
Expected Annual Losses - Displacement:	$16	

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	9,225	45	9,225
2	90	18,450	90	18,450
3	135	27,675	135	27,675
4	180	36,900	180	36,900
5	225	46,125	225	46,125
6	270	55,350	270	55,350
7	315	64,575	315	64,575
8	360	73,800	360	73,800
9	405	83,025	405	83,025
10	450	92,250	450	92,250
11	495	101,475	495	101,475
12	540	110,700	540	110,700
13	585	119,925	585	119,925
14	630	129,150	630	129,150
15	675	138,375	675	138,375
16	720	147,600	720	147,600

Additional Benefits - Street Maintenance

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Total Annual Street Maintenance Budget:	$0
Total Number of Street Miles Maintained:	0
Street Miles that will not require future maintenance:	0
Expected Annual Benefits - Street Maintenance:	$0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Total Project Area (acres):	0.7
Percentage of Urban Green Open Space:	100.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$10,879

Additional Benefits - Social

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Number of Workers:	1
Expected Annual Social Benefits:	$13,622

Benefits-Costs Summary

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$213,710
Total Social Benefits:	$13,622
Total Mitigation Project Benefits:	$227,332
Total Mitigation Project Cost:	$1,054,121
Benefit Cost Ratio - Standard:	0.20
Benefit Cost Ratio - Standard + Social:	0.22

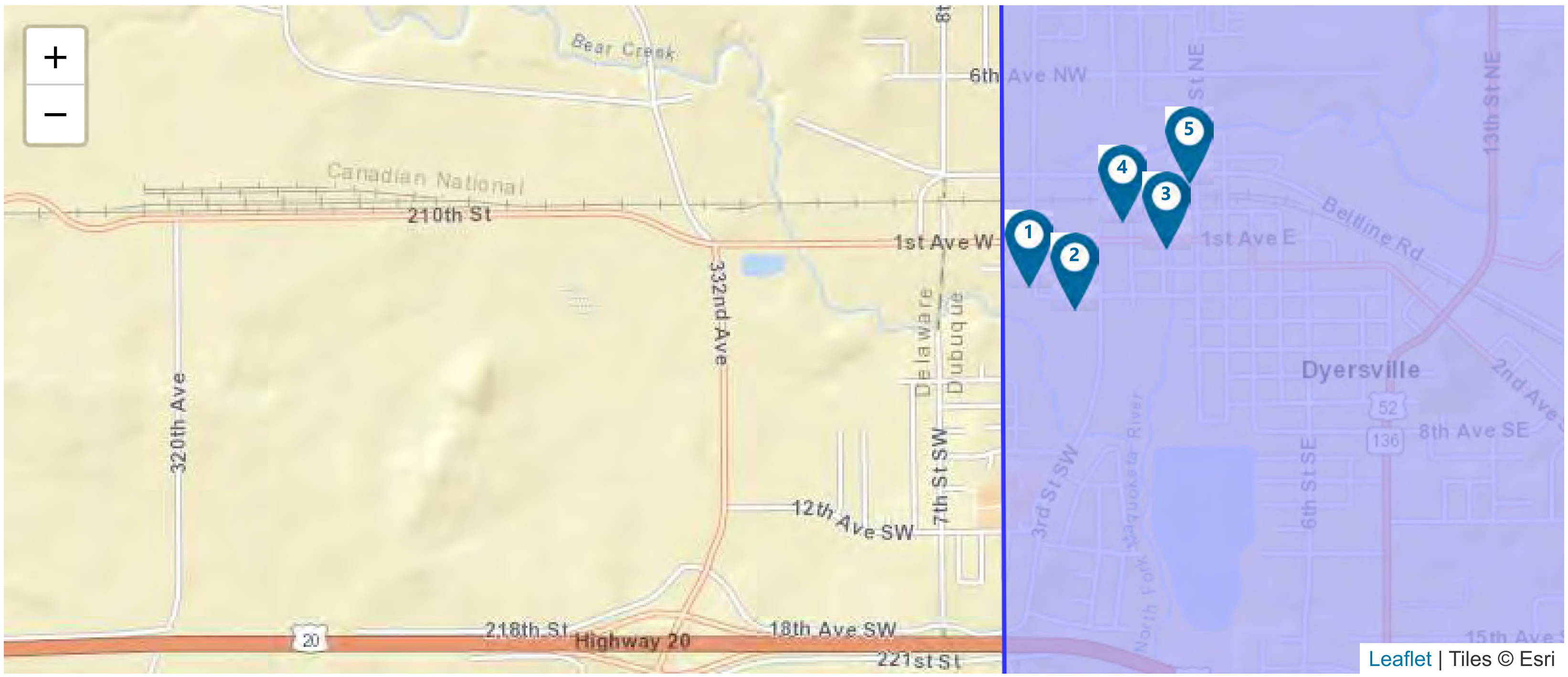
FEMA

Benefit-Cost Calculator

V.6.0 (Build 20241018.1218 | Release Notes)

Benefit-Cost Analysis

Project Name: NF-07 Berm Removal and Excavation East Bank Westside Park



Map Marker ▲	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
1	Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 3,239,354	$ 2,555,495	1.27
2	Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 22,732	$ 0	0.00

Map Marker ▲	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
3	Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 1,577	$ 0	0.00
4	Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 1,225	$ 0	0.00
5	Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 2,187	$ 0	0.00
TOTAL (SELECTED)					**$ 3,267,075**	**$ 2,555,495**	**1.28**
TOTAL					**$ 3,267,075**	**$ 2,555,495**	**1.28**

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48299299389262, -91.13033296127354
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$2,362,000
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$10,000

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft): 934.78

Use Default Recurrence Intervals: Use Defau No

Include Future Precipitation Impacts: Yes

Future Precipitation Scenario: 8.5

Delta Change Factor (%): 16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.62	932.14	5590	6507
10	933.06	934.08	8140	9475
25	934.97	936.08	12000	13968
100	937.39	937.87	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.19	931.69	5590	6507
10	932.56	933.71	8140	9475
25	934.67	935.79	12000	13968
100	937.17	937.66	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-7.76	1.11	$ 0	$ 0	$ 0	$ 0
-4.9	2	$ 0	$ 0	$ 0	$ 0
-2.51	4.79	$ 0	$ 0	$ 0	$ 0
-2	6.04	$ 1	$ 0	$ 0	$ 0
-1.36	8	$ 1	$ 0	$ 0	$ 0
-0.82	10.33	$ 1	$ 0	$ 0	$ 0
0	15.46	$ 3	$ 0	$ 0	$ 0
0.52	20	$ 13	$ 2	$ 4	$ 0
1.18	28.12	$ 3	$ 0	$ 1	$ 0
1.31	30	$ 14	$ 2	$ 3	$ 0
1.86	40	$ 17	$ 2	$ 4	$ 0
2.62	60	$ 6	$ 1	$ 2	$ 0
2.91	70	$ 5	$ 1	$ 1	$ 0
3.16	80	$ 1	$ 0	$ 0	$ 0
3.24	83.48	$ 2	$ 0	$ 1	$ 0
3.38	90	$ 18	$ 2	$ 6	$ 0
4.83	200	$ 8	$ 1	$ 2	$ 0
5.57	300	$ 6	$ 0	$ 1	$ 0
6.08	400	$ 18	$ 1	$ 8	$ 0
Total ($)		$ 117	$ 13	$ 35	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-8.27	1.11	$ 0	$ 0	$ 0	$ 0
-5.41	2	$ 0	$ 0	$ 0	$ 0
-2.96	4.79	$ 0	$ 0	$ 0	$ 0
-2	7.26	$ 0	$ 0	$ 0	$ 0
-1.78	8	$ 1	$ 0	$ 0	$ 0
Total ($)		$ 103	$ 12	$ 32	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-1.2	10.33	$ 2	$ 0	$ 0	$ 0
0	18.29	$ 1	$ 0	$ 0	$ 0
0.19	20	$ 7	$ 1	$ 3	$ 0
0.88	28.12	$ 2	$ 0	$ 1	$ 0
1.01	30	$ 12	$ 2	$ 3	$ 0
1.59	40	$ 16	$ 2	$ 4	$ 0
2.39	60	$ 5	$ 1	$ 1	$ 0
2.7	70	$ 4	$ 1	$ 1	$ 0
2.96	80	$ 1	$ 0	$ 0	$ 0
3.04	83.48	$ 2	$ 0	$ 1	$ 0
3.19	90	$ 18	$ 2	$ 6	$ 0
4.73	200	$ 8	$ 1	$ 2	$ 0
5.51	300	$ 6	$ 0	$ 1	$ 0
6.06	400	$ 18	$ 1	$ 8	$ 0
Total ($)		$ 103	$ 12	$ 32	$ 0

Building Information

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	REL1: Religious/Non-Profit - Church or Membership Organization
Building is outside hundred-year flood area:	No
Building Type:	Religious Facilities
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Depth Damage Curve:	Religious Facilities (Default) Use Default:Yes
Building Size (sq.ft):	64
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$117
Expected Annual Losses due to Building Damages after Mitigation:	$103
Expected Annual Benefits - Building:	$13

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.4	28.16	0	0	0.4	28.16	0	0
-1	0.4	28.16	0	0	0.4	28.16	0	0
0	0.7	49.28	0	0	0.7	49.28	0	0
1	16.4	1,154.56	0	0	16.4	1,154.56	0	0
2	28.3	1,992.32	0	0	28.3	1,992.32	0	0
3	35.9	2,527.36	0	0	35.9	2,527.36	0	0
4	42.9	3,020.16	0	0	42.9	3,020.16	0	0
5	48.4	3,407.36	0	0	48.4	3,407.36	0	0
6	54.2	7,040	0	0	54.2	7,040	0	0
7	58.1	7,040	0	0	58.1	7,040	0	0
8	62.1	7,040	0	0	62.1	7,040	0	0
9	65.3	7,040	0	0	65.3	7,040	0	0
10	66.1	7,040	0	0	66.1	7,040	0	0
11	66.1	7,040	0	0	66.1	7,040	0	0
12	66.1	7,040	0	0	66.1	7,040	0	0
13	66.1	7,040	0	0	66.1	7,040	0	0
14	66.1	7,040	0	0	66.1	7,040	0	0
15	66.1	7,040	0	0	66.1	7,040	0	0
16	66.1	7,040	0	0	66.1	7,040	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Expected Annual Losses due to Content Damages before Mitigation:	$13
Expected Annual Losses due to Content Damages after Mitigation:	$12
Expected Annual Benefits - Content:	$1

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	29	163.32	29	163.32
2	48	270.33	48	270.33
3	60	337.92	60	337.92
4	69	388.60	69	388.60
5	76	428.03	76	428.03
6	81	456.19	81	456.19
7	88	495.61	88	495.61
8	94	529.40	94	529.40
9	97	546.30	97	546.30
10	97	546.30	97	546.30
11	97	546.30	97	546.30
12	97	546.30	97	546.30
13	97	546.30	97	546.30
14	97	546.30	97	546.30
15	97	546.30	97	546.30
16	97	546.30	97	546.30

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	1.37	Use Default:Yes
One-Time Displacement Cost ($/sq.ft):	1.28	Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$35	
Expected Annual Losses due to Displacement Damages after Mitigation:	$32	
Expected Annual Losses - Displacement:	$3	

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	205.38	45	205.38
2	90	410.77	90	410.77
3	135	616.16	135	616.16
4	180	1,080.98	180	1,080.98
5	225	1,351.23	225	1,351.23
6	270	1,621.47	270	1,621.47
7	315	1,891.72	315	1,891.72
8	360	2,680.84	360	2,680.84
9	405	3,015.95	405	3,015.95
10	450	3,351.05	450	3,351.05
11	450	3,351.05	450	3,351.05
12	450	1,297.18	450	1,297.18
13	450	1,297.18	450	1,297.18
14	450	1,297.18	450	1,297.18
15	450	1,297.18	450	1,297.18
16	450	1,297.18	450	1,297.18

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Annual Operating Budget:	$0
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$0
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$0
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$0

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	0	45	0
2	90	0	90	0
3	135	0	135	0
4	180	0	180	0
5	225	0	225	0
6	270	0	270	0
7	315	0	315	0
8	360	0	360	0
9	405	0	405	0
10	450	0	450	0
11	450	0	450	0
12	450	0	450	0
13	450	0	450	0
14	450	0	450	0
15	450	0	450	0
16	450	0	450	0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Total Project Area (acres):	4.5
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	100.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$167,396

Benefits-Costs Summary

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$3,239,354
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$3,239,354
Total Mitigation Project Cost:	$2,555,495
Benefit Cost Ratio - Standard:	1.27
Benefit Cost Ratio - Standard + Social:	1.27

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.482204005346716, -91.12827998172877
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	936.06
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.36	931.82	5590	6507
10	932.62	933.38	8140	9475
25	934.11	934.99	12000	13968
100	936.03	936.44	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	930.86	931.3	5590	6507
10	932.05	932.93	8140	9475
25	933.71	934.63	12000	13968
100	935.73	936.14	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-8.8	1.11	$ 0	$ 0	$ 0	$ 0
-6.22	2	$ 0	$ 0	$ 0	$ 0
-4.17	4.79	$ 0	$ 0	$ 0	$ 0
-3.19	8	$ 0	$ 0	$ 0	$ 0
-2.76	10.33	$ 0	$ 0	$ 0	$ 0
-2	16.31	$ 152	$ 122	$ 0	$ 0
-1.67	20	$ 223	$ 169	$ 0	$ 0
-1.14	28.12	$ 38	$ 28	$ 0	$ 0
-1.04	30	$ 152	$ 108	$ 0	$ 0
-0.59	40	$ 173	$ 118	$ 0	$ 0
0.01	60	$ 2	$ 2	$ 0	$ 0
0	60.39	$ 52	$ 34	$ 0	$ 0
0.21	70	$ 43	$ 28	$ 5	$ 0
0.41	80	$ 13	$ 8	$ 2	$ 0
0.47	83.48	$ 22	$ 14	$ 4	$ 0
0.57	90	$ 174	$ 107	$ 56	$ 0
1.69	200	$ 56	$ 33	$ 30	$ 0
2.24	300	$ 30	$ 17	$ 19	$ 0
2.63	400	$ 312	$ 312	$ 187	$ 0
Total ($)		$ 1,441	$ 1,100	$ 302	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.42	1.11	$ 0	$ 0	$ 0	$ 0
-6.79	2	$ 0	$ 0	$ 0	$ 0
-4.67	4.79	$ 0	$ 0	$ 0	$ 0
-3.68	8	$ 0	$ 0	$ 0	$ 0
-3.2	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 1,182	$ 919	$ 272	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2.06	20	$ 0	$ 0	$ 0	$ 0
-2	20.95	$ 168	$ 134	$ 0	$ 0
-1.5	28.12	$ 34	$ 26	$ 0	$ 0
-1.41	30	$ 137	$ 102	$ 0	$ 0
-0.95	40	$ 159	$ 112	$ 0	$ 0
-0.32	60	$ 51	$ 34	$ 0	$ 0
-0.07	70	$ 17	$ 11	$ 0	$ 0
0	74.03	$ 23	$ 15	$ 0	$ 0
0.12	80	$ 12	$ 8	$ 1	$ 0
0.18	83.48	$ 21	$ 13	$ 2	$ 0
0.3	90	$ 166	$ 103	$ 37	$ 0
1.49	200	$ 54	$ 32	$ 27	$ 0
2.08	300	$ 29	$ 17	$ 17	$ 0
2.49	400	$ 312	$ 312	$ 187	$ 0
Total ($)		$ 1,182	$ 919	$ 272	$ 0

Building Information

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Building Type:	Two or More Stories
Foundation Type:	
Building Has Basement:	**Yes**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Depth Damage Curve:	USACE Generic Use Default:Yes
Building Size (sq.ft):	1,134
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$1,441
Expected Annual Losses due to Building Damages after Mitigation:	$1,182
Expected Annual Benefits - Building:	$259

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	10.2	12,723.48	0	0	10.2	12,723.48	0	0
-1	13.9	17,338.86	0	0	13.9	17,338.86	0	0
0	17.9	22,328.46	0	0	17.9	22,328.46	0	0
1	22.3	27,817.02	0	0	22.3	27,817.02	0	0
2	27	33,679.8	0	0	27	33,679.8	0	0
3	31.9	39,792.06	0	0	31.9	39,792.06	0	0
4	36.9	46,029.06	0	0	36.9	46,029.06	0	0
5	41.9	52,266.06	0	0	41.9	52,266.06	0	0
6	46.9	58,503.06	0	0	46.9	58,503.06	0	0
7	51.8	124,740	0	0	51.8	124,740	0	0
8	56.4	124,740	0	0	56.4	124,740	0	0
9	60.8	124,740	0	0	60.8	124,740	0	0
10	64.8	124,740	0	0	64.8	124,740	0	0
11	68.4	124,740	0	0	68.4	124,740	0	0
12	71.4	124,740	0	0	71.4	124,740	0	0
13	73.7	124,740	0	0	73.7	124,740	0	0
14	75.4	124,740	0	0	75.4	124,740	0	0
15	76.4	124,740	0	0	76.4	124,740	0	0
16	76.4	124,740	0	0	76.4	124,740	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Utilities Elevated:	**No**
Expected Annual Losses due to Content Damages before Mitigation:	$1,100
Expected Annual Losses due to Content Damages after Mitigation:	$919
Expected Annual Benefits - Content:	$181

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	8.4	10,478.16	8.4	10,478.16
-1	10.1	12,598.74	10.1	12,598.74
0	11.9	14,844.06	11.9	14,844.06
1	13.8	17,214.12	13.8	17,214.12
2	15.7	19,584.18	15.7	19,584.18
3	17.7	22,078.98	17.7	22,078.98
4	19.8	24,698.52	19.8	24,698.52
5	22	27,442.80	22	27,442.80
6	24.3	30,311.82	24.3	30,311.82
7	26.7	33,305.58	26.7	33,305.58
8	29.1	36,299.34	29.1	36,299.34
9	31.7	39,542.58	31.7	39,542.58
10	34.4	42,910.56	34.4	42,910.56
11	37.2	46,403.28	37.2	46,403.28
12	40	49,896.00	40	49,896.00
13	43	53,638.20	43	53,638.20
14	46.1	57,505.14	46.1	57,505.14
15	49.3	61,496.82	49.3	61,496.82
16	52.6	65,613.24	52.6	65,613.24

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Lodging Per Diem:	$107 Use Default:Yes
Meals Per Diem:	$59 Use Default:Yes
Population Affected:	2
Duration of Displacement (days):	365 Use Default:Yes
Total Residential Displacement Cost:	$205
Expected Annual Losses due to Displacement Damages before mitigation:	$302
Expected Annual Losses due to Displacement Damages after Mitigation:	$272
Expected Annual Losses - Displacement:	$31

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	9,225	45	9,225
2	90	18,450	90	18,450
3	135	27,675	135	27,675
4	180	36,900	180	36,900
5	225	46,125	225	46,125
6	270	55,350	270	55,350
7	315	64,575	315	64,575
8	360	73,800	360	73,800
9	405	83,025	405	83,025
10	450	92,250	450	92,250
11	495	101,475	495	101,475
12	540	110,700	540	110,700
13	585	119,925	585	119,925
14	630	129,150	630	129,150
15	675	138,375	675	138,375
16	720	147,600	720	147,600

Additional Benefits - Street Maintenance

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Total Annual Street Maintenance Budget:	$0
Total Number of Street Miles Maintained:	0
Street Miles that will not require future maintenance:	0
Expected Annual Benefits - Street Maintenance:	$0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Additional Benefits - Social

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Number of Workers:	1
Expected Annual Social Benefits:	$13,622

Benefits-Costs Summary

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$9,110
Total Social Benefits:	$13,622
Total Mitigation Project Benefits:	$22,732
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48425300348748, -91.12414401542588
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	937.64
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	932.16	932.77	5590	6507
10	933.77	934.62	8140	9475
25	935.57	936.54	12000	13968
100	937.69	938.25	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.81	932.42	5590	6507
10	933.4	934.34	8140	9475
25	935.37	936.33	12000	13968
100	937.51	938.11	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.92	1.11	$ 0	$ 0	$ 0	$ 0
-7.1	2	$ 0	$ 0	$ 0	$ 0
-4.76	4.79	$ 0	$ 0	$ 0	$ 0
-3.64	8	$ 0	$ 0	$ 0	$ 0
-3.13	10.33	$ 0	$ 0	$ 0	$ 0
-2	18.42	$ 4	$ 0	$ 0	$ 0
-1.84	20	$ 14	$ 0	$ 0	$ 0
-1.19	28.12	$ 2	$ 0	$ 0	$ 0
-1.07	30	$ 10	$ 0	$ 0	$ 0
-0.56	40	$ 12	$ 0	$ 0	$ 0
0	54.84	$ 5	$ 0	$ 0	$ 0
0.16	60	$ 19	$ 12	$ 7	$ 2
0.43	70	$ 24	$ 18	$ 7	$ 2
0.67	80	$ 9	$ 7	$ 2	$ 1
0.74	83.48	$ 16	$ 13	$ 4	$ 2
0.87	90	$ 178	$ 146	$ 38	$ 21
2.24	200	$ 75	$ 63	$ 15	$ 11
2.93	300	$ 43	$ 37	$ 9	$ 7
3.42	400	$ 488	$ 230	$ 109	$ 0
Total ($)		$ 900	$ 527	$ 190	$ 45

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-10.35	1.11	$ 0	$ 0	$ 0	$ 0
-7.48	2	$ 0	$ 0	$ 0	$ 0
-5.12	4.79	$ 0	$ 0	$ 0	$ 0
-3.95	8	$ 0	$ 0	$ 0	$ 0
-3.42	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 858	$ 496	$ 186	$ 40

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2.07	20	$ 0	$ 0	$ 0	$ 0
-2	20.9	$ 12	$ 0	$ 0	$ 0
-1.42	28.12	$ 2	$ 0	$ 0	$ 0
-1.3	30	$ 9	$ 0	$ 0	$ 0
-0.75	40	$ 14	$ 0	$ 0	$ 0
0	59.9	$ 0	$ 0	$ 0	$ 0
0	60	$ 10	$ 1	$ 6	$ 0
0.29	70	$ 19	$ 13	$ 6	$ 2
0.53	80	$ 7	$ 6	$ 2	$ 1
0.61	83.48	$ 14	$ 11	$ 4	$ 1
0.75	90	$ 165	$ 134	$ 36	$ 19
2.19	200	$ 74	$ 63	$ 15	$ 10
2.92	300	$ 43	$ 37	$ 9	$ 6
3.43	400	$ 488	$ 230	$ 109	$ 0
Total ($)		$ 858	$ 496	$ 186	$ 40

Building Information

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	COM2: Commercial - Wholesale Trade
Building is outside hundred-year flood area:	No
Building Type:	Warehouse-Non-Refrig
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Depth Damage Curve:	Warehouse, Non-Refrig (Default) Use Default:Yes
Building Size (sq.ft):	1,776
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$900
Expected Annual Losses due to Building Damages after Mitigation:	$858
Expected Annual Benefits - Building:	$42

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.5	976.8	0	0	0.5	976.8	0	0
-1	0.5	976.8	0	0	0.5	976.8	0	0
0	1.1	2,148.96	0	0	1.1	2,148.96	0	0
1	11.8	23,052.48	0	0	11.8	23,052.48	0	0
2	19.9	38,876.63	0	0	19.9	38,876.63	0	0
3	25.4	49,621.43	0	0	25.4	49,621.43	0	0
4	31.4	61,343.03	0	0	31.4	61,343.03	0	0
5	34.2	66,813.12	0	0	34.2	66,813.12	0	0
6	39	76,190.4	0	0	39	76,190.4	0	0
7	41.8	81,660.48	0	0	41.8	81,660.48	0	0
8	45.7	89,279.52	0	0	45.7	89,279.52	0	0
9	50.4	195,360	0	0	50.4	195,360	0	0
10	51.7	195,360	0	0	51.7	195,360	0	0
11	51.7	195,360	0	0	51.7	195,360	0	0
12	51.7	195,360	0	0	51.7	195,360	0	0
13	51.7	195,360	0	0	51.7	195,360	0	0
14	51.7	195,360	0	0	51.7	195,360	0	0
15	51.7	195,360	0	0	51.7	195,360	0	0
16	51.7	195,360	0	0	51.7	195,360	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Expected Annual Losses due to Content Damages before Mitigation:	$527
Expected Annual Losses due to Content Damages after Mitigation:	$496
Expected Annual Benefits - Content:	$32

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	21	19,282.03	21	19,282.03
2	34	31,218.52	34	31,218.52
3	47	43,155.02	47	43,155.02
4	57	52,336.94	57	52,336.94
5	66	60,600.67	66	60,600.67
6	74	67,946.20	74	67,946.20
7	81	74,373.55	81	74,373.55
8	88	80,800.89	88	80,800.89
9	92	84,473.66	92	84,473.66
10	94	86,310.04	94	86,310.04
11	94	86,310.04	94	86,310.04
12	94	86,310.04	94	86,310.04
13	94	86,310.04	94	86,310.04
14	94	86,310.04	94	86,310.04
15	94	86,310.04	94	86,310.04
16	94	86,310.04	94	86,310.04

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	0.64	Use Default:Yes
One-Time Displacement Cost ($/sq.ft):	1.28	Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$190	
Expected Annual Losses due to Displacement Damages after Mitigation:	$186	
Expected Annual Losses - Displacement:	$4	

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	2,662.54	45	2,662.54
2	90	5,325.08	90	5,325.08
3	135	7,987.62	135	7,987.62
4	180	14,013.36	180	14,013.36
5	225	17,516.71	225	17,516.71
6	270	21,020.05	270	21,020.05
7	315	24,523.39	315	24,523.39
8	360	34,753.15	360	34,753.15
9	405	39,097.30	405	39,097.30
10	450	43,441.44	450	43,441.44
11	450	43,441.44	450	43,441.44
12	450	16,816.04	450	16,816.04
13	450	16,816.04	450	16,816.04
14	450	16,816.04	450	16,816.04
15	450	16,816.04	450	16,816.04
16	450	16,816.04	450	16,816.04

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Annual Operating Budget:	$20,000
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$45
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$40
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$4

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	2,465.75	45	2,465.75
2	90	4,931.50	90	4,931.50
3	135	7,397.26	135	7,397.26
4	180	9,863.01	180	9,863.01
5	225	12,328.76	225	12,328.76
6	270	14,794.52	270	14,794.52
7	315	17,260.27	315	17,260.27
8	360	19,726.02	360	19,726.02
9	405	22,191.78	405	22,191.78
10	450	24,657.53	450	24,657.53
11	450	24,657.53	450	24,657.53
12	450	24,657.53	450	24,657.53
13	450	24,657.53	450	24,657.53
14	450	24,657.53	450	24,657.53
15	450	24,657.53	450	24,657.53
16	450	24,657.53	450	24,657.53

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Benefits-Costs Summary

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$1,577
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$1,577
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.485135995077485, -91.12607897777393
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	940.04
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	932.9	933.58	5590	6507
10	934.75	935.96	8140	9475
25	937.07	938.41	12000	13968
100	940	940.62	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	932.62	933.31	5590	6507
10	934.49	935.75	8140	9475
25	936.93	938.27	12000	13968
100	939.89	940.54	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-12.41	1.11	$ 0	$ 0	$ 0	$ 0
-9.14	2	$ 0	$ 0	$ 0	$ 0
-6.32	4.79	$ 0	$ 0	$ 0	$ 0
-4.92	8	$ 0	$ 0	$ 0	$ 0
-4.24	10.33	$ 0	$ 0	$ 0	$ 0
-2.59	20	$ 0	$ 0	$ 0	$ 0
-2	25.71	$ 6	$ 0	$ 0	$ 0
-1.78	28.12	$ 4	$ 0	$ 0	$ 0
-1.61	30	$ 15	$ 0	$ 0	$ 0
-0.93	40	$ 22	$ 0	$ 0	$ 0
0	59.75	$ 0	$ 0	$ 0	$ 0
0.01	60	$ 21	$ 5	$ 12	$ 0
0.37	70	$ 41	$ 31	$ 12	$ 3
0.68	80	$ 16	$ 13	$ 4	$ 1
0.78	83.48	$ 32	$ 26	$ 7	$ 2
0.96	90	$ 357	$ 302	$ 75	$ 31
2.8	200	$ 158	$ 135	$ 33	$ 17
3.74	300	$ 91	$ 79	$ 22	$ 10
4.4	400	$ 880	$ 414	$ 196	$ 0
Total ($)		$ 1,643	$ 1,005	$ 360	$ 65

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-12.7	1.11	$ 0	$ 0	$ 0	$ 0
-9.43	2	$ 0	$ 0	$ 0	$ 0
-6.57	4.79	$ 0	$ 0	$ 0	$ 0
-5.14	8	$ 0	$ 0	$ 0	$ 0
-4.45	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 1,616	$ 985	$ 347	$ 63

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2.78	20	$ 0	$ 0	$ 0	$ 0
-2	27.4	$ 2	$ 0	$ 0	$ 0
-1.92	28.12	$ 4	$ 0	$ 0	$ 0
-1.76	30	$ 15	$ 0	$ 0	$ 0
-1.05	40	$ 21	$ 0	$ 0	$ 0
-0.08	60	$ 2	$ 0	$ 0	$ 0
0	62.09	$ 14	$ 0	$ 0	$ 0
0.29	70	$ 36	$ 26	$ 11	$ 2
0.61	80	$ 15	$ 12	$ 4	$ 1
0.71	83.48	$ 30	$ 24	$ 7	$ 2
0.9	90	$ 347	$ 293	$ 74	$ 30
2.81	200	$ 159	$ 136	$ 33	$ 17
3.78	300	$ 92	$ 80	$ 22	$ 11
4.47	400	$ 880	$ 414	$ 196	$ 0
Total ($)		$ 1,616	$ 985	$ 347	$ 63

Building Information

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Non-Residential Occupancy Type: COM2: Commercial - Wholesale Trade

Building is outside hundred-year flood area: No

Building Type: Warehouse-Non-Refrig

Building Is Engineered: **No**

NFIP: **No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Depth Damage Curve:	Warehouse, Non-Refrig (Default) Use Default:Yes
Building Size (sq.ft):	3,200
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$1,643
Expected Annual Losses due to Building Damages after Mitigation:	$1,616
Expected Annual Benefits - Building:	$28

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.5	1,760	0	0	0.5	1,760	0	0
-1	0.5	1,760	0	0	0.5	1,760	0	0
0	1.1	3,872.00	0	0	1.1	3,872.00	0	0
1	11.8	41,536	0	0	11.8	41,536	0	0
2	19.9	70,048	0	0	19.9	70,048	0	0
3	25.4	89,408	0	0	25.4	89,408	0	0
4	31.4	110,528	0	0	31.4	110,528	0	0
5	34.2	120,384.00	0	0	34.2	120,384.00	0	0
6	39	137,280	0	0	39	137,280	0	0
7	41.8	147,136	0	0	41.8	147,136	0	0
8	45.7	160,864	0	0	45.7	160,864	0	0
9	50.4	352,000	0	0	50.4	352,000	0	0
10	51.7	352,000	0	0	51.7	352,000	0	0
11	51.7	352,000	0	0	51.7	352,000	0	0
12	51.7	352,000	0	0	51.7	352,000	0	0
13	51.7	352,000	0	0	51.7	352,000	0	0
14	51.7	352,000	0	0	51.7	352,000	0	0
15	51.7	352,000	0	0	51.7	352,000	0	0
16	51.7	352,000	0	0	51.7	352,000	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Expected Annual Losses due to Content Damages before Mitigation:	$1,005
Expected Annual Losses due to Content Damages after Mitigation:	$985
Expected Annual Benefits - Content:	$21

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	21	34,742.4	21	34,742.4
2	34	56,249.6	34	56,249.6
3	47	77,756.8	47	77,756.8
4	57	94,300.8	57	94,300.8
5	66	109,190.4	66	109,190.4
6	74	122,425.6	74	122,425.6
7	81	134,006.4	81	134,006.4
8	88	145,587.2	88	145,587.2
9	92	152,204.8	92	152,204.8
10	94	155,513.6	94	155,513.6
11	94	155,513.6	94	155,513.6
12	94	155,513.6	94	155,513.6
13	94	155,513.6	94	155,513.6
14	94	155,513.6	94	155,513.6
15	94	155,513.6	94	155,513.6
16	94	155,513.6	94	155,513.6

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	0.64	Use Default:Yes
One-Time Displacement Cost ($/sq.ft):	1.28	Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$360	
Expected Annual Losses due to Displacement Damages after Mitigation:	$347	
Expected Annual Losses - Displacement:	$13	

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	4,797.36	45	4,797.36
2	90	9,594.73	90	9,594.73
3	135	14,392.10	135	14,392.10
4	180	25,249.31	180	25,249.31
5	225	31,561.64	225	31,561.64
6	270	37,873.97	270	37,873.97
7	315	44,186.30	315	44,186.30
8	360	62,618.30	360	62,618.30
9	405	70,445.58	405	70,445.58
10	450	78,272.87	450	78,272.87
11	450	78,272.87	450	78,272.87
12	450	30,299.17	450	30,299.17
13	450	30,299.17	450	30,299.17
14	450	30,299.17	450	30,299.17
15	450	30,299.17	450	30,299.17
16	450	30,299.17	450	30,299.17

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Annual Operating Budget:	$25,000
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$65
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$63
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$2

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	3,082.19	45	3,082.19
2	90	6,164.38	90	6,164.38
3	135	9,246.57	135	9,246.57
4	180	12,328.76	180	12,328.76
5	225	15,410.95	225	15,410.95
6	270	18,493.15	270	18,493.15
7	315	21,575.34	315	21,575.34
8	360	24,657.53	360	24,657.53
9	405	27,739.72	405	27,739.72
10	450	30,821.91	450	30,821.91
11	450	30,821.91	450	30,821.91
12	450	30,821.91	450	30,821.91
13	450	30,821.91	450	30,821.91
14	450	30,821.91	450	30,821.91
15	450	30,821.91	450	30,821.91
16	450	30,821.91	450	30,821.91

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Benefits-Costs Summary

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$1,225
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$1,225
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.486386994126434, -91.12311396334465
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	940.53
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	933.32	934.08	5590	6507
10	935.33	936.49	8140	9475
25	937.73	938.97	12000	13968
100	940.48	941.2	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	933.07	933.85	5590	6507
10	935.1	936.31	8140	9475
25	937.6	938.85	12000	13968
100	940.38	941.13	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-12.42	1.11	$ 0	$ 0	$ 0	$ 0
-9.15	2	$ 0	$ 0	$ 0	$ 0
-6.29	4.79	$ 0	$ 0	$ 0	$ 0
-4.88	8	$ 0	$ 0	$ 0	$ 0
-4.22	10.33	$ 0	$ 0	$ 0	$ 0
-2.54	20	$ 0	$ 0	$ 0	$ 0
-2	25.08	$ 16	$ 0	$ 0	$ 0
-1.72	28.12	$ 8	$ 0	$ 0	$ 0
-1.56	30	$ 34	$ 0	$ 0	$ 0
-0.87	40	$ 46	$ 0	$ 0	$ 0
0	57.6	$ 8	$ 0	$ 0	$ 0
0.1	60	$ 65	$ 38	$ 27	$ 2
0.46	70	$ 102	$ 80	$ 27	$ 3
0.78	80	$ 39	$ 32	$ 9	$ 1
0.88	83.48	$ 74	$ 62	$ 16	$ 3
1.06	90	$ 807	$ 686	$ 169	$ 33
2.93	200	$ 348	$ 300	$ 73	$ 17
3.88	300	$ 200	$ 174	$ 49	$ 11
4.55	400	$ 1,888	$ 887	$ 420	$ 0
Total ($)		$ 3,636	$ 2,258	$ 790	$ 70

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-12.68	1.11	$ 0	$ 0	$ 0	$ 0
-9.39	2	$ 0	$ 0	$ 0	$ 0
-6.53	4.79	$ 0	$ 0	$ 0	$ 0
-5.08	8	$ 0	$ 0	$ 0	$ 0
-4.41	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 3,575	$ 2,212	$ 784	$ 68

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2.69	20	$ 0	$ 0	$ 0	$ 0
-2	26.49	$ 8	$ 0	$ 0	$ 0
-1.85	28.12	$ 8	$ 0	$ 0	$ 0
-1.67	30	$ 32	$ 0	$ 0	$ 0
-0.96	40	$ 47	$ 0	$ 0	$ 0
0	59.6	$ 1	$ 0	$ 0	$ 0
0.02	60	$ 47	$ 14	$ 26	$ 1
0.39	70	$ 92	$ 71	$ 26	$ 3
0.72	80	$ 37	$ 30	$ 9	$ 1
0.82	83.48	$ 71	$ 59	$ 16	$ 2
1	90	$ 794	$ 676	$ 167	$ 32
2.94	200	$ 350	$ 301	$ 73	$ 17
3.92	300	$ 201	$ 175	$ 49	$ 11
4.61	400	$ 1,888	$ 887	$ 420	$ 0
Total ($)		$ 3,575	$ 2,212	$ 784	$ 68

Building Information

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	COM2: Commercial - Wholesale Trade
Building is outside hundred-year flood area:	No
Building Type:	Warehouse-Non-Refrig
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Depth Damage Curve:	Warehouse, Non-Refrig (Default) Use Default:Yes
Building Size (sq.ft):	6,864
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$3,636
Expected Annual Losses due to Building Damages after Mitigation:	$3,575
Expected Annual Benefits - Building:	$61

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.5	3,775.2	0	0	0.5	3,775.2	0	0
-1	0.5	3,775.2	0	0	0.5	3,775.2	0	0
0	1.1	8,305.44	0	0	1.1	8,305.44	0	0
1	11.8	89,094.72	0	0	11.8	89,094.72	0	0
2	19.9	150,252.96	0	0	19.9	150,252.96	0	0
3	25.4	191,780.15	0	0	25.4	191,780.15	0	0
4	31.4	237,082.55	0	0	31.4	237,082.55	0	0
5	34.2	258,223.68	0	0	34.2	258,223.68	0	0
6	39	294,465.6	0	0	39	294,465.6	0	0
7	41.8	315,606.72	0	0	41.8	315,606.72	0	0
8	45.7	345,053.28	0	0	45.7	345,053.28	0	0
9	50.4	755,040	0	0	50.4	755,040	0	0
10	51.7	755,040	0	0	51.7	755,040	0	0
11	51.7	755,040	0	0	51.7	755,040	0	0
12	51.7	755,040	0	0	51.7	755,040	0	0
13	51.7	755,040	0	0	51.7	755,040	0	0
14	51.7	755,040	0	0	51.7	755,040	0	0
15	51.7	755,040	0	0	51.7	755,040	0	0
16	51.7	755,040	0	0	51.7	755,040	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Expected Annual Losses due to Content Damages before Mitigation:	$2,258
Expected Annual Losses due to Content Damages after Mitigation:	$2,212
Expected Annual Benefits - Content:	$45

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	21	74,522.44	21	74,522.44
2	34	120,655.39	34	120,655.39
3	47	166,788.33	47	166,788.33
4	57	202,275.21	57	202,275.21
5	66	234,213.40	66	234,213.40
6	74	262,602.91	74	262,602.91
7	81	287,443.72	81	287,443.72
8	88	312,284.54	88	312,284.54
9	92	326,479.29	92	326,479.29
10	94	333,576.67	94	333,576.67
11	94	333,576.67	94	333,576.67
12	94	333,576.67	94	333,576.67
13	94	333,576.67	94	333,576.67
14	94	333,576.67	94	333,576.67
15	94	333,576.67	94	333,576.67
16	94	333,576.67	94	333,576.67

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	0.64	Use Default:Yes
One-Time Displacement Cost ($/sq.ft):	1.28	Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$790	
Expected Annual Losses due to Displacement Damages after Mitigation:	$784	
Expected Annual Losses - Displacement:	$5	

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	10,290.35	45	10,290.35
2	90	20,580.71	90	20,580.71
3	135	30,871.07	135	30,871.07
4	180	54,159.78	180	54,159.78
5	225	67,699.72	225	67,699.72
6	270	81,239.67	270	81,239.67
7	315	94,779.61	315	94,779.61
8	360	134,316.25	360	134,316.25
9	405	151,105.78	405	151,105.78
10	450	167,895.32	450	167,895.32
11	450	167,895.32	450	167,895.32
12	450	64,991.73	450	64,991.73
13	450	64,991.73	450	64,991.73
14	450	64,991.73	450	64,991.73
15	450	64,991.73	450	64,991.73
16	450	64,991.73	450	64,991.73

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Annual Operating Budget:	$25,000
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$70
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$68
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$2

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	3,082.19	45	3,082.19
2	90	6,164.38	90	6,164.38
3	135	9,246.57	135	9,246.57
4	180	12,328.76	180	12,328.76
5	225	15,410.95	225	15,410.95
6	270	18,493.15	270	18,493.15
7	315	21,575.34	315	21,575.34
8	360	24,657.53	360	24,657.53
9	405	27,739.72	405	27,739.72
10	450	30,821.91	450	30,821.91
11	450	30,821.91	450	30,821.91
12	450	30,821.91	450	30,821.91
13	450	30,821.91	450	30,821.91
14	450	30,821.91	450	30,821.91
15	450	30,821.91	450	30,821.91
16	450	30,821.91	450	30,821.91

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Benefits-Costs Summary

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$2,187
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$2,187
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

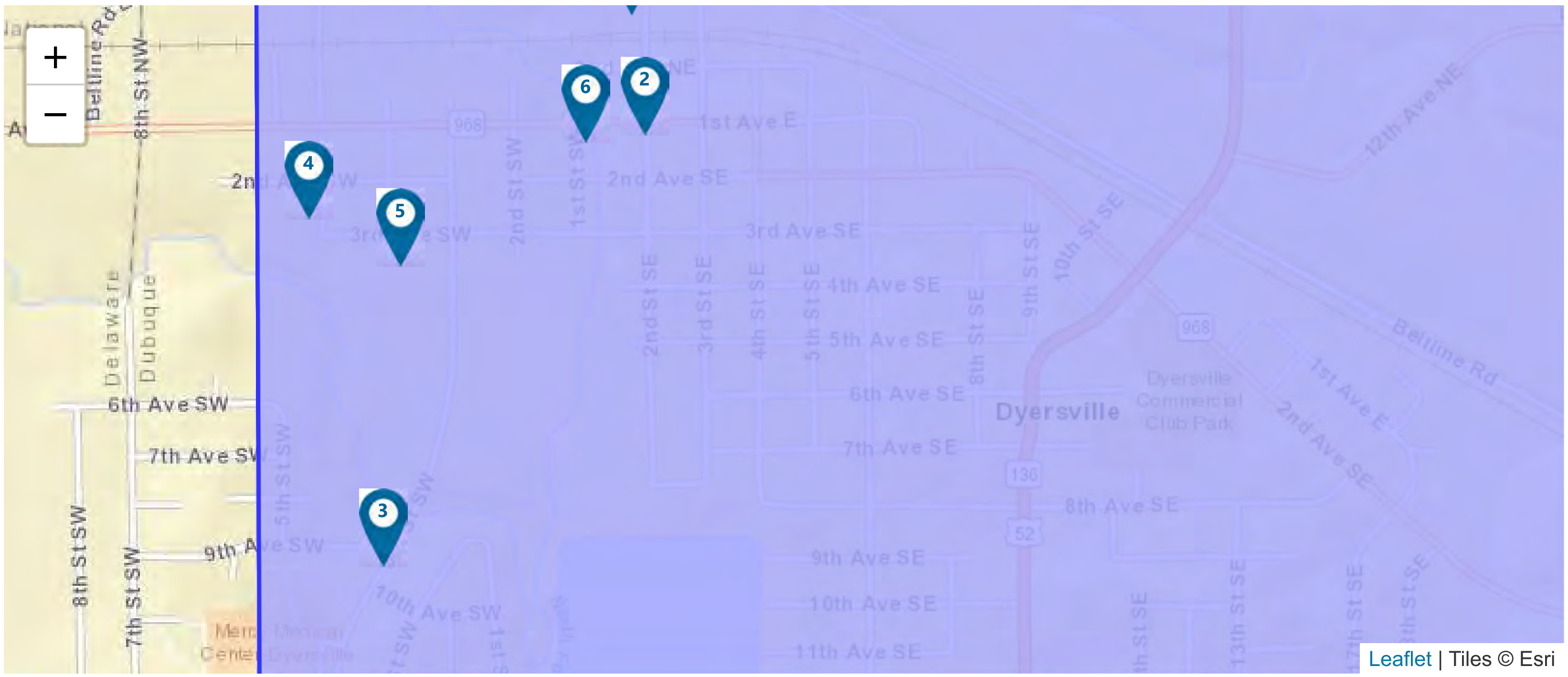
FEMA

Benefit-Cost Calculator

V.6.0 (Build 20241018.1218 | Release Notes)

Benefit-Cost Analysis

Project Name: NF-09 Excavation South of Candy Cane Park



Map Marker ▲	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
1	Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 32,058,912	$ 30,034,990	1.07
2	Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 97,220	$ 0	0.00

Map Marker ▲	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
3	Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 33,564	$ 0	0.00
4	Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 265	$ 0	0.00
5	Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 21,051	$ 0	0.00
6	Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 129	$ 0	0.00
7	Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 15,208	$ 0	0.00
TOTAL (SELECTED)					**$ 32,226,349**	**$ 30,034,990**	**1.07**
TOTAL					**$ 32,226,349**	**$ 30,034,990**	**1.07**

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.484362492097716, -91.12277600500862
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$29,648,000
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$20,000

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	929.37
Use Default Recurrence Intervals:	Use Defau *No*
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	930.44	930.92	5590	6507
10	931.65	932.53	8140	9475
25	933.46	934.2	12000	13968
100	935.18	935.7	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	928.88	929.61	5590	6507
10	930.68	931.62	8140	9475
25	932.9	933.7	12000	13968
100	934.79	935.57	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-3.26	1.11	$ 0	$ 0	$ 0	$ 0
-2	1.35	$ 88	$ 0	$ 0	$ 0
-0.51	2	$ 41	$ 0	$ 0	$ 0
0	2.4	$ 542	$ 0	$ 0	$ 0
1.61	4.79	$ 1,229	$ 152	$ 0	$ 0
2.62	8	$ 527	$ 67	$ 0	$ 0
3.08	10.33	$ 1,031	$ 129	$ 0	$ 0
4.21	20	$ 362	$ 44	$ 0	$ 0
4.76	28.12	$ 57	$ 7	$ 0	$ 0
4.86	30	$ 221	$ 27	$ 0	$ 0
5.31	40	$ 235	$ 27	$ 0	$ 0
5.92	60	$ 70	$ 8	$ 0	$ 0
6.15	70	$ 54	$ 6	$ 0	$ 0
6.35	80	$ 16	$ 2	$ 0	$ 0
6.41	83.48	$ 26	$ 3	$ 0	$ 0
6.51	90	$ 266	$ 22	$ 0	$ 0
7.67	200	$ 104	$ 6	$ 0	$ 0
8.24	300	$ 52	$ 3	$ 0	$ 0
8.63	400	$ 155	$ 10	$ 0	$ 0
Total ($)		$ 5,076	$ 514	$ 0	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-5.15	1.11	$ 0	$ 0	$ 0	$ 0
-2.15	2	$ 0	$ 0	$ 0	$ 0
-2	2.09	$ 100	$ 0	$ 0	$ 0
0	4.18	$ 41	$ 0	$ 0	$ 0
0.34	4.79	$ 518	$ 60	$ 0	$ 0
Total ($)		$ 3,459	$ 372	$ 0	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
1.55	8	$ 379	$ 46	$ 0	$ 0
2.12	10.33	$ 854	$ 105	$ 0	$ 0
3.52	20	$ 334	$ 41	$ 0	$ 0
4.21	28.12	$ 55	$ 7	$ 0	$ 0
4.34	30	$ 211	$ 26	$ 0	$ 0
4.92	40	$ 227	$ 27	$ 0	$ 0
5.71	60	$ 69	$ 8	$ 0	$ 0
6.01	70	$ 53	$ 6	$ 0	$ 0
6.26	80	$ 16	$ 2	$ 0	$ 0
6.34	83.48	$ 26	$ 3	$ 0	$ 0
6.49	90	$ 266	$ 22	$ 0	$ 0
8	200	$ 104	$ 6	$ 0	$ 0
8.75	300	$ 52	$ 3	$ 0	$ 0
9.29	400	$ 155	$ 10	$ 0	$ 0
Total ($)		$ 3,459	$ 372	$ 0	$ 0

Building Information

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	COM8: Commercial - Entertainment and Recreation
Building is outside hundred-year flood area:	No
Building Type:	Recreation
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Depth Damage Curve:	Recreation (Default) Use Default:Yes
Building Size (sq.ft):	565
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$5,076
Expected Annual Losses due to Building Damages after Mitigation:	$3,459
Expected Annual Benefits - Building:	$1,617

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.5	310.75	0	0	0.5	310.75	0	0
-1	0.5	310.75	0	0	0.5	310.75	0	0
0	0.9	559.35	0	0	0.9	559.35	0	0
1	13.5	8,390.25	0	0	13.5	8,390.25	0	0
2	23.6	14,667.40	0	0	23.6	14,667.40	0	0
3	31.3	19,452.95	0	0	31.3	19,452.95	0	0
4	38.6	23,989.9	0	0	38.6	23,989.9	0	0
5	42.1	26,165.15	0	0	42.1	26,165.15	0	0
6	47.6	29,583.4	0	0	47.6	29,583.4	0	0
7	50.3	62,150	0	0	50.3	62,150	0	0
8	54.2	62,150	0	0	54.2	62,150	0	0
9	57.5	62,150	0	0	57.5	62,150	0	0
10	59.1	62,150	0	0	59.1	62,150	0	0
11	59.1	62,150	0	0	59.1	62,150	0	0
12	59.1	62,150	0	0	59.1	62,150	0	0
13	59.1	62,150	0	0	59.1	62,150	0	0
14	59.1	62,150	0	0	59.1	62,150	0	0
15	59.1	62,150	0	0	59.1	62,150	0	0
16	59.1	62,150	0	0	59.1	62,150	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Contents Value in Dollars:	$4,000 Use Default: *No*
Expected Annual Losses due to Content Damages before Mitigation:	$514
Expected Annual Losses due to Content Damages after Mitigation:	$372
Expected Annual Benefits - Content:	$142

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	26	1,040	26	1,040
2	44	1,760	44	1,760
3	63	2,520	63	2,520
4	73	2,920	73	2,920
5	80	3,200	80	3,200
6	84	3,360	84	3,360
7	91	3,640	91	3,640
8	95	3,800	95	3,800
9	95	3,800	95	3,800
10	95	3,800	95	3,800
11	95	3,800	95	3,800
12	95	3,800	95	3,800
13	95	3,800	95	3,800
14	95	3,800	95	3,800
15	95	3,800	95	3,800
16	95	3,800	95	3,800

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	0	Use Default: *No*
One-Time Displacement Cost ($/sq.ft):	0	Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$0	
Expected Annual Losses due to Displacement Damages after Mitigation:	$0	
Expected Annual Losses - Displacement:	$0	

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	0	45	0
2	90	0	90	0
3	135	0	135	0
4	180	0	180	0
5	225	0	225	0
6	270	0	270	0
7	315	0	315	0
8	360	0	360	0
9	405	0	405	0
10	450	0	450	0
11	450	0	450	0
12	450	0	450	0
13	450	0	450	0
14	450	0	450	0
15	450	0	450	0
16	450	0	450	0

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Annual Operating Budget:	$0
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$0
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$0
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$0

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	0	45	0
2	90	0	90	0
3	135	0	135	0
4	180	0	180	0
5	225	0	225	0
6	270	0	270	0
7	315	0	315	0
8	360	0	360	0
9	405	0	405	0
10	450	0	450	0
11	450	0	450	0
12	450	0	450	0
13	450	0	450	0
14	450	0	450	0
15	450	0	450	0
16	450	0	450	0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Total Project Area (acres):	58
Percentage of Urban Green Open Space:	40.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	60.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$1,655,076

Benefits-Costs Summary

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$32,058,912
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$32,058,912
Total Mitigation Project Cost:	$30,034,990
Benefit Cost Ratio - Standard:	1.07
Benefit Cost Ratio - Standard + Social:	1.07

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.484362492097716, -91.12277600500862
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	929.37
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	930.44	930.92	5590	6507
10	931.65	932.53	8140	9475
25	933.46	934.2	12000	13968
100	935.18	935.7	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	928.88	929.61	5590	6507
10	930.68	931.62	8140	9475
25	932.9	933.7	12000	13968
100	934.79	935.57	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-3.31	1.11	$ 0	$ 0	$ 0	$ 0
-2	1.36	$ 137	$ 0	$ 0	$ 0
-0.54	2	$ 67	$ 0	$ 0	$ 0
0	2.41	$ 857	$ 0	$ 0	$ 0
1.61	4.79	$ 1,957	$ 1,026	$ 830	$ 318
2.62	8	$ 840	$ 454	$ 387	$ 148
3.09	10.33	$ 1,642	$ 872	$ 935	$ 312
4.21	20	$ 576	$ 298	$ 411	$ 120
4.76	28.12	$ 91	$ 47	$ 68	$ 20
4.86	30	$ 352	$ 180	$ 269	$ 78
5.31	40	$ 375	$ 186	$ 297	$ 86
5.92	60	$ 112	$ 54	$ 91	$ 27
6.15	70	$ 85	$ 41	$ 71	$ 21
6.35	80	$ 25	$ 12	$ 21	$ 6
6.41	83.48	$ 42	$ 20	$ 36	$ 10
6.51	90	$ 424	$ 149	$ 274	$ 80
7.66	200	$ 165	$ 42	$ 94	$ 24
8.22	300	$ 82	$ 21	$ 55	$ 13
8.62	400	$ 247	$ 67	$ 197	$ 0
Total ($)		$ 8,077	$ 3,472	$ 4,035	$ 1,263

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-5.22	1.11	$ 0	$ 0	$ 0	$ 0
-2.17	2	$ 0	$ 0	$ 0	$ 0
-2	2.1	$ 157	$ 0	$ 0	$ 0
0	4.19	$ 64	$ 0	$ 0	$ 0
0.34	4.79	$ 824	$ 403	$ 293	$ 112
Total ($)		$ 5,508	$ 2,513	$ 2,901	$ 901

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
1.55	8	$ 604	$ 311	$ 247	$ 95
2.12	10.33	$ 1,362	$ 711	$ 619	$ 237
3.53	20	$ 532	$ 278	$ 308	$ 103
4.22	28.12	$ 87	$ 45	$ 60	$ 18
4.35	30	$ 337	$ 174	$ 245	$ 71
4.92	40	$ 362	$ 182	$ 280	$ 82
5.71	60	$ 110	$ 54	$ 89	$ 26
6	70	$ 85	$ 41	$ 70	$ 20
6.26	80	$ 25	$ 12	$ 21	$ 6
6.34	83.48	$ 42	$ 20	$ 35	$ 10
6.48	90	$ 423	$ 150	$ 279	$ 81
7.98	200	$ 165	$ 43	$ 98	$ 26
8.73	300	$ 82	$ 21	$ 59	$ 14
9.26	400	$ 247	$ 67	$ 197	$ 0
Total ($)		$ 5,508	$ 2,513	$ 2,901	$ 901

Building Information

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	COM8: Commercial - Entertainment and Recreation
Building is outside hundred-year flood area:	No
Building Type:	Recreation
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Depth Damage Curve:	Recreation (Default) Use Default:Yes
Building Size (sq.ft):	900
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$8,077
Expected Annual Losses due to Building Damages after Mitigation:	$5,508
Expected Annual Benefits - Building:	$2,569

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.5	495	0	0	0.5	495	0	0
-1	0.5	495	0	0	0.5	495	0	0
0	0.9	891	0	0	0.9	891	0	0
1	13.5	13,365	0	0	13.5	13,365	0	0
2	23.6	23,364	0	0	23.6	23,364	0	0
3	31.3	30,987	0	0	31.3	30,987	0	0
4	38.6	38,214	0	0	38.6	38,214	0	0
5	42.1	41,679	0	0	42.1	41,679	0	0
6	47.6	47,124	0	0	47.6	47,124	0	0
7	50.3	99,000	0	0	50.3	99,000	0	0
8	54.2	99,000	0	0	54.2	99,000	0	0
9	57.5	99,000	0	0	57.5	99,000	0	0
10	59.1	99,000	0	0	59.1	99,000	0	0
11	59.1	99,000	0	0	59.1	99,000	0	0
12	59.1	99,000	0	0	59.1	99,000	0	0
13	59.1	99,000	0	0	59.1	99,000	0	0
14	59.1	99,000	0	0	59.1	99,000	0	0
15	59.1	99,000	0	0	59.1	99,000	0	0
16	59.1	99,000	0	0	59.1	99,000	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Contents Value in Dollars:	$27,000 Use Default: *No*
Expected Annual Losses due to Content Damages before Mitigation:	$3,472
Expected Annual Losses due to Content Damages after Mitigation:	$2,513
Expected Annual Benefits - Content:	$959

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	26	7,020	26	7,020
2	44	11,880	44	11,880
3	63	17,010	63	17,010
4	73	19,710	73	19,710
5	80	21,600	80	21,600
6	84	22,680	84	22,680
7	91	24,570	91	24,570
8	95	25,650	95	25,650
9	95	25,650	95	25,650
10	95	25,650	95	25,650
11	95	25,650	95	25,650
12	95	25,650	95	25,650
13	95	25,650	95	25,650
14	95	25,650	95	25,650
15	95	25,650	95	25,650
16	95	25,650	95	25,650

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	2.29 Use Default:Yes
One-Time Displacement Cost ($/sq.ft):	0 Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$4,035
Expected Annual Losses due to Displacement Damages after Mitigation:	$2,901
Expected Annual Losses - Displacement:	$1,134

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	4,827.82	45	4,827.82
2	90	9,655.64	90	9,655.64
3	135	14,483.46	135	14,483.46
4	180	25,409.58	180	25,409.58
5	225	31,761.98	225	31,761.98
6	270	38,114.38	270	38,114.38
7	315	44,466.78	315	44,466.78
8	360	63,015.78	360	63,015.78
9	405	70,892.75	405	70,892.75
10	450	78,769.72	450	78,769.72
11	450	78,769.72	450	78,769.72
12	450	30,491.50	450	30,491.50
13	450	30,491.50	450	30,491.50
14	450	30,491.50	450	30,491.50
15	450	30,491.50	450	30,491.50
16	450	30,491.50	450	30,491.50

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Annual Operating Budget:	$15,000
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$1,263
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$901
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$363

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	1,849.31	45	1,849.31
2	90	3,698.63	90	3,698.63
3	135	5,547.94	135	5,547.94
4	180	7,397.26	180	7,397.26
5	225	9,246.57	225	9,246.57
6	270	11,095.89	270	11,095.89
7	315	12,945.20	315	12,945.20
8	360	14,794.52	360	14,794.52
9	405	16,643.83	405	16,643.83
10	450	18,493.15	450	18,493.15
11	450	18,493.15	450	18,493.15
12	450	18,493.15	450	18,493.15
13	450	18,493.15	450	18,493.15
14	450	18,493.15	450	18,493.15
15	450	18,493.15	450	18,493.15
16	450	18,493.15	450	18,493.15

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Benefits-Costs Summary

Floodplain and Stream Restoration @ 2nd St SE, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$97,220
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$97,220
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.477231394998256, -91.12867961142464
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	930
Use Default Recurrence Intervals:	Use Defau *No*
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	27.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	930.68	931.51	5590	7122
10	931.84	933.2	8140	10370
25	933.58	934.96	12000	15288
100	935.72	936.53	17000	21658

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	929.47	930.57	5590	7122
10	931.12	932.55	8140	10370
25	933.09	934.59	12000	15288
100	935.36	936.43	17000	21658

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-3.5	1.11	$ 0	$ 0	$ 0	$ 0
-2	1.4	$ 75	$ 0	$ 0	$ 0
-0.64	2	$ 47	$ 0	$ 0	$ 0
0	2.5	$ 497	$ 0	$ 0	$ 0
1.58	4.79	$ 1,220	$ 151	$ 517	$ 0
2.63	8	$ 530	$ 68	$ 245	$ 0
3.12	10.33	$ 1,039	$ 130	$ 596	$ 0
4.3	20	$ 365	$ 45	$ 264	$ 0
4.88	28.12	$ 58	$ 7	$ 44	$ 0
4.99	30	$ 224	$ 27	$ 173	$ 0
5.46	40	$ 239	$ 28	$ 192	$ 0
6.11	60	$ 71	$ 8	$ 59	$ 0
6.35	70	$ 54	$ 6	$ 46	$ 0
6.56	80	$ 16	$ 2	$ 14	$ 0
6.62	83.48	$ 27	$ 3	$ 23	$ 0
6.74	90	$ 267	$ 22	$ 178	$ 0
7.95	200	$ 104	$ 6	$ 61	$ 0
8.55	300	$ 52	$ 3	$ 36	$ 0
8.97	400	$ 155	$ 10	$ 124	$ 0
Total ($)		$ 5,041	$ 516	$ 2,571	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-4.85	1.11	$ 0	$ 0	$ 0	$ 0
-2	1.9	$ 8	$ 0	$ 0	$ 0
-1.8	2	$ 95	$ 0	$ 0	$ 0
0	3.69	$ 113	$ 0	$ 0	$ 0
0.67	4.79	$ 748	$ 90	$ 283	$ 0
Total ($)		$ 3,911	$ 421	$ 2,062	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
1.87	8	$ 428	$ 52	$ 182	$ 0
2.43	10.33	$ 920	$ 114	$ 431	$ 0
3.8	20	$ 347	$ 43	$ 207	$ 0
4.48	28.12	$ 56	$ 7	$ 40	$ 0
4.61	30	$ 217	$ 26	$ 162	$ 0
5.17	40	$ 234	$ 27	$ 184	$ 0
5.94	60	$ 71	$ 8	$ 58	$ 0
6.23	70	$ 54	$ 6	$ 45	$ 0
6.48	80	$ 16	$ 2	$ 14	$ 0
6.56	83.48	$ 27	$ 3	$ 23	$ 0
6.7	90	$ 267	$ 22	$ 201	$ 0
8.17	200	$ 104	$ 6	$ 70	$ 0
8.9	300	$ 52	$ 3	$ 38	$ 0
9.42	400	$ 155	$ 10	$ 124	$ 0
Total ($)		$ 3,911	$ 421	$ 2,062	$ 0

Building Information

Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	COM8: Commercial - Entertainment and Recreation
Building is outside hundred-year flood area:	No
Building Type:	Recreation
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040

Depth Damage Curve:	Recreation (Default) Use Default:Yes
Building Size (sq.ft):	565
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$5,041
Expected Annual Losses due to Building Damages after Mitigation:	$3,911
Expected Annual Benefits - Building:	$1,130

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.5	310.75	0	0	0.5	310.75	0	0
-1	0.5	310.75	0	0	0.5	310.75	0	0
0	0.9	559.35	0	0	0.9	559.35	0	0
1	13.5	8,390.25	0	0	13.5	8,390.25	0	0
2	23.6	14,667.40	0	0	23.6	14,667.40	0	0
3	31.3	19,452.95	0	0	31.3	19,452.95	0	0
4	38.6	23,989.9	0	0	38.6	23,989.9	0	0
5	42.1	26,165.15	0	0	42.1	26,165.15	0	0
6	47.6	29,583.4	0	0	47.6	29,583.4	0	0
7	50.3	62,150	0	0	50.3	62,150	0	0
8	54.2	62,150	0	0	54.2	62,150	0	0
9	57.5	62,150	0	0	57.5	62,150	0	0
10	59.1	62,150	0	0	59.1	62,150	0	0
11	59.1	62,150	0	0	59.1	62,150	0	0
12	59.1	62,150	0	0	59.1	62,150	0	0
13	59.1	62,150	0	0	59.1	62,150	0	0
14	59.1	62,150	0	0	59.1	62,150	0	0
15	59.1	62,150	0	0	59.1	62,150	0	0
16	59.1	62,150	0	0	59.1	62,150	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$4,000	Use Default: *No*
Expected Annual Losses due to Content Damages before Mitigation:	$516	
Expected Annual Losses due to Content Damages after Mitigation:	$421	
Expected Annual Benefits - Content:	$96	

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	26	1,040	26	1,040
2	44	1,760	44	1,760
3	63	2,520	63	2,520
4	73	2,920	73	2,920
5	80	3,200	80	3,200
6	84	3,360	84	3,360
7	91	3,640	91	3,640
8	95	3,800	95	3,800
9	95	3,800	95	3,800
10	95	3,800	95	3,800
11	95	3,800	95	3,800
12	95	3,800	95	3,800
13	95	3,800	95	3,800
14	95	3,800	95	3,800
15	95	3,800	95	3,800
16	95	3,800	95	3,800

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	2.29 Use Default: *No*
One-Time Displacement Cost ($/sq.ft):	0 Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$2,571
Expected Annual Losses due to Displacement Damages after Mitigation:	$2,062
Expected Annual Losses - Displacement:	$509

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	3,030.79	45	3,030.79
2	90	6,061.59	90	6,061.59
3	135	9,092.39	135	9,092.39
4	180	15,951.57	180	15,951.57
5	225	19,939.46	225	19,939.46
6	270	23,927.36	270	23,927.36
7	315	27,915.25	315	27,915.25
8	360	39,559.90	360	39,559.90
9	405	44,504.89	405	44,504.89
10	450	49,449.88	450	49,449.88
11	450	49,449.88	450	49,449.88
12	450	19,141.89	450	19,141.89
13	450	19,141.89	450	19,141.89
14	450	19,141.89	450	19,141.89
15	450	19,141.89	450	19,141.89
16	450	19,141.89	450	19,141.89

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040

Annual Operating Budget:	$0
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$0
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$0
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$0

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	0	45	0
2	90	0	90	0
3	135	0	135	0
4	180	0	180	0
5	225	0	225	0
6	270	0	270	0
7	315	0	315	0
8	360	0	360	0
9	405	0	405	0
10	450	0	450	0
11	450	0	450	0
12	450	0	450	0
13	450	0	450	0
14	450	0	450	0
15	450	0	450	0
16	450	0	450	0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Benefits-Costs Summary

Floodplain and Stream Restoration @ 3rd St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$33,564
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$33,564
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48299299389262, -91.13033296127354
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	934.78
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.62	932.14	5590	6507
10	933.06	934.08	8140	9475
25	934.97	936.08	12000	13968
100	937.39	937.87	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	930.95	931.61	5590	6507
10	932.71	933.69	8140	9475
25	934.71	935.85	12000	13968
100	937.19	937.78	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-7.76	1.11	$ 0	$ 0	$ 0	$ 0
-4.9	2	$ 0	$ 0	$ 0	$ 0
-2.51	4.79	$ 0	$ 0	$ 0	$ 0
-2	6.04	$ 1	$ 0	$ 0	$ 0
-1.36	8	$ 1	$ 0	$ 0	$ 0
-0.82	10.33	$ 1	$ 0	$ 0	$ 0
0	15.46	$ 3	$ 0	$ 0	$ 0
0.52	20	$ 13	$ 2	$ 4	$ 0
1.18	28.12	$ 3	$ 0	$ 1	$ 0
1.31	30	$ 14	$ 2	$ 3	$ 0
1.86	40	$ 17	$ 2	$ 4	$ 0
2.62	60	$ 6	$ 1	$ 2	$ 0
2.91	70	$ 5	$ 1	$ 1	$ 0
3.16	80	$ 1	$ 0	$ 0	$ 0
3.24	83.48	$ 2	$ 0	$ 1	$ 0
3.38	90	$ 18	$ 2	$ 6	$ 0
4.83	200	$ 8	$ 1	$ 2	$ 0
5.57	300	$ 6	$ 0	$ 1	$ 0
6.08	400	$ 18	$ 1	$ 8	$ 0
Total ($)		$ 117	$ 13	$ 35	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-8.44	1.11	$ 0	$ 0	$ 0	$ 0
-5.54	2	$ 0	$ 0	$ 0	$ 0
-3.05	4.79	$ 0	$ 0	$ 0	$ 0
-2	7.41	$ 0	$ 0	$ 0	$ 0
-1.82	8	$ 1	$ 0	$ 0	$ 0
Total ($)		$ 106	$ 12	$ 33	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-1.22	10.33	$ 2	$ 0	$ 0	$ 0
0	18.15	$ 1	$ 0	$ 0	$ 0
0.21	20	$ 8	$ 1	$ 3	$ 0
0.93	28.12	$ 3	$ 0	$ 1	$ 0
1.07	30	$ 12	$ 2	$ 3	$ 0
1.66	40	$ 16	$ 2	$ 4	$ 0
2.5	60	$ 6	$ 1	$ 1	$ 0
2.82	70	$ 4	$ 1	$ 1	$ 0
3.09	80	$ 1	$ 0	$ 0	$ 0
3.17	83.48	$ 2	$ 0	$ 1	$ 0
3.32	90	$ 18	$ 2	$ 6	$ 0
4.94	200	$ 8	$ 1	$ 3	$ 0
5.75	300	$ 6	$ 0	$ 1	$ 0
6.33	400	$ 18	$ 1	$ 8	$ 0
Total ($)		$ 106	$ 12	$ 33	$ 0

Building Information

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	REL1: Religious/Non-Profit - Church or Membership Organization
Building is outside hundred-year flood area:	No
Building Type:	Religious Facilities
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Depth Damage Curve:	Religious Facilities (Default) Use Default:Yes
Building Size (sq.ft):	64
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$117
Expected Annual Losses due to Building Damages after Mitigation:	$106
Expected Annual Benefits - Building:	$11

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.4	28.16	0	0	0.4	28.16	0	0
-1	0.4	28.16	0	0	0.4	28.16	0	0
0	0.7	49.28	0	0	0.7	49.28	0	0
1	16.4	1,154.56	0	0	16.4	1,154.56	0	0
2	28.3	1,992.32	0	0	28.3	1,992.32	0	0
3	35.9	2,527.36	0	0	35.9	2,527.36	0	0
4	42.9	3,020.16	0	0	42.9	3,020.16	0	0
5	48.4	3,407.36	0	0	48.4	3,407.36	0	0
6	54.2	7,040	0	0	54.2	7,040	0	0
7	58.1	7,040	0	0	58.1	7,040	0	0
8	62.1	7,040	0	0	62.1	7,040	0	0
9	65.3	7,040	0	0	65.3	7,040	0	0
10	66.1	7,040	0	0	66.1	7,040	0	0
11	66.1	7,040	0	0	66.1	7,040	0	0
12	66.1	7,040	0	0	66.1	7,040	0	0
13	66.1	7,040	0	0	66.1	7,040	0	0
14	66.1	7,040	0	0	66.1	7,040	0	0
15	66.1	7,040	0	0	66.1	7,040	0	0
16	66.1	7,040	0	0	66.1	7,040	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0	Use Default:Yes
Expected Annual Losses due to Content Damages before Mitigation:	$13	
Expected Annual Losses due to Content Damages after Mitigation:	$12	
Expected Annual Benefits - Content:	$1	

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	29	163.32	29	163.32
2	48	270.33	48	270.33
3	60	337.92	60	337.92
4	69	388.60	69	388.60
5	76	428.03	76	428.03
6	81	456.19	81	456.19
7	88	495.61	88	495.61
8	94	529.40	94	529.40
9	97	546.30	97	546.30
10	97	546.30	97	546.30
11	97	546.30	97	546.30
12	97	546.30	97	546.30
13	97	546.30	97	546.30
14	97	546.30	97	546.30
15	97	546.30	97	546.30
16	97	546.30	97	546.30

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	1.37	Use Default:Yes
One-Time Displacement Cost ($/sq.ft):	1.28	Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$35	
Expected Annual Losses due to Displacement Damages after Mitigation:	$33	
Expected Annual Losses - Displacement:	$2	

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	205.38	45	205.38
2	90	410.77	90	410.77
3	135	616.16	135	616.16
4	180	1,080.98	180	1,080.98
5	225	1,351.23	225	1,351.23
6	270	1,621.47	270	1,621.47
7	315	1,891.72	315	1,891.72
8	360	2,680.84	360	2,680.84
9	405	3,015.95	405	3,015.95
10	450	3,351.05	450	3,351.05
11	450	3,351.05	450	3,351.05
12	450	1,297.18	450	1,297.18
13	450	1,297.18	450	1,297.18
14	450	1,297.18	450	1,297.18
15	450	1,297.18	450	1,297.18
16	450	1,297.18	450	1,297.18

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Annual Operating Budget:	$0
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$0
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$0
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$0

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	0	45	0
2	90	0	90	0
3	135	0	135	0
4	180	0	180	0
5	225	0	225	0
6	270	0	270	0
7	315	0	315	0
8	360	0	360	0
9	405	0	405	0
10	450	0	450	0
11	450	0	450	0
12	450	0	450	0
13	450	0	450	0
14	450	0	450	0
15	450	0	450	0
16	450	0	450	0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Benefits-Costs Summary

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$265
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$265
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.482204005346716, -91.12827998172877
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	936.06
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.35	931.81	5590	6507
10	932.61	933.38	8140	9475
25	934.11	934.99	12000	13968
100	936.03	936.44	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	930.6	931.21	5590	6507
10	932.22	932.93	8140	9475
25	933.78	934.7	12000	13968
100	935.75	936.28	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-8.83	1.11	$ 0	$ 0	$ 0	$ 0
-6.23	2	$ 0	$ 0	$ 0	$ 0
-4.18	4.79	$ 0	$ 0	$ 0	$ 0
-3.21	8	$ 0	$ 0	$ 0	$ 0
-2.75	10.33	$ 0	$ 0	$ 0	$ 0
-2	16.33	$ 151	$ 121	$ 0	$ 0
-1.66	20	$ 222	$ 169	$ 0	$ 0
-1.14	28.12	$ 38	$ 28	$ 0	$ 0
-1.04	30	$ 152	$ 108	$ 0	$ 0
-0.59	40	$ 173	$ 118	$ 0	$ 0
0.01	60	$ 2	$ 1	$ 0	$ 0
0	60.33	$ 52	$ 35	$ 0	$ 0
0.22	70	$ 43	$ 28	$ 5	$ 0
0.41	80	$ 13	$ 8	$ 2	$ 0
0.47	83.48	$ 22	$ 14	$ 4	$ 0
0.58	90	$ 174	$ 107	$ 56	$ 0
1.7	200	$ 56	$ 33	$ 30	$ 0
2.25	300	$ 30	$ 17	$ 19	$ 0
2.64	400	$ 312	$ 312	$ 187	$ 0
Total ($)		$ 1,440	$ 1,099	$ 303	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.64	1.11	$ 0	$ 0	$ 0	$ 0
-6.93	2	$ 0	$ 0	$ 0	$ 0
-4.74	4.79	$ 0	$ 0	$ 0	$ 0
-3.72	8	$ 0	$ 0	$ 0	$ 0
-3.23	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 1,222	$ 941	$ 294	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2.04	20	$ 0	$ 0	$ 0	$ 0
-2	20.48	$ 185	$ 147	$ 0	$ 0
-1.45	28.12	$ 34	$ 26	$ 0	$ 0
-1.34	30	$ 140	$ 103	$ 0	$ 0
-0.86	40	$ 163	$ 114	$ 0	$ 0
-0.18	60	$ 42	$ 28	$ 0	$ 0
0	67.75	$ 11	$ 7	$ 0	$ 0
0.05	70	$ 41	$ 27	$ 2	$ 0
0.27	80	$ 12	$ 8	$ 1	$ 0
0.34	83.48	$ 21	$ 14	$ 3	$ 0
0.46	90	$ 172	$ 106	$ 50	$ 0
1.71	200	$ 56	$ 33	$ 31	$ 0
2.34	300	$ 31	$ 17	$ 20	$ 0
2.78	400	$ 312	$ 312	$ 187	$ 0
Total ($)		$ 1,222	$ 941	$ 294	$ 0

Building Information

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Building Type:	Two or More Stories
Foundation Type:	
Building Has Basement:	**Yes**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Depth Damage Curve:	USACE Generic Use Default:Yes
Building Size (sq.ft):	1,134
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$1,440
Expected Annual Losses due to Building Damages after Mitigation:	$1,222
Expected Annual Benefits - Building:	$218

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	10.2	12,723.48	0	0	10.2	12,723.48	0	0
-1	13.9	17,338.86	0	0	13.9	17,338.86	0	0
0	17.9	22,328.46	0	0	17.9	22,328.46	0	0
1	22.3	27,817.02	0	0	22.3	27,817.02	0	0
2	27	33,679.8	0	0	27	33,679.8	0	0
3	31.9	39,792.06	0	0	31.9	39,792.06	0	0
4	36.9	46,029.06	0	0	36.9	46,029.06	0	0
5	41.9	52,266.06	0	0	41.9	52,266.06	0	0
6	46.9	58,503.06	0	0	46.9	58,503.06	0	0
7	51.8	124,740	0	0	51.8	124,740	0	0
8	56.4	124,740	0	0	56.4	124,740	0	0
9	60.8	124,740	0	0	60.8	124,740	0	0
10	64.8	124,740	0	0	64.8	124,740	0	0
11	68.4	124,740	0	0	68.4	124,740	0	0
12	71.4	124,740	0	0	71.4	124,740	0	0
13	73.7	124,740	0	0	73.7	124,740	0	0
14	75.4	124,740	0	0	75.4	124,740	0	0
15	76.4	124,740	0	0	76.4	124,740	0	0
16	76.4	124,740	0	0	76.4	124,740	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Utilities Elevated:	**No**
Expected Annual Losses due to Content Damages before Mitigation:	$1,099
Expected Annual Losses due to Content Damages after Mitigation:	$941
Expected Annual Benefits - Content:	$157

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	8.4	10,478.16	8.4	10,478.16
-1	10.1	12,598.74	10.1	12,598.74
0	11.9	14,844.06	11.9	14,844.06
1	13.8	17,214.12	13.8	17,214.12
2	15.7	19,584.18	15.7	19,584.18
3	17.7	22,078.98	17.7	22,078.98
4	19.8	24,698.52	19.8	24,698.52
5	22	27,442.80	22	27,442.80
6	24.3	30,311.82	24.3	30,311.82
7	26.7	33,305.58	26.7	33,305.58
8	29.1	36,299.34	29.1	36,299.34
9	31.7	39,542.58	31.7	39,542.58
10	34.4	42,910.56	34.4	42,910.56
11	37.2	46,403.28	37.2	46,403.28
12	40	49,896.00	40	49,896.00
13	43	53,638.20	43	53,638.20
14	46.1	57,505.14	46.1	57,505.14
15	49.3	61,496.82	49.3	61,496.82
16	52.6	65,613.24	52.6	65,613.24

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Lodging Per Diem:	$107 Use Default:Yes
Meals Per Diem:	$59 Use Default:Yes
Population Affected:	2
Duration of Displacement (days):	365 Use Default:Yes
Total Residential Displacement Cost:	$205
Expected Annual Losses due to Displacement Damages before mitigation:	$303
Expected Annual Losses due to Displacement Damages after Mitigation:	$294
Expected Annual Losses - Displacement:	$9

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	9,225	45	9,225
2	90	18,450	90	18,450
3	135	27,675	135	27,675
4	180	36,900	180	36,900
5	225	46,125	225	46,125
6	270	55,350	270	55,350
7	315	64,575	315	64,575
8	360	73,800	360	73,800
9	405	83,025	405	83,025
10	450	92,250	450	92,250
11	495	101,475	495	101,475
12	540	110,700	540	110,700
13	585	119,925	585	119,925
14	630	129,150	630	129,150
15	675	138,375	675	138,375
16	720	147,600	720	147,600

Additional Benefits - Street Maintenance

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Total Annual Street Maintenance Budget:	$0
Total Number of Street Miles Maintained:	0
Street Miles that will not require future maintenance:	0
Expected Annual Benefits - Street Maintenance:	$0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Additional Benefits - Social

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Number of Workers:	1
Expected Annual Social Benefits:	$13,622

Benefits-Costs Summary

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$7,429
Total Social Benefits:	$13,622
Total Mitigation Project Benefits:	$21,051
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48425300348748, -91.12414401542588
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	937.64
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	932.16	932.77	5590	6507
10	933.77	934.62	8140	9475
25	935.57	936.54	12000	13968
100	937.69	938.25	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.62	932.35	5590	6507
10	933.51	934.33	8140	9475
25	935.41	936.37	12000	13968
100	937.53	938.21	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.92	1.11	$ 0	$ 0	$ 0	$ 0
-7.1	2	$ 0	$ 0	$ 0	$ 0
-4.76	4.79	$ 0	$ 0	$ 0	$ 0
-3.64	8	$ 0	$ 0	$ 0	$ 0
-3.13	10.33	$ 0	$ 0	$ 0	$ 0
-2	18.42	$ 4	$ 0	$ 0	$ 0
-1.84	20	$ 14	$ 0	$ 0	$ 0
-1.19	28.12	$ 2	$ 0	$ 0	$ 0
-1.07	30	$ 10	$ 0	$ 0	$ 0
-0.56	40	$ 12	$ 0	$ 0	$ 0
0	54.84	$ 5	$ 0	$ 0	$ 0
0.16	60	$ 19	$ 12	$ 7	$ 0
0.43	70	$ 24	$ 18	$ 7	$ 0
0.67	80	$ 9	$ 7	$ 2	$ 0
0.74	83.48	$ 16	$ 13	$ 4	$ 0
0.87	90	$ 178	$ 146	$ 38	$ 0
2.24	200	$ 75	$ 63	$ 15	$ 0
2.93	300	$ 43	$ 37	$ 9	$ 0
3.42	400	$ 488	$ 230	$ 109	$ 0
Total ($)		$ 900	$ 527	$ 190	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-10.5	1.11	$ 0	$ 0	$ 0	$ 0
-7.61	2	$ 0	$ 0	$ 0	$ 0
-5.17	4.79	$ 0	$ 0	$ 0	$ 0
-4	8	$ 0	$ 0	$ 0	$ 0
-3.44	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 892	$ 528	$ 191	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2.05	20	$ 0	$ 0	$ 0	$ 0
-2	20.69	$ 12	$ 0	$ 0	$ 0
-1.37	28.12	$ 2	$ 0	$ 0	$ 0
-1.24	30	$ 10	$ 0	$ 0	$ 0
-0.69	40	$ 13	$ 0	$ 0	$ 0
0	57.29	$ 2	$ 0	$ 0	$ 0
0.09	60	$ 15	$ 8	$ 7	$ 0
0.38	70	$ 22	$ 17	$ 6	$ 0
0.64	80	$ 8	$ 7	$ 2	$ 0
0.72	83.48	$ 16	$ 13	$ 4	$ 0
0.86	90	$ 179	$ 148	$ 38	$ 0
2.36	200	$ 78	$ 66	$ 16	$ 0
3.11	300	$ 45	$ 39	$ 9	$ 0
3.64	400	$ 488	$ 230	$ 109	$ 0
Total ($)		$ 892	$ 528	$ 191	$ 0

Building Information

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	COM2: Commercial - Wholesale Trade
Building is outside hundred-year flood area:	No
Building Type:	Warehouse-Non-Refrig
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Depth Damage Curve:	Warehouse, Non-Refrig (Default) Use Default:Yes
Building Size (sq.ft):	1,776
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$900
Expected Annual Losses due to Building Damages after Mitigation:	$892
Expected Annual Benefits - Building:	$8

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.5	976.8	0	0	0.5	976.8	0	0
-1	0.5	976.8	0	0	0.5	976.8	0	0
0	1.1	2,148.96	0	0	1.1	2,148.96	0	0
1	11.8	23,052.48	0	0	11.8	23,052.48	0	0
2	19.9	38,876.63	0	0	19.9	38,876.63	0	0
3	25.4	49,621.43	0	0	25.4	49,621.43	0	0
4	31.4	61,343.03	0	0	31.4	61,343.03	0	0
5	34.2	66,813.12	0	0	34.2	66,813.12	0	0
6	39	76,190.4	0	0	39	76,190.4	0	0
7	41.8	81,660.48	0	0	41.8	81,660.48	0	0
8	45.7	89,279.52	0	0	45.7	89,279.52	0	0
9	50.4	195,360	0	0	50.4	195,360	0	0
10	51.7	195,360	0	0	51.7	195,360	0	0
11	51.7	195,360	0	0	51.7	195,360	0	0
12	51.7	195,360	0	0	51.7	195,360	0	0
13	51.7	195,360	0	0	51.7	195,360	0	0
14	51.7	195,360	0	0	51.7	195,360	0	0
15	51.7	195,360	0	0	51.7	195,360	0	0
16	51.7	195,360	0	0	51.7	195,360	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Expected Annual Losses due to Content Damages before Mitigation:	$527
Expected Annual Losses due to Content Damages after Mitigation:	$528
Expected Annual Benefits - Content:	$-1

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	21	19,282.03	21	19,282.03
2	34	31,218.52	34	31,218.52
3	47	43,155.02	47	43,155.02
4	57	52,336.94	57	52,336.94
5	66	60,600.67	66	60,600.67
6	74	67,946.20	74	67,946.20
7	81	74,373.55	81	74,373.55
8	88	80,800.89	88	80,800.89
9	92	84,473.66	92	84,473.66
10	94	86,310.04	94	86,310.04
11	94	86,310.04	94	86,310.04
12	94	86,310.04	94	86,310.04
13	94	86,310.04	94	86,310.04
14	94	86,310.04	94	86,310.04
15	94	86,310.04	94	86,310.04
16	94	86,310.04	94	86,310.04

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	0.64	Use Default:Yes
One-Time Displacement Cost ($/sq.ft):	1.28	Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$190	
Expected Annual Losses due to Displacement Damages after Mitigation:	$191	
Expected Annual Losses - Displacement:	$-1	

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	2,662.54	45	2,662.54
2	90	5,325.08	90	5,325.08
3	135	7,987.62	135	7,987.62
4	180	14,013.36	180	14,013.36
5	225	17,516.71	225	17,516.71
6	270	21,020.05	270	21,020.05
7	315	24,523.39	315	24,523.39
8	360	34,753.15	360	34,753.15
9	405	39,097.30	405	39,097.30
10	450	43,441.44	450	43,441.44
11	450	43,441.44	450	43,441.44
12	450	16,816.04	450	16,816.04
13	450	16,816.04	450	16,816.04
14	450	16,816.04	450	16,816.04
15	450	16,816.04	450	16,816.04
16	450	16,816.04	450	16,816.04

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Annual Operating Budget:	$0
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$0
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$0
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$0

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	0	45	0
2	90	0	90	0
3	135	0	135	0
4	180	0	180	0
5	225	0	225	0
6	270	0	270	0
7	315	0	315	0
8	360	0	360	0
9	405	0	405	0
10	450	0	450	0
11	450	0	450	0
12	450	0	450	0
13	450	0	450	0
14	450	0	450	0
15	450	0	450	0
16	450	0	450	0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Benefits-Costs Summary

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$129
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$129
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.486386994126434, -91.12311396334465
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	940.53
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	933.32	934.08	5590	6507
10	935.33	936.49	8140	9475
25	937.73	938.97	12000	13968
100	940.48	941.2	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	933.26	934.02	5590	6507
10	935.24	936.34	8140	9475
25	937.58	938.72	12000	13968
100	940.13	940.87	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-12.42	1.11	$ 0	$ 0	$ 0	$ 0
-9.15	2	$ 0	$ 0	$ 0	$ 0
-6.29	4.79	$ 0	$ 0	$ 0	$ 0
-4.88	8	$ 0	$ 0	$ 0	$ 0
-4.22	10.33	$ 0	$ 0	$ 0	$ 0
-2.54	20	$ 0	$ 0	$ 0	$ 0
-2	25.08	$ 16	$ 0	$ 0	$ 0
-1.72	28.12	$ 8	$ 0	$ 0	$ 0
-1.56	30	$ 34	$ 0	$ 0	$ 0
-0.87	40	$ 46	$ 0	$ 0	$ 0
0	57.6	$ 8	$ 0	$ 0	$ 0
0.1	60	$ 65	$ 38	$ 27	$ 2
0.46	70	$ 102	$ 80	$ 27	$ 3
0.78	80	$ 39	$ 32	$ 9	$ 1
0.88	83.48	$ 74	$ 62	$ 16	$ 3
1.06	90	$ 807	$ 686	$ 169	$ 33
2.93	200	$ 348	$ 300	$ 73	$ 17
3.88	300	$ 200	$ 174	$ 49	$ 11
4.55	400	$ 1,888	$ 887	$ 420	$ 0
Total ($)		$ 3,636	$ 2,258	$ 790	$ 70

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-12.35	1.11	$ 0	$ 0	$ 0	$ 0
-9.12	2	$ 0	$ 0	$ 0	$ 0
-6.36	4.79	$ 0	$ 0	$ 0	$ 0
-5.01	8	$ 0	$ 0	$ 0	$ 0
-4.36	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 3,267	$ 1,934	$ 713	$ 53

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2.74	20	$ 0	$ 0	$ 0	$ 0
-2	27.61	$ 3	$ 0	$ 0	$ 0
-1.94	28.12	$ 8	$ 0	$ 0	$ 0
-1.79	30	$ 31	$ 0	$ 0	$ 0
-1.14	40	$ 44	$ 0	$ 0	$ 0
-0.2	60	$ 12	$ 0	$ 0	$ 0
0	65.98	$ 11	$ 0	$ 0	$ 0
0.13	70	$ 52	$ 32	$ 21	$ 1
0.44	80	$ 25	$ 19	$ 7	$ 1
0.53	83.48	$ 50	$ 40	$ 13	$ 2
0.7	90	$ 643	$ 529	$ 143	$ 25
2.49	200	$ 315	$ 268	$ 65	$ 15
3.39	300	$ 186	$ 160	$ 44	$ 9
4.03	400	$ 1,888	$ 887	$ 420	$ 0
Total ($)		$ 3,267	$ 1,934	$ 713	$ 53

Building Information

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	COM2: Commercial - Wholesale Trade
Building is outside hundred-year flood area:	No
Building Type:	Warehouse-Non-Refrig
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Depth Damage Curve:	Warehouse, Non-Refrig (Default) Use Default:Yes
Building Size (sq.ft):	6,864
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$3,636
Expected Annual Losses due to Building Damages after Mitigation:	$3,267
Expected Annual Benefits - Building:	$369

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.5	3,775.2	0	0	0.5	3,775.2	0	0
-1	0.5	3,775.2	0	0	0.5	3,775.2	0	0
0	1.1	8,305.44	0	0	1.1	8,305.44	0	0
1	11.8	89,094.72	0	0	11.8	89,094.72	0	0
2	19.9	150,252.96	0	0	19.9	150,252.96	0	0
3	25.4	191,780.15	0	0	25.4	191,780.15	0	0
4	31.4	237,082.55	0	0	31.4	237,082.55	0	0
5	34.2	258,223.68	0	0	34.2	258,223.68	0	0
6	39	294,465.6	0	0	39	294,465.6	0	0
7	41.8	315,606.72	0	0	41.8	315,606.72	0	0
8	45.7	345,053.28	0	0	45.7	345,053.28	0	0
9	50.4	755,040	0	0	50.4	755,040	0	0
10	51.7	755,040	0	0	51.7	755,040	0	0
11	51.7	755,040	0	0	51.7	755,040	0	0
12	51.7	755,040	0	0	51.7	755,040	0	0
13	51.7	755,040	0	0	51.7	755,040	0	0
14	51.7	755,040	0	0	51.7	755,040	0	0
15	51.7	755,040	0	0	51.7	755,040	0	0
16	51.7	755,040	0	0	51.7	755,040	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Expected Annual Losses due to Content Damages before Mitigation:	$2,258
Expected Annual Losses due to Content Damages after Mitigation:	$1,934
Expected Annual Benefits - Content:	$324

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	21	74,522.44	21	74,522.44
2	34	120,655.39	34	120,655.39
3	47	166,788.33	47	166,788.33
4	57	202,275.21	57	202,275.21
5	66	234,213.40	66	234,213.40
6	74	262,602.91	74	262,602.91
7	81	287,443.72	81	287,443.72
8	88	312,284.54	88	312,284.54
9	92	326,479.29	92	326,479.29
10	94	333,576.67	94	333,576.67
11	94	333,576.67	94	333,576.67
12	94	333,576.67	94	333,576.67
13	94	333,576.67	94	333,576.67
14	94	333,576.67	94	333,576.67
15	94	333,576.67	94	333,576.67
16	94	333,576.67	94	333,576.67

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	0.64	Use Default:Yes
One-Time Displacement Cost ($/sq.ft):	1.28	Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$790	
Expected Annual Losses due to Displacement Damages after Mitigation:	$713	
Expected Annual Losses - Displacement:	$77	

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	10,290.35	45	10,290.35
2	90	20,580.71	90	20,580.71
3	135	30,871.07	135	30,871.07
4	180	54,159.78	180	54,159.78
5	225	67,699.72	225	67,699.72
6	270	81,239.67	270	81,239.67
7	315	94,779.61	315	94,779.61
8	360	134,316.25	360	134,316.25
9	405	151,105.78	405	151,105.78
10	450	167,895.32	450	167,895.32
11	450	167,895.32	450	167,895.32
12	450	64,991.73	450	64,991.73
13	450	64,991.73	450	64,991.73
14	450	64,991.73	450	64,991.73
15	450	64,991.73	450	64,991.73
16	450	64,991.73	450	64,991.73

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Annual Operating Budget:	$25,000
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$70
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$53
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$17

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	3,082.19	45	3,082.19
2	90	6,164.38	90	6,164.38
3	135	9,246.57	135	9,246.57
4	180	12,328.76	180	12,328.76
5	225	15,410.95	225	15,410.95
6	270	18,493.15	270	18,493.15
7	315	21,575.34	315	21,575.34
8	360	24,657.53	360	24,657.53
9	405	27,739.72	405	27,739.72
10	450	30,821.91	450	30,821.91
11	450	30,821.91	450	30,821.91
12	450	30,821.91	450	30,821.91
13	450	30,821.91	450	30,821.91
14	450	30,821.91	450	30,821.91
15	450	30,821.91	450	30,821.91
16	450	30,821.91	450	30,821.91

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Benefits-Costs Summary

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$15,208
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$15,208
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

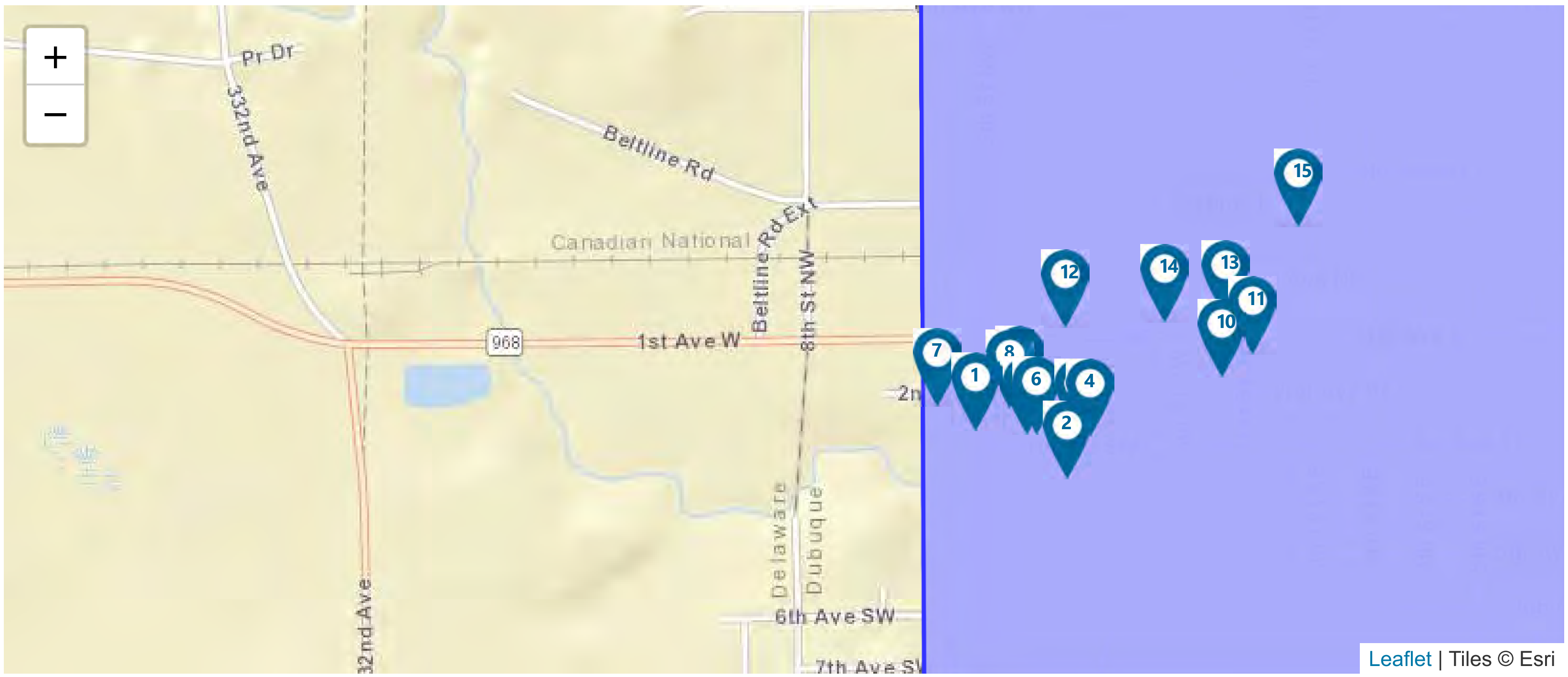
FEMA

Benefit-Cost Calculator

V.6.0 (Build 20241018.1218 | Release Notes)

Benefit-Cost Analysis

Project Name: NF-10 Floodplain Excavation South of Highway 20



Map Marker ▲	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
1	Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 10,797,728	$ 6,561,242	1.65
2	Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 34,655	$ 0	0.00

Map Marker ▲	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
3	Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 30,061	$ 0	0.00
4	Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 30,051	$ 0	0.00
5	Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 30,800	$ 0	0.00
6	Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 29,214	$ 0	0.00
7	Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 30,275	$ 0	0.00
8	Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 36,730	$ 0	0.00
9	Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 33,043	$ 0	0.00
10	Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 29,631	$ 0	0.00
11	Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 8,154	$ 0	0.00
12	Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 21,693	$ 0	0.00
13	Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 13,413	$ 0	0.00
14	Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 22,961	$ 0	0.00
15	Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 16,190	$ 0	0.00
TOTAL (SELECTED)					**$ 11,164,599**	**$ 6,561,242**	**1.70**
TOTAL					**$ 11,164,599**	**$ 6,561,242**	**1.70**

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48299299389262, -91.13033296127354
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$6,271,000
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$15,000

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	934.78
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.62	932.14	5590	6507
10	933.06	934.08	8140	9475
25	934.97	936.08	12000	13968
100	937.39	937.87	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.51	932.03	5590	6507
10	932.86	933.69	8140	9475
25	934.59	935.41	12000	13968
100	936.44	936.96	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-7.76	1.11	$ 0	$ 0	$ 0	$ 0
-4.9	2	$ 0	$ 0	$ 0	$ 0
-2.51	4.79	$ 0	$ 0	$ 0	$ 0
-2	6.04	$ 1	$ 0	$ 0	$ 0
-1.36	8	$ 1	$ 0	$ 0	$ 0
-0.82	10.33	$ 1	$ 0	$ 0	$ 0
0	15.46	$ 3	$ 0	$ 0	$ 0
0.52	20	$ 13	$ 2	$ 4	$ 0
1.18	28.12	$ 3	$ 0	$ 1	$ 0
1.31	30	$ 14	$ 2	$ 3	$ 0
1.86	40	$ 17	$ 2	$ 4	$ 0
2.62	60	$ 6	$ 1	$ 2	$ 0
2.91	70	$ 5	$ 1	$ 1	$ 0
3.16	80	$ 1	$ 0	$ 0	$ 0
3.24	83.48	$ 2	$ 0	$ 1	$ 0
3.38	90	$ 18	$ 2	$ 6	$ 0
4.83	200	$ 8	$ 1	$ 2	$ 0
5.57	300	$ 6	$ 0	$ 1	$ 0
6.08	400	$ 18	$ 1	$ 8	$ 0
Total ($)		$ 117	$ 13	$ 35	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-7.39	1.11	$ 0	$ 0	$ 0	$ 0
-4.79	2	$ 0	$ 0	$ 0	$ 0
-2.67	4.79	$ 0	$ 0	$ 0	$ 0
-2	6.7	$ 1	$ 0	$ 0	$ 0
-1.64	8	$ 1	$ 0	$ 0	$ 0
Total ($)		$ 80	$ 9	$ 24	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-1.17	10.33	$ 2	$ 0	$ 0	$ 0
-0.01	20	$ 0	$ 0	$ 0	$ 0
0	20.3	$ 2	$ 0	$ 0	$ 0
0.54	28.12	$ 2	$ 0	$ 0	$ 0
0.65	30	$ 8	$ 1	$ 2	$ 0
1.12	40	$ 13	$ 2	$ 3	$ 0
1.77	60	$ 5	$ 1	$ 1	$ 0
2.01	70	$ 4	$ 0	$ 1	$ 0
2.22	80	$ 1	$ 0	$ 0	$ 0
2.28	83.48	$ 2	$ 0	$ 0	$ 0
2.4	90	$ 15	$ 2	$ 4	$ 0
3.62	200	$ 5	$ 1	$ 2	$ 0
4.23	300	$ 3	$ 0	$ 1	$ 0
4.66	400	$ 18	$ 1	$ 8	$ 0
Total ($)		$ 80	$ 9	$ 24	$ 0

Building Information

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	REL1: Religious/Non-Profit - Church or Membership Organization
Building is outside hundred-year flood area:	No
Building Type:	Religious Facilities
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Depth Damage Curve:	Religious Facilities (Default) Use Default:Yes
Building Size (sq.ft):	64
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$117
Expected Annual Losses due to Building Damages after Mitigation:	$80
Expected Annual Benefits - Building:	$37

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.4	28.16	0	0	0.4	28.16	0	0
-1	0.4	28.16	0	0	0.4	28.16	0	0
0	0.7	49.28	0	0	0.7	49.28	0	0
1	16.4	1,154.56	0	0	16.4	1,154.56	0	0
2	28.3	1,992.32	0	0	28.3	1,992.32	0	0
3	35.9	2,527.36	0	0	35.9	2,527.36	0	0
4	42.9	3,020.16	0	0	42.9	3,020.16	0	0
5	48.4	3,407.36	0	0	48.4	3,407.36	0	0
6	54.2	7,040	0	0	54.2	7,040	0	0
7	58.1	7,040	0	0	58.1	7,040	0	0
8	62.1	7,040	0	0	62.1	7,040	0	0
9	65.3	7,040	0	0	65.3	7,040	0	0
10	66.1	7,040	0	0	66.1	7,040	0	0
11	66.1	7,040	0	0	66.1	7,040	0	0
12	66.1	7,040	0	0	66.1	7,040	0	0
13	66.1	7,040	0	0	66.1	7,040	0	0
14	66.1	7,040	0	0	66.1	7,040	0	0
15	66.1	7,040	0	0	66.1	7,040	0	0
16	66.1	7,040	0	0	66.1	7,040	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0	Use Default:Yes
Expected Annual Losses due to Content Damages before Mitigation:	$13	
Expected Annual Losses due to Content Damages after Mitigation:	$9	
Expected Annual Benefits - Content:	$4	

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	29	163.32	29	163.32
2	48	270.33	48	270.33
3	60	337.92	60	337.92
4	69	388.60	69	388.60
5	76	428.03	76	428.03
6	81	456.19	81	456.19
7	88	495.61	88	495.61
8	94	529.40	94	529.40
9	97	546.30	97	546.30
10	97	546.30	97	546.30
11	97	546.30	97	546.30
12	97	546.30	97	546.30
13	97	546.30	97	546.30
14	97	546.30	97	546.30
15	97	546.30	97	546.30
16	97	546.30	97	546.30

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	1.37	Use Default:Yes
One-Time Displacement Cost ($/sq.ft):	1.28	Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$35	
Expected Annual Losses due to Displacement Damages after Mitigation:	$24	
Expected Annual Losses - Displacement:	$11	

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	205.38	45	205.38
2	90	410.77	90	410.77
3	135	616.16	135	616.16
4	180	1,080.98	180	1,080.98
5	225	1,351.23	225	1,351.23
6	270	1,621.47	270	1,621.47
7	315	1,891.72	315	1,891.72
8	360	2,680.84	360	2,680.84
9	405	3,015.95	405	3,015.95
10	450	3,351.05	450	3,351.05
11	450	3,351.05	450	3,351.05
12	450	1,297.18	450	1,297.18
13	450	1,297.18	450	1,297.18
14	450	1,297.18	450	1,297.18
15	450	1,297.18	450	1,297.18
16	450	1,297.18	450	1,297.18

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Annual Operating Budget:	$0
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$0
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$0
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$0

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	0	45	0
2	90	0	90	0
3	135	0	135	0
4	180	0	180	0
5	225	0	225	0
6	270	0	270	0
7	315	0	315	0
8	360	0	360	0
9	405	0	405	0
10	450	0	450	0
11	450	0	450	0
12	450	0	450	0
13	450	0	450	0
14	450	0	450	0
15	450	0	450	0
16	450	0	450	0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Total Project Area (acres):	15
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	100.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$557,985

Benefits-Costs Summary

Floodplain and Stream Restoration @ 225 5th St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$10,797,728
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$10,797,728
Total Mitigation Project Cost:	$6,561,242
Benefit Cost Ratio - Standard:	1.65
Benefit Cost Ratio - Standard + Social:	1.65

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.482204005346716, -91.12827998172877
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	936.06
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.35	931.81	5590	6507
10	932.61	933.38	8140	9475
25	934.11	934.99	12000	13968
100	936.03	936.44	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.23	931.7	5590	6507
10	932.4	932.87	8140	9475
25	933.61	934.07	12000	13968
100	934.68	935.16	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-8.83	1.11	$ 0	$ 0	$ 0	$ 0
-6.23	2	$ 0	$ 0	$ 0	$ 0
-4.18	4.79	$ 0	$ 0	$ 0	$ 0
-3.21	8	$ 0	$ 0	$ 0	$ 0
-2.75	10.33	$ 0	$ 0	$ 0	$ 0
-2	16.33	$ 151	$ 121	$ 0	$ 0
-1.66	20	$ 222	$ 169	$ 0	$ 0
-1.14	28.12	$ 38	$ 28	$ 0	$ 0
-1.04	30	$ 152	$ 108	$ 0	$ 0
-0.59	40	$ 173	$ 118	$ 0	$ 0
0.01	60	$ 2	$ 1	$ 0	$ 0
0	60.33	$ 52	$ 35	$ 0	$ 0
0.22	70	$ 43	$ 28	$ 5	$ 0
0.41	80	$ 13	$ 8	$ 2	$ 0
0.47	83.48	$ 22	$ 14	$ 4	$ 0
0.58	90	$ 174	$ 107	$ 56	$ 0
1.7	200	$ 56	$ 33	$ 30	$ 0
2.25	300	$ 30	$ 17	$ 19	$ 0
2.64	400	$ 312	$ 312	$ 187	$ 0
Total ($)		$ 1,440	$ 1,099	$ 303	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-8.06	1.11	$ 0	$ 0	$ 0	$ 0
-5.93	2	$ 0	$ 0	$ 0	$ 0
-4.3	4.79	$ 0	$ 0	$ 0	$ 0
-3.55	8	$ 0	$ 0	$ 0	$ 0
-3.22	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 852	$ 709	$ 193	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2.42	20	$ 0	$ 0	$ 0	$ 0
-2.01	28.12	$ 0	$ 0	$ 0	$ 0
-2	28.82	$ 17	$ 14	$ 0	$ 0
-1.94	30	$ 114	$ 91	$ 0	$ 0
-1.61	40	$ 128	$ 98	$ 0	$ 0
-1.18	60	$ 40	$ 29	$ 0	$ 0
-1.02	70	$ 31	$ 23	$ 0	$ 0
-0.88	80	$ 9	$ 7	$ 0	$ 0
-0.85	83.48	$ 16	$ 11	$ 0	$ 0
-0.77	90	$ 121	$ 83	$ 0	$ 0
0	194.53	$ 3	$ 2	$ 0	$ 0
0.03	200	$ 39	$ 26	$ 2	$ 0
0.42	300	$ 21	$ 13	$ 4	$ 0
0.7	400	$ 312	$ 312	$ 187	$ 0
Total ($)		$ 852	$ 709	$ 193	$ 0

Building Information

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Building Type:	Two or More Stories
Foundation Type:	
Building Has Basement:	**Yes**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Depth Damage Curve:	USACE Generic Use Default:Yes
Building Size (sq.ft):	1,134
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$1,440
Expected Annual Losses due to Building Damages after Mitigation:	$852
Expected Annual Benefits - Building:	$587

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	10.2	12,723.48	0	0	10.2	12,723.48	0	0
-1	13.9	17,338.86	0	0	13.9	17,338.86	0	0
0	17.9	22,328.46	0	0	17.9	22,328.46	0	0
1	22.3	27,817.02	0	0	22.3	27,817.02	0	0
2	27	33,679.8	0	0	27	33,679.8	0	0
3	31.9	39,792.06	0	0	31.9	39,792.06	0	0
4	36.9	46,029.06	0	0	36.9	46,029.06	0	0
5	41.9	52,266.06	0	0	41.9	52,266.06	0	0
6	46.9	58,503.06	0	0	46.9	58,503.06	0	0
7	51.8	124,740	0	0	51.8	124,740	0	0
8	56.4	124,740	0	0	56.4	124,740	0	0
9	60.8	124,740	0	0	60.8	124,740	0	0
10	64.8	124,740	0	0	64.8	124,740	0	0
11	68.4	124,740	0	0	68.4	124,740	0	0
12	71.4	124,740	0	0	71.4	124,740	0	0
13	73.7	124,740	0	0	73.7	124,740	0	0
14	75.4	124,740	0	0	75.4	124,740	0	0
15	76.4	124,740	0	0	76.4	124,740	0	0
16	76.4	124,740	0	0	76.4	124,740	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Utilities Elevated:	**No**
Expected Annual Losses due to Content Damages before Mitigation:	$1,099
Expected Annual Losses due to Content Damages after Mitigation:	$709
Expected Annual Benefits - Content:	$390

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	8.4	10,478.16	8.4	10,478.16
-1	10.1	12,598.74	10.1	12,598.74
0	11.9	14,844.06	11.9	14,844.06
1	13.8	17,214.12	13.8	17,214.12
2	15.7	19,584.18	15.7	19,584.18
3	17.7	22,078.98	17.7	22,078.98
4	19.8	24,698.52	19.8	24,698.52
5	22	27,442.80	22	27,442.80
6	24.3	30,311.82	24.3	30,311.82
7	26.7	33,305.58	26.7	33,305.58
8	29.1	36,299.34	29.1	36,299.34
9	31.7	39,542.58	31.7	39,542.58
10	34.4	42,910.56	34.4	42,910.56
11	37.2	46,403.28	37.2	46,403.28
12	40	49,896.00	40	49,896.00
13	43	53,638.20	43	53,638.20
14	46.1	57,505.14	46.1	57,505.14
15	49.3	61,496.82	49.3	61,496.82
16	52.6	65,613.24	52.6	65,613.24

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Lodging Per Diem:	$107 Use Default:Yes
Meals Per Diem:	$59 Use Default:Yes
Population Affected:	2
Duration of Displacement (days):	365 Use Default:Yes
Total Residential Displacement Cost:	$205
Expected Annual Losses due to Displacement Damages before mitigation:	$303
Expected Annual Losses due to Displacement Damages after Mitigation:	$193
Expected Annual Losses - Displacement:	$110

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	9,225	45	9,225
2	90	18,450	90	18,450
3	135	27,675	135	27,675
4	180	36,900	180	36,900
5	225	46,125	225	46,125
6	270	55,350	270	55,350
7	315	64,575	315	64,575
8	360	73,800	360	73,800
9	405	83,025	405	83,025
10	450	92,250	450	92,250
11	495	101,475	495	101,475
12	540	110,700	540	110,700
13	585	119,925	585	119,925
14	630	129,150	630	129,150
15	675	138,375	675	138,375
16	720	147,600	720	147,600

Additional Benefits - Street Maintenance

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Total Annual Street Maintenance Budget:	$0
Total Number of Street Miles Maintained:	0
Street Miles that will not require future maintenance:	0
Expected Annual Benefits - Street Maintenance:	$0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Additional Benefits - Social

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Number of Workers:	1
Expected Annual Social Benefits:	$13,622

Benefits-Costs Summary

Floodplain and Stream Restoration @ 320 4th St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$21,033
Total Social Benefits:	$13,622
Total Mitigation Project Benefits:	$34,655
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48290401999043, -91.12804101366925
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	936.59
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	27.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.68	932.69	5590	7122
10	933.16	934.65	8140	10370
25	935.07	936.68	12000	15288
100	937.54	938.49	17000	21658

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.56	932.51	5590	7122
10	932.98	934.22	8140	10370
25	934.72	935.99	12000	15288
100	936.63	937.57	17000	21658

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.15	1.11	$ 0	$ 0	$ 0	$ 0
-6.23	2	$ 0	$ 0	$ 0	$ 0
-3.78	4.79	$ 0	$ 0	$ 0	$ 0
-2.6	8	$ 0	$ 0	$ 0	$ 0
-2.05	10.33	$ 0	$ 0	$ 0	$ 0
-2	10.65	$ 0	$ 0	$ 0	$ 0
-0.7	20	$ 171	$ 84	$ 0	$ 0
-0.01	28.12	$ 8	$ 4	$ 0	$ 0
0	28.52	$ 29	$ 16	$ 0	$ 0
0.1	30	$ 168	$ 93	$ 20	$ 0
0.65	40	$ 225	$ 128	$ 74	$ 0
1.43	60	$ 78	$ 45	$ 34	$ 0
1.72	70	$ 63	$ 37	$ 30	$ 0
1.96	80	$ 19	$ 11	$ 10	$ 0
2.04	83.48	$ 33	$ 19	$ 17	$ 0
2.18	90	$ 276	$ 162	$ 159	$ 0
3.65	200	$ 93	$ 55	$ 62	$ 0
4.39	300	$ 51	$ 30	$ 36	$ 0
4.91	400	$ 443	$ 443	$ 187	$ 0
Total ($)		$ 1,657	$ 1,128	$ 628	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-8.88	1.11	$ 0	$ 0	$ 0	$ 0
-6.18	2	$ 0	$ 0	$ 0	$ 0
-3.98	4.79	$ 0	$ 0	$ 0	$ 0
-2.94	8	$ 0	$ 0	$ 0	$ 0
-2.45	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 1,274	$ 893	$ 396	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2	13.32	$ 0	$ 0	$ 0	$ 0
-1.26	20	$ 84	$ 32	$ 0	$ 0
-0.69	28.12	$ 21	$ 10	$ 0	$ 0
-0.58	30	$ 103	$ 52	$ 0	$ 0
-0.1	40	$ 24	$ 13	$ 0	$ 0
0	42.56	$ 131	$ 72	$ 0	$ 0
0.56	60	$ 56	$ 32	$ 15	$ 0
0.81	70	$ 46	$ 27	$ 15	$ 0
1.02	80	$ 14	$ 8	$ 5	$ 0
1.09	83.48	$ 25	$ 14	$ 9	$ 0
1.21	90	$ 212	$ 123	$ 97	$ 0
2.46	200	$ 74	$ 43	$ 42	$ 0
3.09	300	$ 41	$ 24	$ 25	$ 0
3.53	400	$ 443	$ 443	$ 187	$ 0
Total ($)		$ 1,274	$ 893	$ 396	$ 0

Building Information

Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040

Building Type:	Two or More Stories
Foundation Type:	
Building Has Basement:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040

Depth Damage Curve:	USACE Generic Use Default:Yes
Building Size (sq.ft):	1,611
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$1,657
Expected Annual Losses due to Building Damages after Mitigation:	$1,274
Expected Annual Benefits - Building:	$383

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0	0	0	0	0	0	0	0
-1	3	5,316.29	0	0	3	5,316.29	0	0
0	9.3	16,480.53	0	0	9.3	16,480.53	0	0
1	15.2	26,935.92	0	0	15.2	26,935.92	0	0
2	20.9	37,036.88	0	0	20.9	37,036.88	0	0
3	26.3	46,606.22	0	0	26.3	46,606.22	0	0
4	31.4	55,643.93	0	0	31.4	55,643.93	0	0
5	36.2	64,150.02	0	0	36.2	64,150.02	0	0
6	40.7	72,124.47	0	0	40.7	72,124.47	0	0
7	44.9	79,567.29	0	0	44.9	79,567.29	0	0
8	48.8	86,478.48	0	0	48.8	86,478.48	0	0
9	52.4	177,210	0	0	52.4	177,210	0	0
10	55.7	177,210	0	0	55.7	177,210	0	0
11	58.7	177,210	0	0	58.7	177,210	0	0
12	61.4	177,210	0	0	61.4	177,210	0	0
13	63.8	177,210	0	0	63.8	177,210	0	0
14	65.9	177,210	0	0	65.9	177,210	0	0
15	67.7	177,210	0	0	67.7	177,210	0	0
16	69.2	177,210	0	0	69.2	177,210	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Utilities Elevated:	**No**
Expected Annual Losses due to Content Damages before Mitigation:	$1,128
Expected Annual Losses due to Content Damages after Mitigation:	$893
Expected Annual Benefits - Content:	$234

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	1	1,772.1	1	1,772.1
0	5	8,860.5	5	8,860.5
1	8.7	15,417.26	8.7	15,417.26
2	12.2	21,619.62	12.2	21,619.62
3	15.5	27,467.55	15.5	27,467.55
4	18.5	32,783.85	18.5	32,783.85
5	21.3	37,745.73	21.3	37,745.73
6	23.9	42,353.19	23.9	42,353.19
7	26.3	46,606.23	26.3	46,606.23
8	28.4	50,327.64	28.4	50,327.64
9	30.3	53,694.63	30.3	53,694.63
10	32	56,707.2	32	56,707.2
11	33.4	59,188.14	33.4	59,188.14
12	34.7	61,491.87	34.7	61,491.87
13	35.6	63,086.76	35.6	63,086.76
14	36.4	64,504.44	36.4	64,504.44
15	36.9	65,390.49	36.9	65,390.49
16	37.2	65,922.12	37.2	65,922.12

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040

Lodging Per Diem:	$107 Use Default:Yes
Meals Per Diem:	$59 Use Default:Yes
Population Affected:	2
Duration of Displacement (days):	365 Use Default:Yes
Total Residential Displacement Cost:	$205
Expected Annual Losses due to Displacement Damages before mitigation:	$628
Expected Annual Losses due to Displacement Damages after Mitigation:	$396
Expected Annual Losses - Displacement:	$232

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	9,225	45	9,225
2	90	18,450	90	18,450
3	135	27,675	135	27,675
4	180	36,900	180	36,900
5	225	46,125	225	46,125
6	270	55,350	270	55,350
7	315	64,575	315	64,575
8	360	73,800	360	73,800
9	405	83,025	405	83,025
10	450	92,250	450	92,250
11	495	101,475	495	101,475
12	540	110,700	540	110,700
13	585	119,925	585	119,925
14	630	129,150	630	129,150
15	675	138,375	675	138,375
16	720	147,600	720	147,600

Additional Benefits - Street Maintenance

Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040

Total Annual Street Maintenance Budget:	$0
Total Number of Street Miles Maintained:	0
Street Miles that will not require future maintenance:	0
Expected Annual Benefits - Street Maintenance:	$0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Additional Benefits - Social

Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040

Number of Workers:	1
Expected Annual Social Benefits:	$13,622

Benefits-Costs Summary

Floodplain and Stream Restoration @ 322 3rd Ave SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$16,439
Total Social Benefits:	$13,622
Total Mitigation Project Benefits:	$30,061
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.482899996676906, -91.12778000120436
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	937.12
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.69	932.22	5590	6507
10	933.16	934.18	8140	9475
25	935.07	936.21	12000	13968
100	937.55	938.03	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.57	932.11	5590	6507
10	932.98	933.81	8140	9475
25	934.72	935.58	12000	13968
100	936.63	937.16	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-10.08	1.11	$ 0	$ 0	$ 0	$ 0
-7.21	2	$ 0	$ 0	$ 0	$ 0
-4.78	4.79	$ 0	$ 0	$ 0	$ 0
-3.62	8	$ 0	$ 0	$ 0	$ 0
-3.05	10.33	$ 0	$ 0	$ 0	$ 0
-2	17.28	$ 123	$ 92	$ 0	$ 0
-1.7	20	$ 266	$ 188	$ 0	$ 0
-1.01	28.12	$ 47	$ 32	$ 0	$ 0
-0.9	30	$ 192	$ 127	$ 0	$ 0
-0.34	40	$ 106	$ 67	$ 0	$ 0
0	47.79	$ 122	$ 75	$ 0	$ 0
0.43	60	$ 74	$ 45	$ 12	$ 0
0.72	70	$ 59	$ 35	$ 14	$ 0
0.98	80	$ 18	$ 11	$ 5	$ 0
1.06	83.48	$ 30	$ 18	$ 9	$ 0
1.2	90	$ 248	$ 140	$ 101	$ 0
2.68	200	$ 81	$ 44	$ 47	$ 0
3.42	300	$ 62	$ 24	$ 28	$ 0
3.95	400	$ 267	$ 267	$ 187	$ 0
Total ($)		$ 1,695	$ 1,164	$ 403	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.74	1.11	$ 0	$ 0	$ 0	$ 0
-7.09	2	$ 0	$ 0	$ 0	$ 0
-4.93	4.79	$ 0	$ 0	$ 0	$ 0
-3.89	8	$ 0	$ 0	$ 0	$ 0
-3.39	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 1,240	$ 901	$ 272	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2.2	20	$ 0	$ 0	$ 0	$ 0
-2	22.7	$ 134	$ 100	$ 0	$ 0
-1.62	28.12	$ 38	$ 28	$ 0	$ 0
-1.52	30	$ 158	$ 110	$ 0	$ 0
-1.04	40	$ 187	$ 124	$ 0	$ 0
-0.36	60	$ 61	$ 39	$ 0	$ 0
-0.13	70	$ 30	$ 19	$ 0	$ 0
0	75.9	$ 19	$ 12	$ 0	$ 0
0.08	80	$ 15	$ 9	$ 1	$ 0
0.15	83.48	$ 25	$ 15	$ 2	$ 0
0.27	90	$ 203	$ 121	$ 36	$ 0
1.53	200	$ 67	$ 38	$ 28	$ 0
2.16	300	$ 37	$ 20	$ 18	$ 0
2.6	400	$ 267	$ 267	$ 187	$ 0
Total ($)		$ 1,240	$ 901	$ 272	$ 0

Building Information

Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040

Building Type:	One Story
Foundation Type:	
Building Has Basement:	**Yes**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040

Depth Damage Curve:	USACE Generic Use Default:Yes
Building Size (sq.ft):	970
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$1,695
Expected Annual Losses due to Building Damages after Mitigation:	$1,240
Expected Annual Benefits - Building:	$456

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	13.8	14,724.6	0	0	13.8	14,724.6	0	0
-1	19.4	20,699.8	0	0	19.4	20,699.8	0	0
0	25.5	27,208.5	0	0	25.5	27,208.5	0	0
1	32	34,144	0	0	32	34,144	0	0
2	38.7	41,292.9	0	0	38.7	41,292.9	0	0
3	45.5	48,548.5	0	0	45.5	48,548.5	0	0
4	52.2	106,700	0	0	52.2	106,700	0	0
5	58.6	106,700	0	0	58.6	106,700	0	0
6	64.5	106,700	0	0	64.5	106,700	0	0
7	69.8	106,700	0	0	69.8	106,700	0	0
8	74.2	106,700	0	0	74.2	106,700	0	0
9	77.7	106,700	0	0	77.7	106,700	0	0
10	80.1	106,700	0	0	80.1	106,700	0	0
11	81.1	106,700	0	0	81.1	106,700	0	0
12	81.1	106,700	0	0	81.1	106,700	0	0
13	81.1	106,700	0	0	81.1	106,700	0	0
14	81.1	106,700	0	0	81.1	106,700	0	0
15	81.1	106,700	0	0	81.1	106,700	0	0
16	81.1	106,700	0	0	81.1	106,700	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Utilities Elevated:	**No**
Expected Annual Losses due to Content Damages before Mitigation:	$1,164
Expected Annual Losses due to Content Damages after Mitigation:	$901
Expected Annual Benefits - Content:	$262

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	10.5	11,203.50	10.5	11,203.50
-1	13.2	14,084.4	13.2	14,084.4
0	16	17,072.00	16	17,072.00
1	18.9	20,166.30	18.9	20,166.30
2	21.8	23,260.60	21.8	23,260.60
3	24.7	26,354.90	24.7	26,354.90
4	27.4	29,235.80	27.4	29,235.80
5	30	32,010.00	30	32,010.00
6	32.4	34,570.8	32.4	34,570.8
7	34.5	36,811.50	34.5	36,811.50
8	36.3	38,732.1	36.3	38,732.1
9	37.7	40,225.90	37.7	40,225.90
10	38.6	41,186.20	38.6	41,186.20
11	39.1	41,719.70	39.1	41,719.70
12	39.1	41,719.70	39.1	41,719.70
13	39.1	41,719.70	39.1	41,719.70
14	39.1	41,719.70	39.1	41,719.70
15	39.1	41,719.70	39.1	41,719.70
16	39.1	41,719.70	39.1	41,719.70

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040

Lodging Per Diem:	$107 Use Default:Yes
Meals Per Diem:	$59 Use Default:Yes
Population Affected:	2
Duration of Displacement (days):	365 Use Default:Yes
Total Residential Displacement Cost:	$205
Expected Annual Losses due to Displacement Damages before mitigation:	$403
Expected Annual Losses due to Displacement Damages after Mitigation:	$272
Expected Annual Losses - Displacement:	$131

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	9,225	45	9,225
2	90	18,450	90	18,450
3	135	27,675	135	27,675
4	180	36,900	180	36,900
5	225	46,125	225	46,125
6	270	55,350	270	55,350
7	315	64,575	315	64,575
8	360	73,800	360	73,800
9	405	83,025	405	83,025
10	450	92,250	450	92,250
11	495	101,475	495	101,475
12	540	110,700	540	110,700
13	585	119,925	585	119,925
14	630	129,150	630	129,150
15	675	138,375	675	138,375
16	720	147,600	720	147,600

Additional Benefits - Street Maintenance

Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040

Total Annual Street Maintenance Budget:	$0
Total Number of Street Miles Maintained:	0
Street Miles that will not require future maintenance:	0
Expected Annual Benefits - Street Maintenance:	$0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Additional Benefits - Social

Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040

Number of Workers:	1
Expected Annual Social Benefits:	$13,622

Benefits-Costs Summary

Floodplain and Stream Restoration @ 316 3rd Ave SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$16,429
Total Social Benefits:	$13,622
Total Mitigation Project Benefits:	$30,051
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48291998751597, -91.12917399552147
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	936.67
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.68	932.22	5590	6507
10	933.16	934.18	8140	9475
25	935.06	936.2	12000	13968
100	937.54	938.02	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.57	932.11	5590	6507
10	932.97	933.8	8140	9475
25	934.7	935.56	12000	13968
100	936.61	937.13	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.62	1.11	$ 0	$ 0	$ 0	$ 0
-6.74	2	$ 0	$ 0	$ 0	$ 0
-4.33	4.79	$ 0	$ 0	$ 0	$ 0
-3.17	8	$ 0	$ 0	$ 0	$ 0
-2.62	10.33	$ 0	$ 0	$ 0	$ 0
-2	13.89	$ 336	$ 264	$ 0	$ 0
-1.24	20	$ 273	$ 197	$ 0	$ 0
-0.58	28.12	$ 47	$ 32	$ 0	$ 0
-0.44	30	$ 158	$ 107	$ 0	$ 0
0	37.98	$ 32	$ 21	$ 0	$ 0
0.1	40	$ 222	$ 142	$ 23	$ 0
0.87	60	$ 71	$ 44	$ 22	$ 0
1.16	70	$ 56	$ 34	$ 21	$ 0
1.42	80	$ 17	$ 10	$ 7	$ 0
1.49	83.48	$ 29	$ 17	$ 13	$ 0
1.63	90	$ 233	$ 134	$ 127	$ 0
3.11	200	$ 76	$ 42	$ 53	$ 0
3.85	300	$ 42	$ 22	$ 32	$ 0
4.38	400	$ 333	$ 333	$ 187	$ 0
Total ($)		$ 1,925	$ 1,399	$ 485	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.27	1.11	$ 0	$ 0	$ 0	$ 0
-6.63	2	$ 0	$ 0	$ 0	$ 0
-4.48	4.79	$ 0	$ 0	$ 0	$ 0
-3.43	8	$ 0	$ 0	$ 0	$ 0
-2.95	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 1,476	$ 1,121	$ 324	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2	17.67	$ 93	$ 75	$ 0	$ 0
-1.78	20	$ 231	$ 178	$ 0	$ 0
-1.2	28.12	$ 40	$ 29	$ 0	$ 0
-1.09	30	$ 161	$ 115	$ 0	$ 0
-0.6	40	$ 174	$ 119	$ 0	$ 0
0	58.41	$ 11	$ 7	$ 0	$ 0
0.04	60	$ 59	$ 39	$ 2	$ 0
0.29	70	$ 47	$ 30	$ 6	$ 0
0.5	80	$ 14	$ 9	$ 3	$ 0
0.57	83.48	$ 24	$ 15	$ 5	$ 0
0.69	90	$ 193	$ 117	$ 65	$ 0
1.94	200	$ 63	$ 36	$ 34	$ 0
2.56	300	$ 34	$ 19	$ 21	$ 0
3	400	$ 333	$ 333	$ 187	$ 0
Total ($)		$ 1,476	$ 1,121	$ 324	$ 0

Building Information

Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040

Building Type:	Two or More Stories
Foundation Type:	
Building Has Basement:	**Yes**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040

Depth Damage Curve:	USACE Generic Use Default:Yes
Building Size (sq.ft):	1,211
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$1,925
Expected Annual Losses due to Building Damages after Mitigation:	$1,476
Expected Annual Benefits - Building:	$449

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	10.2	13,587.41	0	0	10.2	13,587.41	0	0
-1	13.9	18,516.19	0	0	13.9	18,516.19	0	0
0	17.9	23,844.58	0	0	17.9	23,844.58	0	0
1	22.3	29,705.82	0	0	22.3	29,705.82	0	0
2	27	35,966.7	0	0	27	35,966.7	0	0
3	31.9	42,493.99	0	0	31.9	42,493.99	0	0
4	36.9	49,154.49	0	0	36.9	49,154.49	0	0
5	41.9	55,814.98	0	0	41.9	55,814.98	0	0
6	46.9	62,475.48	0	0	46.9	62,475.48	0	0
7	51.8	133,210	0	0	51.8	133,210	0	0
8	56.4	133,210	0	0	56.4	133,210	0	0
9	60.8	133,210	0	0	60.8	133,210	0	0
10	64.8	133,210	0	0	64.8	133,210	0	0
11	68.4	133,210	0	0	68.4	133,210	0	0
12	71.4	133,210	0	0	71.4	133,210	0	0
13	73.7	133,210	0	0	73.7	133,210	0	0
14	75.4	133,210	0	0	75.4	133,210	0	0
15	76.4	133,210	0	0	76.4	133,210	0	0
16	76.4	133,210	0	0	76.4	133,210	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Utilities Elevated:	**No**
Expected Annual Losses due to Content Damages before Mitigation:	$1,399
Expected Annual Losses due to Content Damages after Mitigation:	$1,121
Expected Annual Benefits - Content:	$278

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	8.4	11,189.64	8.4	11,189.64
-1	10.1	13,454.21	10.1	13,454.21
0	11.9	15,851.99	11.9	15,851.99
1	13.8	18,382.98	13.8	18,382.98
2	15.7	20,913.97	15.7	20,913.97
3	17.7	23,578.17	17.7	23,578.17
4	19.8	26,375.58	19.8	26,375.58
5	22	29,306.2	22	29,306.2
6	24.3	32,370.03	24.3	32,370.03
7	26.7	35,567.07	26.7	35,567.07
8	29.1	38,764.11	29.1	38,764.11
9	31.7	42,227.57	31.7	42,227.57
10	34.4	45,824.24	34.4	45,824.24
11	37.2	49,554.12	37.2	49,554.12
12	40	53,284	40	53,284
13	43	57,280.3	43	57,280.3
14	46.1	61,409.81	46.1	61,409.81
15	49.3	65,672.53	49.3	65,672.53
16	52.6	70,068.46	52.6	70,068.46

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040

Lodging Per Diem:	$107	Use Default:Yes
Meals Per Diem:	$59	Use Default:Yes
Population Affected:	2	
Duration of Displacement (days):	365	Use Default:Yes
Total Residential Displacement Cost:	$205	
Expected Annual Losses due to Displacement Damages before mitigation:	$485	
Expected Annual Losses due to Displacement Damages after Mitigation:	$324	
Expected Annual Losses - Displacement:	$160	

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	9,225	45	9,225
2	90	18,450	90	18,450
3	135	27,675	135	27,675
4	180	36,900	180	36,900
5	225	46,125	225	46,125
6	270	55,350	270	55,350
7	315	64,575	315	64,575
8	360	73,800	360	73,800
9	405	83,025	405	83,025
10	450	92,250	450	92,250
11	495	101,475	495	101,475
12	540	110,700	540	110,700
13	585	119,925	585	119,925
14	630	129,150	630	129,150
15	675	138,375	675	138,375
16	720	147,600	720	147,600

Additional Benefits - Street Maintenance

Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040

Total Annual Street Maintenance Budget:	$0
Total Number of Street Miles Maintained:	0
Street Miles that will not require future maintenance:	0
Expected Annual Benefits - Street Maintenance:	$0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Additional Benefits - Social

Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040

Number of Workers:	1
Expected Annual Social Benefits:	$13,622

Benefits-Costs Summary

Floodplain and Stream Restoration @ 414 3rd Ave SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$17,178
Total Social Benefits:	$13,622
Total Mitigation Project Benefits:	$30,800
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48291298862682, -91.1289829719481
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	937.26
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.68	932.22	5590	6507
10	933.16	934.18	8140	9475
25	935.07	936.2	12000	13968
100	937.54	938.02	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.56	932.1	5590	6507
10	932.96	933.8	8140	9475
25	934.71	935.56	12000	13968
100	936.61	937.14	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-10.21	1.11	$ 0	$ 0	$ 0	$ 0
-7.33	2	$ 0	$ 0	$ 0	$ 0
-4.92	4.79	$ 0	$ 0	$ 0	$ 0
-3.75	8	$ 0	$ 0	$ 0	$ 0
-3.21	10.33	$ 0	$ 0	$ 0	$ 0
-2	18.56	$ 60	$ 49	$ 0	$ 0
-1.83	20	$ 254	$ 196	$ 0	$ 0
-1.17	28.12	$ 44	$ 32	$ 0	$ 0
-1.03	30	$ 182	$ 129	$ 0	$ 0
-0.49	40	$ 141	$ 95	$ 0	$ 0
0	51.68	$ 73	$ 48	$ 0	$ 0
0.28	60	$ 69	$ 45	$ 9	$ 0
0.57	70	$ 55	$ 35	$ 11	$ 0
0.83	80	$ 17	$ 10	$ 4	$ 0
0.9	83.48	$ 28	$ 18	$ 8	$ 0
1.05	90	$ 232	$ 137	$ 92	$ 0
2.52	200	$ 77	$ 43	$ 44	$ 0
3.25	300	$ 42	$ 23	$ 27	$ 0
3.79	400	$ 368	$ 368	$ 187	$ 0
Total ($)		$ 1,644	$ 1,229	$ 382	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.88	1.11	$ 0	$ 0	$ 0	$ 0
-7.22	2	$ 0	$ 0	$ 0	$ 0
-5.06	4.79	$ 0	$ 0	$ 0	$ 0
-4.04	8	$ 0	$ 0	$ 0	$ 0
-3.54	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 1,230	$ 968	$ 251	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2.37	20	$ 0	$ 0	$ 0	$ 0
-2	24.86	$ 73	$ 59	$ 0	$ 0
-1.79	28.12	$ 37	$ 29	$ 0	$ 0
-1.68	30	$ 150	$ 115	$ 0	$ 0
-1.2	40	$ 177	$ 127	$ 0	$ 0
-0.52	60	$ 57	$ 39	$ 0	$ 0
-0.29	70	$ 45	$ 30	$ 0	$ 0
-0.06	80	$ 14	$ 9	$ 0	$ 0
0.01	83.48	$ 2	$ 1	$ 0	$ 0
0	83.94	$ 21	$ 14	$ 0	$ 0
0.11	90	$ 189	$ 119	$ 22	$ 0
1.36	200	$ 62	$ 37	$ 25	$ 0
1.99	300	$ 34	$ 20	$ 17	$ 0
2.43	400	$ 368	$ 368	$ 187	$ 0
Total ($)		$ 1,230	$ 968	$ 251	$ 0

Building Information

Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040

Building Type:	Two or More Stories
Foundation Type:	
Building Has Basement:	**Yes**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040

Depth Damage Curve:	USACE Generic Use Default:Yes
Building Size (sq.ft):	1,340
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$1,644
Expected Annual Losses due to Building Damages after Mitigation:	$1,230
Expected Annual Benefits - Building:	$414

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	10.2	15,034.8	0	0	10.2	15,034.8	0	0
-1	13.9	20,488.60	0	0	13.9	20,488.60	0	0
0	17.9	26,384.6	0	0	17.9	26,384.6	0	0
1	22.3	32,870.20	0	0	22.3	32,870.20	0	0
2	27	39,798	0	0	27	39,798	0	0
3	31.9	47,020.6	0	0	31.9	47,020.6	0	0
4	36.9	54,390.6	0	0	36.9	54,390.6	0	0
5	41.9	61,760.6	0	0	41.9	61,760.6	0	0
6	46.9	69,130.59	0	0	46.9	69,130.59	0	0
7	51.8	147,400	0	0	51.8	147,400	0	0
8	56.4	147,400	0	0	56.4	147,400	0	0
9	60.8	147,400	0	0	60.8	147,400	0	0
10	64.8	147,400	0	0	64.8	147,400	0	0
11	68.4	147,400	0	0	68.4	147,400	0	0
12	71.4	147,400	0	0	71.4	147,400	0	0
13	73.7	147,400	0	0	73.7	147,400	0	0
14	75.4	147,400	0	0	75.4	147,400	0	0
15	76.4	147,400	0	0	76.4	147,400	0	0
16	76.4	147,400	0	0	76.4	147,400	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Utilities Elevated:	**No**
Expected Annual Losses due to Content Damages before Mitigation:	$1,229
Expected Annual Losses due to Content Damages after Mitigation:	$968
Expected Annual Benefits - Content:	$261

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	8.4	12,381.6	8.4	12,381.6
-1	10.1	14,887.4	10.1	14,887.4
0	11.9	17,540.6	11.9	17,540.6
1	13.8	20,341.2	13.8	20,341.2
2	15.7	23,141.8	15.7	23,141.8
3	17.7	26,089.8	17.7	26,089.8
4	19.8	29,185.2	19.8	29,185.2
5	22	32,428	22	32,428
6	24.3	35,818.2	24.3	35,818.2
7	26.7	39,355.8	26.7	39,355.8
8	29.1	42,893.4	29.1	42,893.4
9	31.7	46,725.8	31.7	46,725.8
10	34.4	50,705.6	34.4	50,705.6
11	37.2	54,832.8	37.2	54,832.8
12	40	58,960	40	58,960
13	43	63,382	43	63,382
14	46.1	67,951.4	46.1	67,951.4
15	49.3	72,668.2	49.3	72,668.2
16	52.6	77,532.4	52.6	77,532.4

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040

Lodging Per Diem:	$107 Use Default:Yes
Meals Per Diem:	$59 Use Default:Yes
Population Affected:	2
Duration of Displacement (days):	365 Use Default:Yes
Total Residential Displacement Cost:	$205
Expected Annual Losses due to Displacement Damages before mitigation:	$382
Expected Annual Losses due to Displacement Damages after Mitigation:	$251
Expected Annual Losses - Displacement:	$131

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	9,225	45	9,225
2	90	18,450	90	18,450
3	135	27,675	135	27,675
4	180	36,900	180	36,900
5	225	46,125	225	46,125
6	270	55,350	270	55,350
7	315	64,575	315	64,575
8	360	73,800	360	73,800
9	405	83,025	405	83,025
10	450	92,250	450	92,250
11	495	101,475	495	101,475
12	540	110,700	540	110,700
13	585	119,925	585	119,925
14	630	129,150	630	129,150
15	675	138,375	675	138,375
16	720	147,600	720	147,600

Additional Benefits - Street Maintenance

Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040

Total Annual Street Maintenance Budget:	$0
Total Number of Street Miles Maintained:	0
Street Miles that will not require future maintenance:	0
Expected Annual Benefits - Street Maintenance:	$0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Additional Benefits - Social

Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040

Number of Workers:	1
Expected Annual Social Benefits:	$13,622

Benefits-Costs Summary

Floodplain and Stream Restoration @ 410 3rd Ave SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$15,592
Total Social Benefits:	$13,622
Total Mitigation Project Benefits:	$29,214
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.483385015504155, -91.13118900504485
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	937
Use Default Recurrence Intervals:	Use Defau *No*
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.73	932.26	5590	6507
10	933.18	934.15	8140	9475
25	935.01	936.11	12000	13968
100	937.4	937.87	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.62	932.15	5590	6507
10	932.99	933.78	8140	9475
25	934.66	935.47	12000	13968
100	936.47	936.98	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.82	1.11	$ 0	$ 0	$ 0	$ 0
-6.99	2	$ 0	$ 0	$ 0	$ 0
-4.64	4.79	$ 0	$ 0	$ 0	$ 0
-3.49	8	$ 0	$ 0	$ 0	$ 0
-2.95	10.33	$ 0	$ 0	$ 0	$ 0
-2	16.73	$ 155	$ 124	$ 0	$ 0
-1.65	20	$ 267	$ 202	$ 0	$ 0
-0.98	28.12	$ 46	$ 33	$ 0	$ 0
-0.86	30	$ 188	$ 132	$ 0	$ 0
-0.32	40	$ 106	$ 71	$ 0	$ 0
0	48.05	$ 114	$ 75	$ 0	$ 0
0.41	60	$ 71	$ 45	$ 12	$ 0
0.69	70	$ 56	$ 35	$ 13	$ 0
0.93	80	$ 17	$ 10	$ 5	$ 0
1.01	83.48	$ 29	$ 18	$ 9	$ 0
1.14	90	$ 234	$ 138	$ 96	$ 0
2.56	200	$ 77	$ 43	$ 45	$ 0
3.27	300	$ 42	$ 23	$ 27	$ 0
3.78	400	$ 366	$ 366	$ 187	$ 0
Total ($)		$ 1,769	$ 1,315	$ 393	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.44	1.11	$ 0	$ 0	$ 0	$ 0
-6.86	2	$ 0	$ 0	$ 0	$ 0
-4.77	4.79	$ 0	$ 0	$ 0	$ 0
-3.76	8	$ 0	$ 0	$ 0	$ 0
-3.31	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 1,322	$ 1,034	$ 260	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2.16	20	$ 0	$ 0	$ 0	$ 0
-2	22.23	$ 150	$ 120	$ 0	$ 0
-1.6	28.12	$ 38	$ 30	$ 0	$ 0
-1.51	30	$ 157	$ 117	$ 0	$ 0
-1.05	40	$ 182	$ 129	$ 0	$ 0
-0.42	60	$ 58	$ 40	$ 0	$ 0
-0.18	70	$ 42	$ 28	$ 0	$ 0
0	78.97	$ 4	$ 3	$ 0	$ 0
0.02	80	$ 14	$ 9	$ 0	$ 0
0.08	83.48	$ 24	$ 15	$ 1	$ 0
0.2	90	$ 191	$ 120	$ 30	$ 0
1.39	200	$ 62	$ 37	$ 26	$ 0
1.98	300	$ 34	$ 20	$ 17	$ 0
2.4	400	$ 366	$ 366	$ 187	$ 0
Total ($)		$ 1,322	$ 1,034	$ 260	$ 0

Building Information

Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040

Building Type:	Two or More Stories
Foundation Type:	
Building Has Basement:	**Yes**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040

Depth Damage Curve:	USACE Generic Use Default:Yes
Building Size (sq.ft):	1,332
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$1,769
Expected Annual Losses due to Building Damages after Mitigation:	$1,322
Expected Annual Benefits - Building:	$446

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	10.2	14,945.03	0	0	10.2	14,945.03	0	0
-1	13.9	20,366.28	0	0	13.9	20,366.28	0	0
0	17.9	26,227.07	0	0	17.9	26,227.07	0	0
1	22.3	32,673.96	0	0	22.3	32,673.96	0	0
2	27	39,560.4	0	0	27	39,560.4	0	0
3	31.9	46,739.88	0	0	31.9	46,739.88	0	0
4	36.9	54,065.88	0	0	36.9	54,065.88	0	0
5	41.9	61,391.88	0	0	41.9	61,391.88	0	0
6	46.9	68,717.88	0	0	46.9	68,717.88	0	0
7	51.8	146,520	0	0	51.8	146,520	0	0
8	56.4	146,520	0	0	56.4	146,520	0	0
9	60.8	146,520	0	0	60.8	146,520	0	0
10	64.8	146,520	0	0	64.8	146,520	0	0
11	68.4	146,520	0	0	68.4	146,520	0	0
12	71.4	146,520	0	0	71.4	146,520	0	0
13	73.7	146,520	0	0	73.7	146,520	0	0
14	75.4	146,520	0	0	75.4	146,520	0	0
15	76.4	146,520	0	0	76.4	146,520	0	0
16	76.4	146,520	0	0	76.4	146,520	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Utilities Elevated:	**No**
Expected Annual Losses due to Content Damages before Mitigation:	$1,315
Expected Annual Losses due to Content Damages after Mitigation:	$1,034
Expected Annual Benefits - Content:	$281

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	8.4	12,307.68	8.4	12,307.68
-1	10.1	14,798.52	10.1	14,798.52
0	11.9	17,435.88	11.9	17,435.88
1	13.8	20,219.76	13.8	20,219.76
2	15.7	23,003.64	15.7	23,003.64
3	17.7	25,934.04	17.7	25,934.04
4	19.8	29,010.96	19.8	29,010.96
5	22	32,234.4	22	32,234.4
6	24.3	35,604.36	24.3	35,604.36
7	26.7	39,120.84	26.7	39,120.84
8	29.1	42,637.32	29.1	42,637.32
9	31.7	46,446.84	31.7	46,446.84
10	34.4	50,402.88	34.4	50,402.88
11	37.2	54,505.44	37.2	54,505.44
12	40	58,608	40	58,608
13	43	63,003.6	43	63,003.6
14	46.1	67,545.72	46.1	67,545.72
15	49.3	72,234.36	49.3	72,234.36
16	52.6	77,069.52	52.6	77,069.52

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040

Lodging Per Diem:	$107 Use Default:Yes
Meals Per Diem:	$59 Use Default:Yes
Population Affected:	2
Duration of Displacement (days):	365 Use Default:Yes
Total Residential Displacement Cost:	$205
Expected Annual Losses due to Displacement Damages before mitigation:	$393
Expected Annual Losses due to Displacement Damages after Mitigation:	$260
Expected Annual Losses - Displacement:	$133

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	9,225	45	9,225
2	90	18,450	90	18,450
3	135	27,675	135	27,675
4	180	36,900	180	36,900
5	225	46,125	225	46,125
6	270	55,350	270	55,350
7	315	64,575	315	64,575
8	360	73,800	360	73,800
9	405	83,025	405	83,025
10	450	92,250	450	92,250
11	495	101,475	495	101,475
12	540	110,700	540	110,700
13	585	119,925	585	119,925
14	630	129,150	630	129,150
15	675	138,375	675	138,375
16	720	147,600	720	147,600

Additional Benefits - Street Maintenance

Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040

Total Annual Street Maintenance Budget:	$0
Total Number of Street Miles Maintained:	0
Street Miles that will not require future maintenance:	0
Expected Annual Benefits - Street Maintenance:	$0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Additional Benefits - Social

Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040

Number of Workers:	1
Expected Annual Social Benefits:	$13,622

Benefits-Costs Summary

Floodplain and Stream Restoration @ 527 2nd Ave SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$16,653
Total Social Benefits:	$13,622
Total Mitigation Project Benefits:	$30,275
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.483368000240716, -91.1295650113046
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	936.58
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.72	932.25	5590	6507
10	933.18	934.15	8140	9475
25	935.02	936.11	12000	13968
100	937.39	937.87	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.63	932.16	5590	6507
10	933.01	933.79	8140	9475
25	934.66	935.47	12000	13968
100	936.47	936.98	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.41	1.11	$ 0	$ 0	$ 0	$ 0
-6.58	2	$ 0	$ 0	$ 0	$ 0
-4.23	4.79	$ 0	$ 0	$ 0	$ 0
-3.09	8	$ 0	$ 0	$ 0	$ 0
-2.55	10.33	$ 0	$ 0	$ 0	$ 0
-2	13.56	$ 511	$ 400	$ 0	$ 0
-1.23	20	$ 385	$ 277	$ 0	$ 0
-0.58	28.12	$ 66	$ 46	$ 0	$ 0
-0.44	30	$ 229	$ 155	$ 0	$ 0
0	38.3	$ 38	$ 25	$ 0	$ 0
0.08	40	$ 309	$ 198	$ 20	$ 0
0.83	60	$ 99	$ 61	$ 21	$ 0
1.11	70	$ 78	$ 48	$ 20	$ 0
1.35	80	$ 23	$ 14	$ 7	$ 0
1.43	83.48	$ 40	$ 24	$ 12	$ 0
1.56	90	$ 322	$ 185	$ 122	$ 0
2.99	200	$ 105	$ 57	$ 51	$ 0
3.7	300	$ 57	$ 31	$ 30	$ 0
4.21	400	$ 467	$ 467	$ 187	$ 0
Total ($)		$ 2,728	$ 1,988	$ 470	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9	1.11	$ 0	$ 0	$ 0	$ 0
-6.41	2	$ 0	$ 0	$ 0	$ 0
-4.34	4.79	$ 0	$ 0	$ 0	$ 0
-3.33	8	$ 0	$ 0	$ 0	$ 0
-2.88	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 2,089	$ 1,593	$ 310	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2	17.23	$ 160	$ 130	$ 0	$ 0
-1.75	20	$ 327	$ 251	$ 0	$ 0
-1.19	28.12	$ 56	$ 41	$ 0	$ 0
-1.07	30	$ 225	$ 161	$ 0	$ 0
-0.63	40	$ 258	$ 176	$ 0	$ 0
0	60	$ 0	$ 0	$ 0	$ 0
0	60.05	$ 81	$ 54	$ 0	$ 0
0.24	70	$ 65	$ 42	$ 5	$ 0
0.44	80	$ 19	$ 12	$ 2	$ 0
0.5	83.48	$ 33	$ 21	$ 4	$ 0
0.62	90	$ 265	$ 162	$ 59	$ 0
1.81	200	$ 86	$ 50	$ 32	$ 0
2.4	300	$ 47	$ 26	$ 20	$ 0
2.81	400	$ 467	$ 467	$ 187	$ 0
Total ($)		$ 2,089	$ 1,593	$ 310	$ 0

Building Information

Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040

Building Type:	Two or More Stories
Foundation Type:	
Building Has Basement:	**Yes**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040

Depth Damage Curve:	USACE Generic Use Default:Yes
Building Size (sq.ft):	1,699
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$2,728
Expected Annual Losses due to Building Damages after Mitigation:	$2,089
Expected Annual Benefits - Building:	$639

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	10.2	19,062.78	0	0	10.2	19,062.78	0	0
-1	13.9	25,977.71	0	0	13.9	25,977.71	0	0
0	17.9	33,453.31	0	0	17.9	33,453.31	0	0
1	22.3	41,676.47	0	0	22.3	41,676.47	0	0
2	27	50,460.3	0	0	27	50,460.3	0	0
3	31.9	59,617.91	0	0	31.9	59,617.91	0	0
4	36.9	68,962.41	0	0	36.9	68,962.41	0	0
5	41.9	78,306.91	0	0	41.9	78,306.91	0	0
6	46.9	87,651.41	0	0	46.9	87,651.41	0	0
7	51.8	186,890	0	0	51.8	186,890	0	0
8	56.4	186,890	0	0	56.4	186,890	0	0
9	60.8	186,890	0	0	60.8	186,890	0	0
10	64.8	186,890	0	0	64.8	186,890	0	0
11	68.4	186,890	0	0	68.4	186,890	0	0
12	71.4	186,890	0	0	71.4	186,890	0	0
13	73.7	186,890	0	0	73.7	186,890	0	0
14	75.4	186,890	0	0	75.4	186,890	0	0
15	76.4	186,890	0	0	76.4	186,890	0	0
16	76.4	186,890	0	0	76.4	186,890	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Utilities Elevated:	**No**
Expected Annual Losses due to Content Damages before Mitigation:	$1,988
Expected Annual Losses due to Content Damages after Mitigation:	$1,593
Expected Annual Benefits - Content:	$396

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	8.4	15,698.76	8.4	15,698.76
-1	10.1	18,875.89	10.1	18,875.89
0	11.9	22,239.91	11.9	22,239.91
1	13.8	25,790.82	13.8	25,790.82
2	15.7	29,341.73	15.7	29,341.73
3	17.7	33,079.53	17.7	33,079.53
4	19.8	37,004.22	19.8	37,004.22
5	22	41,115.8	22	41,115.8
6	24.3	45,414.27	24.3	45,414.27
7	26.7	49,899.63	26.7	49,899.63
8	29.1	54,384.99	29.1	54,384.99
9	31.7	59,244.13	31.7	59,244.13
10	34.4	64,290.16	34.4	64,290.16
11	37.2	69,523.08	37.2	69,523.08
12	40	74,756.00	40	74,756.00
13	43	80,362.70	43	80,362.70
14	46.1	86,156.29	46.1	86,156.29
15	49.3	92,136.77	49.3	92,136.77
16	52.6	98,304.14	52.6	98,304.14

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040

Lodging Per Diem:	$107 Use Default:Yes
Meals Per Diem:	$59 Use Default:Yes
Population Affected:	2
Duration of Displacement (days):	365 Use Default:Yes
Total Residential Displacement Cost:	$205
Expected Annual Losses due to Displacement Damages before mitigation:	$470
Expected Annual Losses due to Displacement Damages after Mitigation:	$310
Expected Annual Losses - Displacement:	$160

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	9,225	45	9,225
2	90	18,450	90	18,450
3	135	27,675	135	27,675
4	180	36,900	180	36,900
5	225	46,125	225	46,125
6	270	55,350	270	55,350
7	315	64,575	315	64,575
8	360	73,800	360	73,800
9	405	83,025	405	83,025
10	450	92,250	450	92,250
11	495	101,475	495	101,475
12	540	110,700	540	110,700
13	585	119,925	585	119,925
14	630	129,150	630	129,150
15	675	138,375	675	138,375
16	720	147,600	720	147,600

Additional Benefits - Street Maintenance

Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040

Total Annual Street Maintenance Budget:	$0
Total Number of Street Miles Maintained:	0
Street Miles that will not require future maintenance:	0
Expected Annual Benefits - Street Maintenance:	$0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Additional Benefits - Social

Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040

Number of Workers:	1
Expected Annual Social Benefits:	$13,622

Benefits-Costs Summary

Floodplain and Stream Restoration @ 421 2nd Ave SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$23,108
Total Social Benefits:	$13,622
Total Mitigation Project Benefits:	$36,730
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.483428014667425, -91.12935202714492
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	936.72
Use Default Recurrence Intervals:	Use Defau *No*
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.76	932.3	5590	6507
10	933.23	934.18	8140	9475
25	935.05	936.13	12000	13968
100	937.4	937.88	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.66	932.2	5590	6507
10	933.06	933.82	8140	9475
25	934.7	935.5	12000	13968
100	936.49	937.01	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.47	1.11	$ 0	$ 0	$ 0	$ 0
-6.66	2	$ 0	$ 0	$ 0	$ 0
-4.31	4.79	$ 0	$ 0	$ 0	$ 0
-3.19	8	$ 0	$ 0	$ 0	$ 0
-2.64	10.33	$ 0	$ 0	$ 0	$ 0
-2	14.32	$ 367	$ 289	$ 0	$ 0
-1.33	20	$ 325	$ 237	$ 0	$ 0
-0.68	28.12	$ 56	$ 39	$ 0	$ 0
-0.55	30	$ 226	$ 154	$ 0	$ 0
-0.04	40	$ 16	$ 11	$ 0	$ 0
0	40.92	$ 246	$ 159	$ 0	$ 0
0.7	60	$ 84	$ 52	$ 18	$ 0
0.98	70	$ 66	$ 41	$ 18	$ 0
1.22	80	$ 20	$ 12	$ 6	$ 0
1.29	83.48	$ 34	$ 21	$ 11	$ 0
1.43	90	$ 274	$ 159	$ 114	$ 0
2.84	200	$ 89	$ 49	$ 49	$ 0
3.55	300	$ 49	$ 26	$ 29	$ 0
4.05	400	$ 408	$ 408	$ 187	$ 0
Total ($)		$ 2,260	$ 1,657	$ 432	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.1	1.11	$ 0	$ 0	$ 0	$ 0
-6.5	2	$ 0	$ 0	$ 0	$ 0
-4.43	4.79	$ 0	$ 0	$ 0	$ 0
-3.45	8	$ 0	$ 0	$ 0	$ 0
-2.99	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 1,725	$ 1,323	$ 297	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2	18.37	$ 76	$ 62	$ 0	$ 0
-1.84	20	$ 276	$ 214	$ 0	$ 0
-1.3	28.12	$ 47	$ 35	$ 0	$ 0
-1.18	30	$ 191	$ 138	$ 0	$ 0
-0.74	40	$ 219	$ 151	$ 0	$ 0
-0.11	60	$ 34	$ 23	$ 0	$ 0
0	64.58	$ 36	$ 23	$ 0	$ 0
0.12	70	$ 55	$ 36	$ 3	$ 0
0.33	80	$ 17	$ 11	$ 2	$ 0
0.39	83.48	$ 28	$ 18	$ 4	$ 0
0.5	90	$ 226	$ 139	$ 52	$ 0
1.69	200	$ 73	$ 43	$ 30	$ 0
2.28	300	$ 40	$ 23	$ 19	$ 0
2.69	400	$ 408	$ 408	$ 187	$ 0
Total ($)		$ 1,725	$ 1,323	$ 297	$ 0

Building Information

Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040

Building Type:	Two or More Stories
Foundation Type:	
Building Has Basement:	**Yes**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040

Depth Damage Curve:	USACE Generic Use Default:Yes
Building Size (sq.ft):	1,483
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$2,260
Expected Annual Losses due to Building Damages after Mitigation:	$1,725
Expected Annual Benefits - Building:	$535

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	10.2	16,639.26	0	0	10.2	16,639.26	0	0
-1	13.9	22,675.07	0	0	13.9	22,675.07	0	0
0	17.9	29,200.26	0	0	17.9	29,200.26	0	0
1	22.3	36,377.99	0	0	22.3	36,377.99	0	0
2	27	44,045.1	0	0	27	44,045.1	0	0
3	31.9	52,038.46	0	0	31.9	52,038.46	0	0
4	36.9	60,194.96	0	0	36.9	60,194.96	0	0
5	41.9	68,351.47	0	0	41.9	68,351.47	0	0
6	46.9	76,507.97	0	0	46.9	76,507.97	0	0
7	51.8	163,130	0	0	51.8	163,130	0	0
8	56.4	163,130	0	0	56.4	163,130	0	0
9	60.8	163,130	0	0	60.8	163,130	0	0
10	64.8	163,130	0	0	64.8	163,130	0	0
11	68.4	163,130	0	0	68.4	163,130	0	0
12	71.4	163,130	0	0	71.4	163,130	0	0
13	73.7	163,130	0	0	73.7	163,130	0	0
14	75.4	163,130	0	0	75.4	163,130	0	0
15	76.4	163,130	0	0	76.4	163,130	0	0
16	76.4	163,130	0	0	76.4	163,130	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Utilities Elevated:	**No**
Expected Annual Losses due to Content Damages before Mitigation:	$1,657
Expected Annual Losses due to Content Damages after Mitigation:	$1,323
Expected Annual Benefits - Content:	$334

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	8.4	13,702.92	8.4	13,702.92
-1	10.1	16,476.13	10.1	16,476.13
0	11.9	19,412.47	11.9	19,412.47
1	13.8	22,511.94	13.8	22,511.94
2	15.7	25,611.41	15.7	25,611.41
3	17.7	28,874.01	17.7	28,874.01
4	19.8	32,299.74	19.8	32,299.74
5	22	35,888.6	22	35,888.6
6	24.3	39,640.59	24.3	39,640.59
7	26.7	43,555.71	26.7	43,555.71
8	29.1	47,470.83	29.1	47,470.83
9	31.7	51,712.21	31.7	51,712.21
10	34.4	56,116.72	34.4	56,116.72
11	37.2	60,684.36	37.2	60,684.36
12	40	65,252	40	65,252
13	43	70,145.9	43	70,145.9
14	46.1	75,202.93	46.1	75,202.93
15	49.3	80,423.09	49.3	80,423.09
16	52.6	85,806.38	52.6	85,806.38

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040

Lodging Per Diem:	$107 Use Default:Yes
Meals Per Diem:	$59 Use Default:Yes
Population Affected:	2
Duration of Displacement (days):	365 Use Default:Yes
Total Residential Displacement Cost:	$205
Expected Annual Losses due to Displacement Damages before mitigation:	$432
Expected Annual Losses due to Displacement Damages after Mitigation:	$297
Expected Annual Losses - Displacement:	$135

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	9,225	45	9,225
2	90	18,450	90	18,450
3	135	27,675	135	27,675
4	180	36,900	180	36,900
5	225	46,125	225	46,125
6	270	55,350	270	55,350
7	315	64,575	315	64,575
8	360	73,800	360	73,800
9	405	83,025	405	83,025
10	450	92,250	450	92,250
11	495	101,475	495	101,475
12	540	110,700	540	110,700
13	585	119,925	585	119,925
14	630	129,150	630	129,150
15	675	138,375	675	138,375
16	720	147,600	720	147,600

Additional Benefits - Street Maintenance

Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040

Total Annual Street Maintenance Budget:	$0
Total Number of Street Miles Maintained:	0
Street Miles that will not require future maintenance:	0
Expected Annual Benefits - Street Maintenance:	$0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Additional Benefits - Social

Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040

Number of Workers:	1
Expected Annual Social Benefits:	$13,622

Benefits-Costs Summary

Floodplain and Stream Restoration @ 417 2nd Ave SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$19,421
Total Social Benefits:	$13,622
Total Mitigation Project Benefits:	$33,043
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48388000879618, -91.12480903562383
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	936.93
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.97	932.53	5590	6507
10	933.48	934.38	8140	9475
25	935.27	936.29	12000	13968
100	937.49	938	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	931.86	932.44	5590	6507
10	933.33	934.06	8140	9475
25	934.97	935.73	12000	13968
100	936.67	937.23	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.41	1.11	$ 0	$ 0	$ 0	$ 0
-6.6	2	$ 0	$ 0	$ 0	$ 0
-4.29	4.79	$ 0	$ 0	$ 0	$ 0
-3.19	8	$ 0	$ 0	$ 0	$ 0
-2.65	10.33	$ 0	$ 0	$ 0	$ 0
-2	14.47	$ 321	$ 253	$ 0	$ 0
-1.38	20	$ 293	$ 215	$ 0	$ 0
-0.73	28.12	$ 50	$ 35	$ 0	$ 0
-0.61	30	$ 203	$ 139	$ 0	$ 0
-0.1	40	$ 37	$ 25	$ 0	$ 0
0	42.37	$ 198	$ 129	$ 0	$ 0
0.62	60	$ 75	$ 47	$ 16	$ 0
0.89	70	$ 59	$ 37	$ 17	$ 0
1.13	80	$ 18	$ 11	$ 6	$ 0
1.2	83.48	$ 30	$ 18	$ 10	$ 0
1.33	90	$ 245	$ 143	$ 107	$ 0
2.71	200	$ 80	$ 44	$ 47	$ 0
3.4	300	$ 43	$ 24	$ 28	$ 0
3.88	400	$ 372	$ 372	$ 187	$ 0
Total ($)		$ 2,025	$ 1,491	$ 417	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.09	1.11	$ 0	$ 0	$ 0	$ 0
-6.48	2	$ 0	$ 0	$ 0	$ 0
-4.4	4.79	$ 0	$ 0	$ 0	$ 0
-3.42	8	$ 0	$ 0	$ 0	$ 0
-2.96	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 1,589	$ 1,219	$ 298	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2	18.1	$ 82	$ 67	$ 0	$ 0
-1.82	20	$ 253	$ 196	$ 0	$ 0
-1.28	28.12	$ 43	$ 32	$ 0	$ 0
-1.16	30	$ 175	$ 126	$ 0	$ 0
-0.72	40	$ 201	$ 138	$ 0	$ 0
-0.08	60	$ 28	$ 18	$ 0	$ 0
0	64.04	$ 36	$ 24	$ 0	$ 0
0.14	70	$ 50	$ 33	$ 4	$ 0
0.34	80	$ 15	$ 10	$ 2	$ 0
0.4	83.48	$ 26	$ 16	$ 4	$ 0
0.51	90	$ 206	$ 127	$ 52	$ 0
1.69	200	$ 67	$ 39	$ 30	$ 0
2.28	300	$ 36	$ 21	$ 19	$ 0
2.69	400	$ 372	$ 372	$ 187	$ 0
Total ($)		$ 1,589	$ 1,219	$ 298	$ 0

Building Information

Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040

Building Type:	Two or More Stories
Foundation Type:	
Building Has Basement:	**Yes**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040

Depth Damage Curve:	USACE Generic Use Default:Yes
Building Size (sq.ft):	1,352
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$2,025
Expected Annual Losses due to Building Damages after Mitigation:	$1,589
Expected Annual Benefits - Building:	$435

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	10.2	15,169.43	0	0	10.2	15,169.43	0	0
-1	13.9	20,672.08	0	0	13.9	20,672.08	0	0
0	17.9	26,620.87	0	0	17.9	26,620.87	0	0
1	22.3	33,164.56	0	0	22.3	33,164.56	0	0
2	27	40,154.4	0	0	27	40,154.4	0	0
3	31.9	47,441.68	0	0	31.9	47,441.68	0	0
4	36.9	54,877.68	0	0	36.9	54,877.68	0	0
5	41.9	62,313.68	0	0	41.9	62,313.68	0	0
6	46.9	69,749.68	0	0	46.9	69,749.68	0	0
7	51.8	148,720	0	0	51.8	148,720	0	0
8	56.4	148,720	0	0	56.4	148,720	0	0
9	60.8	148,720	0	0	60.8	148,720	0	0
10	64.8	148,720	0	0	64.8	148,720	0	0
11	68.4	148,720	0	0	68.4	148,720	0	0
12	71.4	148,720	0	0	71.4	148,720	0	0
13	73.7	148,720	0	0	73.7	148,720	0	0
14	75.4	148,720	0	0	75.4	148,720	0	0
15	76.4	148,720	0	0	76.4	148,720	0	0
16	76.4	148,720	0	0	76.4	148,720	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Utilities Elevated:	**No**
Expected Annual Losses due to Content Damages before Mitigation:	$1,491
Expected Annual Losses due to Content Damages after Mitigation:	$1,219
Expected Annual Benefits - Content:	$272

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	8.4	12,492.48	8.4	12,492.48
-1	10.1	15,020.72	10.1	15,020.72
0	11.9	17,697.68	11.9	17,697.68
1	13.8	20,523.36	13.8	20,523.36
2	15.7	23,349.04	15.7	23,349.04
3	17.7	26,323.44	17.7	26,323.44
4	19.8	29,446.56	19.8	29,446.56
5	22	32,718.4	22	32,718.4
6	24.3	36,138.96	24.3	36,138.96
7	26.7	39,708.24	26.7	39,708.24
8	29.1	43,277.52	29.1	43,277.52
9	31.7	47,144.24	31.7	47,144.24
10	34.4	51,159.68	34.4	51,159.68
11	37.2	55,323.84	37.2	55,323.84
12	40	59,488	40	59,488
13	43	63,949.6	43	63,949.6
14	46.1	68,559.92	46.1	68,559.92
15	49.3	73,318.96	49.3	73,318.96
16	52.6	78,226.72	52.6	78,226.72

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040

Lodging Per Diem:	$107 Use Default:Yes
Meals Per Diem:	$59 Use Default:Yes
Population Affected:	2
Duration of Displacement (days):	365 Use Default:Yes
Total Residential Displacement Cost:	$205
Expected Annual Losses due to Displacement Damages before mitigation:	$417
Expected Annual Losses due to Displacement Damages after Mitigation:	$298
Expected Annual Losses - Displacement:	$120

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	9,225	45	9,225
2	90	18,450	90	18,450
3	135	27,675	135	27,675
4	180	36,900	180	36,900
5	225	46,125	225	46,125
6	270	55,350	270	55,350
7	315	64,575	315	64,575
8	360	73,800	360	73,800
9	405	83,025	405	83,025
10	450	92,250	450	92,250
11	495	101,475	495	101,475
12	540	110,700	540	110,700
13	585	119,925	585	119,925
14	630	129,150	630	129,150
15	675	138,375	675	138,375
16	720	147,600	720	147,600

Additional Benefits - Street Maintenance

Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040

Total Annual Street Maintenance Budget:	$0
Total Number of Street Miles Maintained:	0
Street Miles that will not require future maintenance:	0
Expected Annual Benefits - Street Maintenance:	$0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Additional Benefits - Social

Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040

Number of Workers:	1
Expected Annual Social Benefits:	$13,622

Benefits-Costs Summary

Floodplain and Stream Restoration @ 112 2nd Ave SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$16,009
Total Social Benefits:	$13,622
Total Mitigation Project Benefits:	$29,631
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48425300348748, -91.12414401542588
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	937.64
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	932.16	932.77	5590	6507
10	933.77	934.62	8140	9475
25	935.57	936.54	12000	13968
100	937.69	938.25	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	932.07	932.69	5590	6507
10	933.63	934.35	8140	9475
25	935.34	936.07	12000	13968
100	937	937.61	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.92	1.11	$ 0	$ 0	$ 0	$ 0
-7.1	2	$ 0	$ 0	$ 0	$ 0
-4.76	4.79	$ 0	$ 0	$ 0	$ 0
-3.64	8	$ 0	$ 0	$ 0	$ 0
-3.13	10.33	$ 0	$ 0	$ 0	$ 0
-2	18.42	$ 4	$ 0	$ 0	$ 0
-1.84	20	$ 14	$ 0	$ 0	$ 0
-1.19	28.12	$ 2	$ 0	$ 0	$ 0
-1.07	30	$ 10	$ 0	$ 0	$ 0
-0.56	40	$ 12	$ 0	$ 0	$ 0
0	54.84	$ 5	$ 0	$ 0	$ 0
0.16	60	$ 19	$ 12	$ 7	$ 2
0.43	70	$ 24	$ 18	$ 7	$ 2
0.67	80	$ 9	$ 7	$ 2	$ 1
0.74	83.48	$ 16	$ 13	$ 4	$ 2
0.87	90	$ 178	$ 146	$ 38	$ 21
2.24	200	$ 75	$ 63	$ 15	$ 11
2.93	300	$ 43	$ 37	$ 9	$ 7
3.42	400	$ 488	$ 230	$ 109	$ 0
Total ($)		$ 900	$ 527	$ 190	$ 45

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-9.65	1.11	$ 0	$ 0	$ 0	$ 0
-6.99	2	$ 0	$ 0	$ 0	$ 0
-4.87	4.79	$ 0	$ 0	$ 0	$ 0
-3.84	8	$ 0	$ 0	$ 0	$ 0
-3.38	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 703	$ 363	$ 155	$ 19

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2.22	20	$ 0	$ 0	$ 0	$ 0
-2	22.85	$ 8	$ 0	$ 0	$ 0
-1.64	28.12	$ 2	$ 0	$ 0	$ 0
-1.53	30	$ 8	$ 0	$ 0	$ 0
-1.08	40	$ 11	$ 0	$ 0	$ 0
-0.44	60	$ 4	$ 0	$ 0	$ 0
-0.18	70	$ 3	$ 0	$ 0	$ 0
0	79.59	$ 0	$ 0	$ 0	$ 0
0.01	80	$ 2	$ 0	$ 1	$ 0
0.07	83.48	$ 4	$ 2	$ 2	$ 0
0.19	90	$ 82	$ 57	$ 25	$ 8
1.4	200	$ 56	$ 46	$ 11	$ 7
2	300	$ 34	$ 28	$ 7	$ 5
2.43	400	$ 488	$ 230	$ 109	$ 0
Total ($)		$ 703	$ 363	$ 155	$ 19

Building Information

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	COM2: Commercial - Wholesale Trade
Building is outside hundred-year flood area:	No
Building Type:	Warehouse-Non-Refrig
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Depth Damage Curve:	Warehouse, Non-Refrig (Default) Use Default:Yes
Building Size (sq.ft):	1,776
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$900
Expected Annual Losses due to Building Damages after Mitigation:	$703
Expected Annual Benefits - Building:	$197

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.5	976.8	0	0	0.5	976.8	0	0
-1	0.5	976.8	0	0	0.5	976.8	0	0
0	1.1	2,148.96	0	0	1.1	2,148.96	0	0
1	11.8	23,052.48	0	0	11.8	23,052.48	0	0
2	19.9	38,876.63	0	0	19.9	38,876.63	0	0
3	25.4	49,621.43	0	0	25.4	49,621.43	0	0
4	31.4	61,343.03	0	0	31.4	61,343.03	0	0
5	34.2	66,813.12	0	0	34.2	66,813.12	0	0
6	39	76,190.4	0	0	39	76,190.4	0	0
7	41.8	81,660.48	0	0	41.8	81,660.48	0	0
8	45.7	89,279.52	0	0	45.7	89,279.52	0	0
9	50.4	195,360	0	0	50.4	195,360	0	0
10	51.7	195,360	0	0	51.7	195,360	0	0
11	51.7	195,360	0	0	51.7	195,360	0	0
12	51.7	195,360	0	0	51.7	195,360	0	0
13	51.7	195,360	0	0	51.7	195,360	0	0
14	51.7	195,360	0	0	51.7	195,360	0	0
15	51.7	195,360	0	0	51.7	195,360	0	0
16	51.7	195,360	0	0	51.7	195,360	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Expected Annual Losses due to Content Damages before Mitigation:	$527
Expected Annual Losses due to Content Damages after Mitigation:	$363
Expected Annual Benefits - Content:	$165

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	21	19,282.03	21	19,282.03
2	34	31,218.52	34	31,218.52
3	47	43,155.02	47	43,155.02
4	57	52,336.94	57	52,336.94
5	66	60,600.67	66	60,600.67
6	74	67,946.20	74	67,946.20
7	81	74,373.55	81	74,373.55
8	88	80,800.89	88	80,800.89
9	92	84,473.66	92	84,473.66
10	94	86,310.04	94	86,310.04
11	94	86,310.04	94	86,310.04
12	94	86,310.04	94	86,310.04
13	94	86,310.04	94	86,310.04
14	94	86,310.04	94	86,310.04
15	94	86,310.04	94	86,310.04
16	94	86,310.04	94	86,310.04

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	0.64	Use Default:Yes
One-Time Displacement Cost ($/sq.ft):	1.28	Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$190	
Expected Annual Losses due to Displacement Damages after Mitigation:	$155	
Expected Annual Losses - Displacement:	$35	

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	2,662.54	45	2,662.54
2	90	5,325.08	90	5,325.08
3	135	7,987.62	135	7,987.62
4	180	14,013.36	180	14,013.36
5	225	17,516.71	225	17,516.71
6	270	21,020.05	270	21,020.05
7	315	24,523.39	315	24,523.39
8	360	34,753.15	360	34,753.15
9	405	39,097.30	405	39,097.30
10	450	43,441.44	450	43,441.44
11	450	43,441.44	450	43,441.44
12	450	16,816.04	450	16,816.04
13	450	16,816.04	450	16,816.04
14	450	16,816.04	450	16,816.04
15	450	16,816.04	450	16,816.04
16	450	16,816.04	450	16,816.04

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Annual Operating Budget:	$20,000
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$45
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$19
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$25

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	2,465.75	45	2,465.75
2	90	4,931.50	90	4,931.50
3	135	7,397.26	135	7,397.26
4	180	9,863.01	180	9,863.01
5	225	12,328.76	225	12,328.76
6	270	14,794.52	270	14,794.52
7	315	17,260.27	315	17,260.27
8	360	19,726.02	360	19,726.02
9	405	22,191.78	405	22,191.78
10	450	24,657.53	450	24,657.53
11	450	24,657.53	450	24,657.53
12	450	24,657.53	450	24,657.53
13	450	24,657.53	450	24,657.53
14	450	24,657.53	450	24,657.53
15	450	24,657.53	450	24,657.53
16	450	24,657.53	450	24,657.53

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Benefits-Costs Summary

Floodplain and Stream Restoration @ 114 1st St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$8,154
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$8,154
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48470902092973, -91.12834703695418
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	939.18
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	932.51	933.15	5590	6507
10	934.3	935.49	8140	9475
25	936.48	937.91	12000	13968
100	939.55	940.08	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	932.44	933.08	5590	6507
10	934.19	935.27	8140	9475
25	936.28	937.53	12000	13968
100	939	939.57	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-11.82	1.11	$ 0	$ 0	$ 0	$ 0
-8.64	2	$ 0	$ 0	$ 0	$ 0
-5.89	4.79	$ 0	$ 0	$ 0	$ 0
-4.49	8	$ 0	$ 0	$ 0	$ 0
-3.85	10.33	$ 0	$ 0	$ 0	$ 0
-2.24	20	$ 0	$ 0	$ 0	$ 0
-2	22.12	$ 161	$ 128	$ 0	$ 0
-1.41	28.12	$ 42	$ 32	$ 0	$ 0
-1.26	30	$ 176	$ 127	$ 0	$ 0
-0.6	40	$ 141	$ 96	$ 0	$ 0
0	51.77	$ 74	$ 48	$ 0	$ 0
0.34	60	$ 72	$ 46	$ 11	$ 0
0.7	70	$ 58	$ 36	$ 14	$ 0
1.01	80	$ 18	$ 11	$ 5	$ 0
1.1	83.48	$ 30	$ 18	$ 10	$ 0
1.28	90	$ 252	$ 146	$ 112	$ 0
3.1	200	$ 86	$ 47	$ 54	$ 0
4.02	300	$ 48	$ 26	$ 33	$ 0
4.68	400	$ 373	$ 373	$ 187	$ 0
Total ($)		$ 1,529	$ 1,133	$ 426	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-11.66	1.11	$ 0	$ 0	$ 0	$ 0
-8.59	2	$ 0	$ 0	$ 0	$ 0
-5.96	4.79	$ 0	$ 0	$ 0	$ 0
-4.68	8	$ 0	$ 0	$ 0	$ 0
-4.05	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 1,320	$ 1,006	$ 345	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2.53	20	$ 0	$ 0	$ 0	$ 0
-2	25.54	$ 57	$ 46	$ 0	$ 0
-1.77	28.12	$ 37	$ 29	$ 0	$ 0
-1.64	30	$ 157	$ 118	$ 0	$ 0
-1	40	$ 193	$ 135	$ 0	$ 0
-0.12	60	$ 28	$ 18	$ 0	$ 0
0	64.04	$ 36	$ 24	$ 0	$ 0
0.19	70	$ 52	$ 33	$ 5	$ 0
0.47	80	$ 16	$ 10	$ 2	$ 0
0.57	83.48	$ 27	$ 17	$ 5	$ 0
0.73	90	$ 226	$ 135	$ 75	$ 0
2.41	200	$ 77	$ 43	$ 43	$ 0
3.25	300	$ 43	$ 23	$ 27	$ 0
3.87	400	$ 373	$ 373	$ 187	$ 0
Total ($)		$ 1,320	$ 1,006	$ 345	$ 0

Building Information

Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040

Building Type:	Two or More Stories
Foundation Type:	
Building Has Basement:	**Yes**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040

Depth Damage Curve:	USACE Generic Use Default:Yes
Building Size (sq.ft):	1,356
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$1,529
Expected Annual Losses due to Building Damages after Mitigation:	$1,320
Expected Annual Benefits - Building:	$209

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	10.2	15,214.31	0	0	10.2	15,214.31	0	0
-1	13.9	20,733.23	0	0	13.9	20,733.23	0	0
0	17.9	26,699.63	0	0	17.9	26,699.63	0	0
1	22.3	33,262.68	0	0	22.3	33,262.68	0	0
2	27	40,273.2	0	0	27	40,273.2	0	0
3	31.9	47,582.03	0	0	31.9	47,582.03	0	0
4	36.9	55,040.03	0	0	36.9	55,040.03	0	0
5	41.9	62,498.03	0	0	41.9	62,498.03	0	0
6	46.9	69,956.04	0	0	46.9	69,956.04	0	0
7	51.8	149,160	0	0	51.8	149,160	0	0
8	56.4	149,160	0	0	56.4	149,160	0	0
9	60.8	149,160	0	0	60.8	149,160	0	0
10	64.8	149,160	0	0	64.8	149,160	0	0
11	68.4	149,160	0	0	68.4	149,160	0	0
12	71.4	149,160	0	0	71.4	149,160	0	0
13	73.7	149,160	0	0	73.7	149,160	0	0
14	75.4	149,160	0	0	75.4	149,160	0	0
15	76.4	149,160	0	0	76.4	149,160	0	0
16	76.4	149,160	0	0	76.4	149,160	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Utilities Elevated:	**No**
Expected Annual Losses due to Content Damages before Mitigation:	$1,133
Expected Annual Losses due to Content Damages after Mitigation:	$1,006
Expected Annual Benefits - Content:	$127

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	8.4	12,529.44	8.4	12,529.44
-1	10.1	15,065.16	10.1	15,065.16
0	11.9	17,750.04	11.9	17,750.04
1	13.8	20,584.08	13.8	20,584.08
2	15.7	23,418.12	15.7	23,418.12
3	17.7	26,401.32	17.7	26,401.32
4	19.8	29,533.68	19.8	29,533.68
5	22	32,815.2	22	32,815.2
6	24.3	36,245.88	24.3	36,245.88
7	26.7	39,825.72	26.7	39,825.72
8	29.1	43,405.56	29.1	43,405.56
9	31.7	47,283.72	31.7	47,283.72
10	34.4	51,311.04	34.4	51,311.04
11	37.2	55,487.52	37.2	55,487.52
12	40	59,664	40	59,664
13	43	64,138.8	43	64,138.8
14	46.1	68,762.76	46.1	68,762.76
15	49.3	73,535.88	49.3	73,535.88
16	52.6	78,458.16	52.6	78,458.16

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040

Lodging Per Diem:	$107 Use Default:Yes
Meals Per Diem:	$59 Use Default:Yes
Population Affected:	2
Duration of Displacement (days):	365 Use Default:Yes
Total Residential Displacement Cost:	$205
Expected Annual Losses due to Displacement Damages before mitigation:	$426
Expected Annual Losses due to Displacement Damages after Mitigation:	$345
Expected Annual Losses - Displacement:	$81

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	9,225	45	9,225
2	90	18,450	90	18,450
3	135	27,675	135	27,675
4	180	36,900	180	36,900
5	225	46,125	225	46,125
6	270	55,350	270	55,350
7	315	64,575	315	64,575
8	360	73,800	360	73,800
9	405	83,025	405	83,025
10	450	92,250	450	92,250
11	495	101,475	495	101,475
12	540	110,700	540	110,700
13	585	119,925	585	119,925
14	630	129,150	630	129,150
15	675	138,375	675	138,375
16	720	147,600	720	147,600

Additional Benefits - Street Maintenance

Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040

Total Annual Street Maintenance Budget:	$0
Total Number of Street Miles Maintained:	0
Street Miles that will not require future maintenance:	0
Expected Annual Benefits - Street Maintenance:	$0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Additional Benefits - Social

Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040

Number of Workers:	1
Expected Annual Social Benefits:	$13,622

Benefits-Costs Summary

Floodplain and Stream Restoration @ 328 1st Ave W, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$8,071
Total Social Benefits:	$13,622
Total Mitigation Project Benefits:	$21,693
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48484199982363, -91.12470501620541
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	939.04
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	932.53	933.17	5590	6507
10	934.33	935.54	8140	9475
25	936.55	938	12000	13968
100	939.66	940.2	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	932.44	933.08	5590	6507
10	934.22	935.34	8140	9475
25	936.34	937.68	12000	13968
100	939.22	939.77	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-11.71	1.11	$ 0	$ 0	$ 0	$ 0
-8.5	2	$ 0	$ 0	$ 0	$ 0
-5.73	4.79	$ 0	$ 0	$ 0	$ 0
-4.34	8	$ 0	$ 0	$ 0	$ 0
-3.66	10.33	$ 0	$ 0	$ 0	$ 0
-2.03	20	$ 0	$ 0	$ 0	$ 0
-2	20.26	$ 28	$ 0	$ 0	$ 0
-1.19	28.12	$ 5	$ 0	$ 0	$ 0
-1.05	30	$ 21	$ 0	$ 0	$ 0
-0.36	40	$ 12	$ 0	$ 0	$ 0
0	46.63	$ 54	$ 0	$ 0	$ 0
0.6	60	$ 102	$ 58	$ 36	$ 11
0.96	70	$ 107	$ 61	$ 40	$ 12
1.27	80	$ 36	$ 20	$ 14	$ 4
1.37	83.48	$ 65	$ 37	$ 25	$ 8
1.55	90	$ 642	$ 370	$ 282	$ 86
3.41	200	$ 254	$ 146	$ 148	$ 40
4.35	300	$ 141	$ 80	$ 103	$ 24
5.02	400	$ 1,029	$ 309	$ 819	$ 0
Total ($)		$ 2,495	$ 1,081	$ 1,466	$ 185

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-11.62	1.11	$ 0	$ 0	$ 0	$ 0
-8.51	2	$ 0	$ 0	$ 0	$ 0
-5.81	4.79	$ 0	$ 0	$ 0	$ 0
-4.48	8	$ 0	$ 0	$ 0	$ 0
-3.85	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 2,176	$ 930	$ 1,287	$ 141

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2.28	20	$ 0	$ 0	$ 0	$ 0
-2	22.75	$ 17	$ 0	$ 0	$ 0
-1.51	28.12	$ 5	$ 0	$ 0	$ 0
-1.35	30	$ 19	$ 0	$ 0	$ 0
-0.7	40	$ 21	$ 0	$ 0	$ 0
0	55.05	$ 11	$ 0	$ 0	$ 0
0.19	60	$ 49	$ 24	$ 15	$ 5
0.53	70	$ 68	$ 38	$ 24	$ 7
0.82	80	$ 26	$ 15	$ 9	$ 3
0.92	83.48	$ 48	$ 28	$ 18	$ 5
1.09	90	$ 524	$ 307	$ 216	$ 66
2.85	200	$ 228	$ 134	$ 109	$ 33
3.73	300	$ 131	$ 75	$ 77	$ 21
4.36	400	$ 1,029	$ 309	$ 819	$ 0
Total ($)		$ 2,176	$ 930	$ 1,287	$ 141

Building Information

Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	COM8: Commercial - Entertainment and Recreation
Building is outside hundred-year flood area:	No
Building Type:	Recreation
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040

Depth Damage Curve:	Recreation (Default) Use Default:Yes
Building Size (sq.ft):	3,742
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$2,495
Expected Annual Losses due to Building Damages after Mitigation:	$2,176
Expected Annual Benefits - Building:	$319

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.5	2,058.1	0	0	0.5	2,058.1	0	0
-1	0.5	2,058.1	0	0	0.5	2,058.1	0	0
0	0.9	3,704.58	0	0	0.9	3,704.58	0	0
1	13.5	55,568.7	0	0	13.5	55,568.7	0	0
2	23.6	97,142.32	0	0	23.6	97,142.32	0	0
3	31.3	128,837.06	0	0	31.3	128,837.06	0	0
4	38.6	158,885.32	0	0	38.6	158,885.32	0	0
5	42.1	173,292.02	0	0	42.1	173,292.02	0	0
6	47.6	195,931.12	0	0	47.6	195,931.12	0	0
7	50.3	411,620	0	0	50.3	411,620	0	0
8	54.2	411,620	0	0	54.2	411,620	0	0
9	57.5	411,620	0	0	57.5	411,620	0	0
10	59.1	411,620	0	0	59.1	411,620	0	0
11	59.1	411,620	0	0	59.1	411,620	0	0
12	59.1	411,620	0	0	59.1	411,620	0	0
13	59.1	411,620	0	0	59.1	411,620	0	0
14	59.1	411,620	0	0	59.1	411,620	0	0
15	59.1	411,620	0	0	59.1	411,620	0	0
16	59.1	411,620	0	0	59.1	411,620	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Expected Annual Losses due to Content Damages before Mitigation:	$1,081
Expected Annual Losses due to Content Damages after Mitigation:	$930
Expected Annual Benefits - Content:	$151

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	26	32,106.36	26	32,106.36
2	44	54,333.84	44	54,333.84
3	63	77,796.18	63	77,796.18
4	73	90,144.78	73	90,144.78
5	80	98,788.80	80	98,788.80
6	84	103,728.24	84	103,728.24
7	91	112,372.26	91	112,372.26
8	95	117,311.70	95	117,311.70
9	95	117,311.70	95	117,311.70
10	95	117,311.70	95	117,311.70
11	95	117,311.70	95	117,311.70
12	95	117,311.70	95	117,311.70
13	95	117,311.70	95	117,311.70
14	95	117,311.70	95	117,311.70
15	95	117,311.70	95	117,311.70
16	95	117,311.70	95	117,311.70

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	2.29 Use Default:Yes
One-Time Displacement Cost ($/sq.ft):	0 Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$1,466
Expected Annual Losses due to Displacement Damages after Mitigation:	$1,287
Expected Annual Losses - Displacement:	$179

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	20,073.01	45	20,073.01
2	90	40,146.02	90	40,146.02
3	135	60,219.03	135	60,219.03
4	180	105,647.42	180	105,647.42
5	225	132,059.28	225	132,059.28
6	270	158,471.13	270	158,471.13
7	315	184,882.99	315	184,882.99
8	360	262,005.61	360	262,005.61
9	405	294,756.31	405	294,756.31
10	450	327,507.01	450	327,507.01
11	450	327,507.01	450	327,507.01
12	450	126,776.90	450	126,776.90
13	450	126,776.90	450	126,776.90
14	450	126,776.90	450	126,776.90
15	450	126,776.90	450	126,776.90
16	450	126,776.90	450	126,776.90

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040

Annual Operating Budget:	$50,000
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$185
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$141
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$44

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	6,164.38	45	6,164.38
2	90	12,328.76	90	12,328.76
3	135	18,493.15	135	18,493.15
4	180	24,657.53	180	24,657.53
5	225	30,821.91	225	30,821.91
6	270	36,986.30	270	36,986.30
7	315	43,150.68	315	43,150.68
8	360	49,315.06	360	49,315.06
9	405	55,479.45	405	55,479.45
10	450	61,643.83	450	61,643.83
11	450	61,643.83	450	61,643.83
12	450	61,643.83	450	61,643.83
13	450	61,643.83	450	61,643.83
14	450	61,643.83	450	61,643.83
15	450	61,643.83	450	61,643.83
16	450	61,643.83	450	61,643.83

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Benefits-Costs Summary

Floodplain and Stream Restoration @ 108 1st Ave W, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$13,413
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$13,413
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.484783997053654, -91.12609800469414
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	939.75
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	932.52	933.16	5590	6507
10	934.33	935.53	8140	9475
25	936.54	937.98	12000	13968
100	939.63	940.17	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	932.44	933.09	5590	6507
10	934.23	935.33	8140	9475
25	936.33	937.65	12000	13968
100	939.18	939.74	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-12.42	1.11	$ 0	$ 0	$ 0	$ 0
-9.23	2	$ 0	$ 0	$ 0	$ 0
-6.43	4.79	$ 0	$ 0	$ 0	$ 0
-5.06	8	$ 0	$ 0	$ 0	$ 0
-4.4	10.33	$ 0	$ 0	$ 0	$ 0
-2.74	20	$ 0	$ 0	$ 0	$ 0
-2	27.38	$ 25	$ 21	$ 0	$ 0
-1.92	28.12	$ 60	$ 48	$ 0	$ 0
-1.78	30	$ 257	$ 196	$ 0	$ 0
-1.08	40	$ 322	$ 226	$ 0	$ 0
-0.14	60	$ 43	$ 29	$ 0	$ 0
0	63.72	$ 65	$ 43	$ 0	$ 0
0.22	70	$ 88	$ 57	$ 6	$ 0
0.53	80	$ 27	$ 17	$ 3	$ 0
0.63	83.48	$ 46	$ 29	$ 6	$ 0
0.81	90	$ 392	$ 233	$ 83	$ 0
2.66	200	$ 137	$ 75	$ 48	$ 0
3.6	300	$ 77	$ 41	$ 30	$ 0
4.27	400	$ 630	$ 630	$ 187	$ 0
Total ($)		$ 2,169	$ 1,646	$ 362	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-12.29	1.11	$ 0	$ 0	$ 0	$ 0
-9.19	2	$ 0	$ 0	$ 0	$ 0
-6.53	4.79	$ 0	$ 0	$ 0	$ 0
-5.21	8	$ 0	$ 0	$ 0	$ 0
-4.58	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 1,908	$ 1,486	$ 300	$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-3.02	20	$ 0	$ 0	$ 0	$ 0
-2.24	28.12	$ 0	$ 0	$ 0	$ 0
-2.08	30	$ 0	$ 0	$ 0	$ 0
-2	31.33	$ 195	$ 154	$ 0	$ 0
-1.45	40	$ 291	$ 212	$ 0	$ 0
-0.55	60	$ 98	$ 67	$ 0	$ 0
-0.21	70	$ 58	$ 39	$ 0	$ 0
0	77.07	$ 22	$ 14	$ 0	$ 0
0.08	80	$ 24	$ 16	$ 1	$ 0
0.18	83.48	$ 42	$ 27	$ 2	$ 0
0.34	90	$ 355	$ 217	$ 47	$ 0
2.08	200	$ 124	$ 70	$ 38	$ 0
2.96	300	$ 70	$ 38	$ 25	$ 0
3.58	400	$ 630	$ 630	$ 187	$ 0
Total ($)		$ 1,908	$ 1,486	$ 300	$ 0

Building Information

Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040

Building Type:	Two or More Stories
Foundation Type:	
Building Has Basement:	**Yes**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040

Depth Damage Curve:	USACE Generic Use Default:Yes
Building Size (sq.ft):	2,292
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$2,169
Expected Annual Losses due to Building Damages after Mitigation:	$1,908
Expected Annual Benefits - Building:	$261

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	10.2	25,716.23	0	0	10.2	25,716.23	0	0
-1	13.9	35,044.68	0	0	13.9	35,044.68	0	0
0	17.9	45,129.47	0	0	17.9	45,129.47	0	0
1	22.3	56,222.75	0	0	22.3	56,222.75	0	0
2	27	68,072.4	0	0	27	68,072.4	0	0
3	31.9	80,426.27	0	0	31.9	80,426.27	0	0
4	36.9	93,032.27	0	0	36.9	93,032.27	0	0
5	41.9	105,638.27	0	0	41.9	105,638.27	0	0
6	46.9	118,244.27	0	0	46.9	118,244.27	0	0
7	51.8	252,120	0	0	51.8	252,120	0	0
8	56.4	252,120	0	0	56.4	252,120	0	0
9	60.8	252,120	0	0	60.8	252,120	0	0
10	64.8	252,120	0	0	64.8	252,120	0	0
11	68.4	252,120	0	0	68.4	252,120	0	0
12	71.4	252,120	0	0	71.4	252,120	0	0
13	73.7	252,120	0	0	73.7	252,120	0	0
14	75.4	252,120	0	0	75.4	252,120	0	0
15	76.4	252,120	0	0	76.4	252,120	0	0
16	76.4	252,120	0	0	76.4	252,120	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Utilities Elevated:	**No**
Expected Annual Losses due to Content Damages before Mitigation:	$1,646
Expected Annual Losses due to Content Damages after Mitigation:	$1,486
Expected Annual Benefits - Content:	$160

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	8.4	21,178.08	8.4	21,178.08
-1	10.1	25,464.12	10.1	25,464.12
0	11.9	30,002.28	11.9	30,002.28
1	13.8	34,792.56	13.8	34,792.56
2	15.7	39,582.84	15.7	39,582.84
3	17.7	44,625.24	17.7	44,625.24
4	19.8	49,919.76	19.8	49,919.76
5	22	55,466.40	22	55,466.40
6	24.3	61,265.16	24.3	61,265.16
7	26.7	67,316.04	26.7	67,316.04
8	29.1	73,366.92	29.1	73,366.92
9	31.7	79,922.04	31.7	79,922.04
10	34.4	86,729.28	34.4	86,729.28
11	37.2	93,788.64	37.2	93,788.64
12	40	100,848.00	40	100,848.00
13	43	108,411.60	43	108,411.60
14	46.1	116,227.32	46.1	116,227.32
15	49.3	124,295.16	49.3	124,295.16
16	52.6	132,615.12	52.6	132,615.12

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040

Lodging Per Diem:	$107	Use Default:Yes
Meals Per Diem:	$59	Use Default:Yes
Population Affected:	2	
Duration of Displacement (days):	365	Use Default:Yes
Total Residential Displacement Cost:	$205	
Expected Annual Losses due to Displacement Damages before mitigation:	$362	
Expected Annual Losses due to Displacement Damages after Mitigation:	$300	
Expected Annual Losses - Displacement:	$61	

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	9,225	45	9,225
2	90	18,450	90	18,450
3	135	27,675	135	27,675
4	180	36,900	180	36,900
5	225	46,125	225	46,125
6	270	55,350	270	55,350
7	315	64,575	315	64,575
8	360	73,800	360	73,800
9	405	83,025	405	83,025
10	450	92,250	450	92,250
11	495	101,475	495	101,475
12	540	110,700	540	110,700
13	585	119,925	585	119,925
14	630	129,150	630	129,150
15	675	138,375	675	138,375
16	720	147,600	720	147,600

Additional Benefits - Street Maintenance

Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040

Total Annual Street Maintenance Budget:	$0
Total Number of Street Miles Maintained:	0
Street Miles that will not require future maintenance:	0
Expected Annual Benefits - Street Maintenance:	$0

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Additional Benefits - Social

Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040

Number of Workers:	1
Expected Annual Social Benefits:	$13,622

Benefits-Costs Summary

Floodplain and Stream Restoration @ 206 1st Ave W, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$9,339
Total Social Benefits:	$13,622
Total Mitigation Project Benefits:	$22,961
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.486386994126434, -91.12311396334465
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$0
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	940.53
Use Default Recurrence Intervals:	Use Defau ***No***
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	933.32	934.08	5590	6507
10	935.33	936.49	8140	9475
25	937.73	938.97	12000	13968
100	940.48	941.2	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	933.26	934.02	5590	6507
10	935.24	936.34	8140	9475
25	937.58	938.72	12000	13968
100	940.13	940.87	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-12.42	1.11	$ 0	$ 0	$ 0	$ 0
-9.15	2	$ 0	$ 0	$ 0	$ 0
-6.29	4.79	$ 0	$ 0	$ 0	$ 0
-4.88	8	$ 0	$ 0	$ 0	$ 0
-4.22	10.33	$ 0	$ 0	$ 0	$ 0
-2.54	20	$ 0	$ 0	$ 0	$ 0
-2	25.08	$ 16	$ 0	$ 0	$ 0
-1.72	28.12	$ 8	$ 0	$ 0	$ 0
-1.56	30	$ 34	$ 0	$ 0	$ 0
-0.87	40	$ 46	$ 0	$ 0	$ 0
0	57.6	$ 8	$ 0	$ 0	$ 0
0.1	60	$ 65	$ 38	$ 27	$ 6
0.46	70	$ 102	$ 80	$ 27	$ 13
0.78	80	$ 39	$ 32	$ 9	$ 5
0.88	83.48	$ 74	$ 62	$ 16	$ 10
1.06	90	$ 807	$ 686	$ 169	$ 132
2.93	200	$ 348	$ 300	$ 73	$ 69
3.88	300	$ 200	$ 174	$ 49	$ 43
4.55	400	$ 1,888	$ 887	$ 420	$ 0
Total ($)		$ 3,636	$ 2,258	$ 790	$ 280

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-12.35	1.11	$ 0	$ 0	$ 0	$ 0
-9.12	2	$ 0	$ 0	$ 0	$ 0
-6.36	4.79	$ 0	$ 0	$ 0	$ 0
-5.01	8	$ 0	$ 0	$ 0	$ 0
-4.36	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 3,267	$ 1,934	$ 713	$ 212

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2.74	20	$ 0	$ 0	$ 0	$ 0
-2	27.61	$ 3	$ 0	$ 0	$ 0
-1.94	28.12	$ 8	$ 0	$ 0	$ 0
-1.79	30	$ 31	$ 0	$ 0	$ 0
-1.14	40	$ 44	$ 0	$ 0	$ 0
-0.2	60	$ 12	$ 0	$ 0	$ 0
0	65.98	$ 11	$ 0	$ 0	$ 0
0.13	70	$ 52	$ 32	$ 21	$ 5
0.44	80	$ 25	$ 19	$ 7	$ 3
0.53	83.48	$ 50	$ 40	$ 13	$ 7
0.7	90	$ 643	$ 529	$ 143	$ 100
2.49	200	$ 315	$ 268	$ 65	$ 60
3.39	300	$ 186	$ 160	$ 44	$ 38
4.03	400	$ 1,888	$ 887	$ 420	$ 0
Total ($)		$ 3,267	$ 1,934	$ 713	$ 212

Building Information

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	COM2: Commercial - Wholesale Trade
Building is outside hundred-year flood area:	No
Building Type:	Warehouse-Non-Refrig
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Depth Damage Curve:	Warehouse, Non-Refrig (Default) Use Default:Yes
Building Size (sq.ft):	6,864
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$3,636
Expected Annual Losses due to Building Damages after Mitigation:	$3,267
Expected Annual Benefits - Building:	$369

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.5	3,775.2	0	0	0.5	3,775.2	0	0
-1	0.5	3,775.2	0	0	0.5	3,775.2	0	0
0	1.1	8,305.44	0	0	1.1	8,305.44	0	0
1	11.8	89,094.72	0	0	11.8	89,094.72	0	0
2	19.9	150,252.96	0	0	19.9	150,252.96	0	0
3	25.4	191,780.15	0	0	25.4	191,780.15	0	0
4	31.4	237,082.55	0	0	31.4	237,082.55	0	0
5	34.2	258,223.68	0	0	34.2	258,223.68	0	0
6	39	294,465.6	0	0	39	294,465.6	0	0
7	41.8	315,606.72	0	0	41.8	315,606.72	0	0
8	45.7	345,053.28	0	0	45.7	345,053.28	0	0
9	50.4	755,040	0	0	50.4	755,040	0	0
10	51.7	755,040	0	0	51.7	755,040	0	0
11	51.7	755,040	0	0	51.7	755,040	0	0
12	51.7	755,040	0	0	51.7	755,040	0	0
13	51.7	755,040	0	0	51.7	755,040	0	0
14	51.7	755,040	0	0	51.7	755,040	0	0
15	51.7	755,040	0	0	51.7	755,040	0	0
16	51.7	755,040	0	0	51.7	755,040	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Expected Annual Losses due to Content Damages before Mitigation:	$2,258
Expected Annual Losses due to Content Damages after Mitigation:	$1,934
Expected Annual Benefits - Content:	$324

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	21	74,522.44	21	74,522.44
2	34	120,655.39	34	120,655.39
3	47	166,788.33	47	166,788.33
4	57	202,275.21	57	202,275.21
5	66	234,213.40	66	234,213.40
6	74	262,602.91	74	262,602.91
7	81	287,443.72	81	287,443.72
8	88	312,284.54	88	312,284.54
9	92	326,479.29	92	326,479.29
10	94	333,576.67	94	333,576.67
11	94	333,576.67	94	333,576.67
12	94	333,576.67	94	333,576.67
13	94	333,576.67	94	333,576.67
14	94	333,576.67	94	333,576.67
15	94	333,576.67	94	333,576.67
16	94	333,576.67	94	333,576.67

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	0.64	Use Default:Yes
One-Time Displacement Cost ($/sq.ft):	1.28	Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$790	
Expected Annual Losses due to Displacement Damages after Mitigation:	$713	
Expected Annual Losses - Displacement:	$77	

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	10,290.35	45	10,290.35
2	90	20,580.71	90	20,580.71
3	135	30,871.07	135	30,871.07
4	180	54,159.78	180	54,159.78
5	225	67,699.72	225	67,699.72
6	270	81,239.67	270	81,239.67
7	315	94,779.61	315	94,779.61
8	360	134,316.25	360	134,316.25
9	405	151,105.78	405	151,105.78
10	450	167,895.32	450	167,895.32
11	450	167,895.32	450	167,895.32
12	450	64,991.73	450	64,991.73
13	450	64,991.73	450	64,991.73
14	450	64,991.73	450	64,991.73
15	450	64,991.73	450	64,991.73
16	450	64,991.73	450	64,991.73

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Annual Operating Budget:	$100,000
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$280
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$212
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$68

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	12,328.76	45	12,328.76
2	90	24,657.53	90	24,657.53
3	135	36,986.30	135	36,986.30
4	180	49,315.06	180	49,315.06
5	225	61,643.83	225	61,643.83
6	270	73,972.60	270	73,972.60
7	315	86,301.36	315	86,301.36
8	360	98,630.13	360	98,630.13
9	405	110,958.90	405	110,958.90
10	450	123,287.67	450	123,287.67
11	450	123,287.67	450	123,287.67
12	450	123,287.67	450	123,287.67
13	450	123,287.67	450	123,287.67
14	450	123,287.67	450	123,287.67
15	450	123,287.67	450	123,287.67
16	450	123,287.67	450	123,287.67

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Benefits-Costs Summary

Floodplain and Stream Restoration @ 244 2nd St NE, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$16,190
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$16,190
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

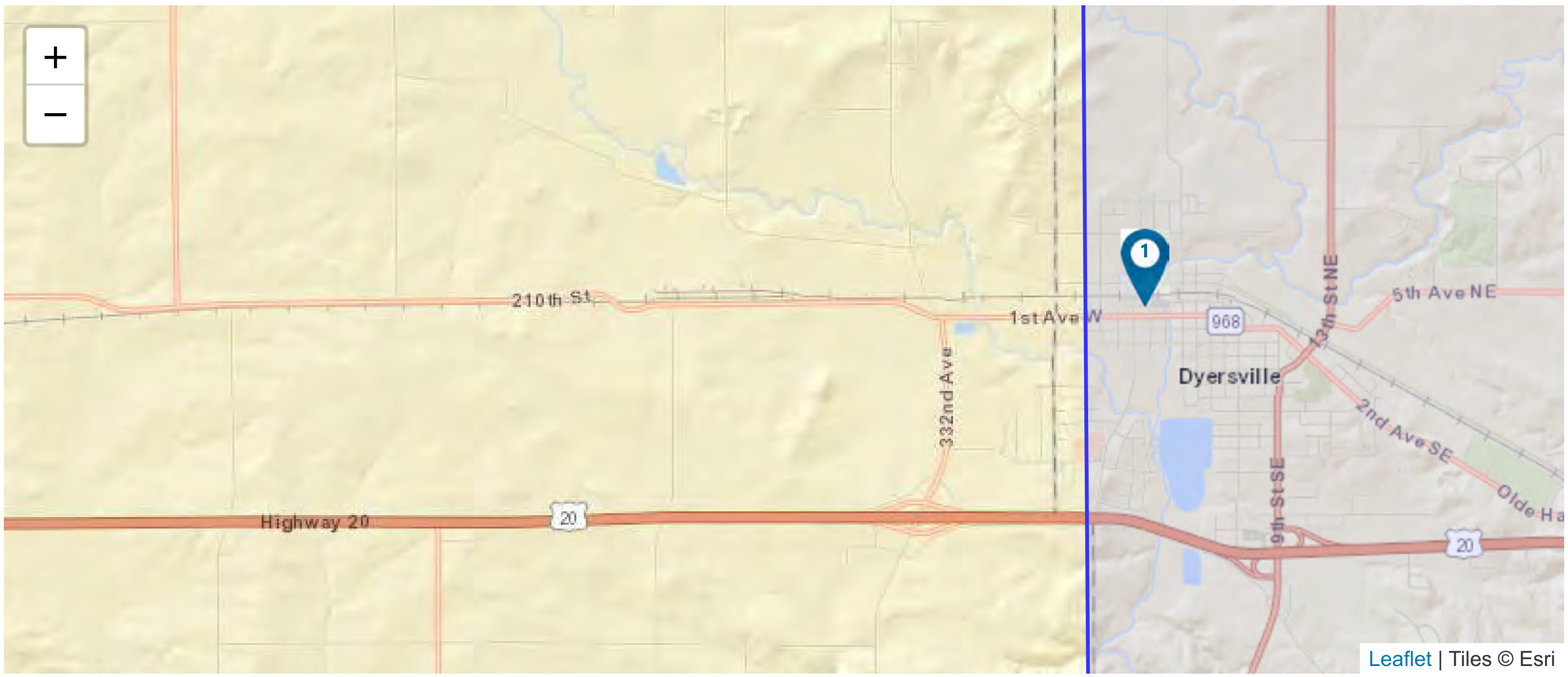
FEMA

Benefit-Cost Calculator

V.6.0 (Build 20241018.1218 | Release Notes)

Benefit-Cost Analysis

Project Name: NF-11 Floodplain Excavation South of Railroad



Map Marker ▲	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
1	Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040		Riverine Flood	3.1	$ 301,186	$ 906,747	0.33
TOTAL (SELECTED)					**$ 301,186**	**$ 906,747**	**0.33**
TOTAL					**$ 301,186**	**$ 906,747**	**0.33**

Property Configuration

Property Title:	Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.485135995077485, -91.12607897777393
Hazard Type:	Riverine Flood
Mitigation Action Type:	Floodplain and Stream Restoration
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	30
Project Cost:	$810,000
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$5,000

Hazard Probabilities Parameters - Flood

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Lowest Floor Elevation of the Property (ft):	940.04
Use Default Recurrence Intervals:	Use Defau No
Include Future Precipitation Impacts:	Yes
Future Precipitation Scenario:	8.5
Delta Change Factor (%):	16.4 Use Default:Yes

Discharge

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	932.9	933.58	5590	6507
10	934.75	935.96	8140	9475
25	937.07	938.41	12000	13968
100	940	940.62	17000	19788

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Future Water Surface Elevation Due to Climate Change (ft)	Discharge (cfs)	Future Discharge Due to Climate Change (cfs)
5	932.88	933.56	5590	6507
10	934.74	935.94	8140	9475
25	937.04	938.4	12000	13968
100	940	940.61	17000	19788

Estimated Annual Damages by Category

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-12.41	1.11	$ 0	$ 0	$ 0	$ 0
-9.14	2	$ 0	$ 0	$ 0	$ 0
-6.32	4.79	$ 0	$ 0	$ 0	$ 0
-4.92	8	$ 0	$ 0	$ 0	$ 0
-4.24	10.33	$ 0	$ 0	$ 0	$ 0
-2.59	20	$ 0	$ 0	$ 0	$ 0
-2	25.71	$ 6	$ 0	$ 0	$ 0
-1.78	28.12	$ 4	$ 0	$ 0	$ 0
-1.61	30	$ 15	$ 0	$ 0	$ 0
-0.93	40	$ 22	$ 0	$ 0	$ 0
0	59.75	$ 0	$ 0	$ 0	$ 0
0.01	60	$ 21	$ 5	$ 12	$ 0
0.37	70	$ 41	$ 31	$ 12	$ 3
0.68	80	$ 16	$ 13	$ 4	$ 1
0.78	83.48	$ 32	$ 26	$ 7	$ 2
0.96	90	$ 357	$ 302	$ 75	$ 31
2.8	200	$ 158	$ 135	$ 33	$ 17
3.74	300	$ 91	$ 79	$ 22	$ 10
4.4	400	$ 880	$ 414	$ 196	$ 0
Total ($)		$ 1,643	$ 1,005	$ 360	$ 65

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-12.43	1.11	$ 0	$ 0	$ 0	$ 0
-9.15	2	$ 0	$ 0	$ 0	$ 0
-6.34	4.79	$ 0	$ 0	$ 0	$ 0
-4.94	8	$ 0	$ 0	$ 0	$ 0
-4.26	10.33	$ 0	$ 0	$ 0	$ 0
Total ($)		$ 1,639	$ 998	$ 348	$ 64

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building ($)	Contents ($)	Displacement ($)	Loss of Function ($)
-2.62	20	$ 0	$ 0	$ 0	$ 0
-2	25.86	$ 5	$ 0	$ 0	$ 0
-1.78	28.12	$ 4	$ 0	$ 0	$ 0
-1.64	30	$ 15	$ 0	$ 0	$ 0
-0.94	40	$ 22	$ 0	$ 0	$ 0
0	60	$ 0	$ 0	$ 0	$ 0
0	60	$ 20	$ 0	$ 0	$ 0
0.36	70	$ 40	$ 31	$ 12	$ 3
0.67	80	$ 16	$ 13	$ 4	$ 1
0.77	83.48	$ 31	$ 26	$ 7	$ 2
0.94	90	$ 355	$ 300	$ 75	$ 31
2.8	200	$ 158	$ 135	$ 33	$ 17
3.73	300	$ 91	$ 79	$ 22	$ 10
4.4	400	$ 880	$ 414	$ 196	$ 0
Total ($)		$ 1,639	$ 998	$ 348	$ 64

Building Information

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Non-Residential Occupancy Type:	COM2: Commercial - Wholesale Trade
Building is outside hundred-year flood area:	No
Building Type:	Warehouse-Non-Refrig
Building Is Engineered:	**No**
NFIP:	**No**

Standard Benefits - Building

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Depth Damage Curve:	Warehouse, Non-Refrig (Default) Use Default:Yes
Building Size (sq.ft):	3,200
Building Replacement Value (BRV) ($/sq.ft):	$100 Use Default:Yes
BRV Distributional Weight Multiplier:	1.1
Demolition Threshold (%):	50.00% Use Default:Yes
Expected Annual Losses due to Building Damages before Mitigation:	$1,643
Expected Annual Losses due to Building Damages after Mitigation:	$1,639
Expected Annual Benefits - Building:	$4

Depth Damage Curve - Building

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

	BEFORE MITIGATION				AFTER MITIGATION			
Flood Depth (ft)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)	Percent (%)	Damage Value ($)	NFIP ($)	ICC Fees ($)
-2	0.5	1,760	0	0	0.5	1,760	0	0
-1	0.5	1,760	0	0	0.5	1,760	0	0
0	1.1	3,872.00	0	0	1.1	3,872.00	0	0
1	11.8	41,536	0	0	11.8	41,536	0	0
2	19.9	70,048	0	0	19.9	70,048	0	0
3	25.4	89,408	0	0	25.4	89,408	0	0
4	31.4	110,528	0	0	31.4	110,528	0	0
5	34.2	120,384.00	0	0	34.2	120,384.00	0	0
6	39	137,280	0	0	39	137,280	0	0
7	41.8	147,136	0	0	41.8	147,136	0	0
8	45.7	160,864	0	0	45.7	160,864	0	0
9	50.4	352,000	0	0	50.4	352,000	0	0
10	51.7	352,000	0	0	51.7	352,000	0	0
11	51.7	352,000	0	0	51.7	352,000	0	0
12	51.7	352,000	0	0	51.7	352,000	0	0
13	51.7	352,000	0	0	51.7	352,000	0	0
14	51.7	352,000	0	0	51.7	352,000	0	0
15	51.7	352,000	0	0	51.7	352,000	0	0
16	51.7	352,000	0	0	51.7	352,000	0	0

Standard Benefits - Contents

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Contents Value in Dollars:	$0 Use Default:Yes
Expected Annual Losses due to Content Damages before Mitigation:	$1,005
Expected Annual Losses due to Content Damages after Mitigation:	$998
Expected Annual Benefits - Content:	$7

Depth Damage Curve - Contents

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Percent (%)	Damage Value ($)	Percent (%)	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	21	34,742.4	21	34,742.4
2	34	56,249.6	34	56,249.6
3	47	77,756.8	47	77,756.8
4	57	94,300.8	57	94,300.8
5	66	109,190.4	66	109,190.4
6	74	122,425.6	74	122,425.6
7	81	134,006.4	81	134,006.4
8	88	145,587.2	88	145,587.2
9	92	152,204.8	92	152,204.8
10	94	155,513.6	94	155,513.6
11	94	155,513.6	94	155,513.6
12	94	155,513.6	94	155,513.6
13	94	155,513.6	94	155,513.6
14	94	155,513.6	94	155,513.6
15	94	155,513.6	94	155,513.6
16	94	155,513.6	94	155,513.6

Standard Benefits - Displacement

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Monthly Displacement Cost ($/sq.ft/month):	0.64 Use Default:Yes
One-Time Displacement Cost ($/sq.ft):	1.28 Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	$360
Expected Annual Losses due to Displacement Damages after Mitigation:	$348
Expected Annual Losses - Displacement:	$12

Depth Damage Curve - Displacement

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	4,797.36	45	4,797.36
2	90	9,594.73	90	9,594.73
3	135	14,392.10	135	14,392.10
4	180	25,249.31	180	25,249.31
5	225	31,561.64	225	31,561.64
6	270	37,873.97	270	37,873.97
7	315	44,186.30	315	44,186.30
8	360	62,618.30	360	62,618.30
9	405	70,445.58	405	70,445.58
10	450	78,272.87	450	78,272.87
11	450	78,272.87	450	78,272.87
12	450	30,299.17	450	30,299.17
13	450	30,299.17	450	30,299.17
14	450	30,299.17	450	30,299.17
15	450	30,299.17	450	30,299.17
16	450	30,299.17	450	30,299.17

Standard Benefits - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Annual Operating Budget:	$25,000
Loss of Function/Loss of Income Per Day:	$0
Expected Annual Losses due to Loss of Function/Loss of Income before mitigation:	$65
Expected Annual Losses due to Loss of Function/Loss of Income after mitigation:	$64
Expected Annual Benefits - Expected Annual Benefits - Loss of Function/Loss of Income:	$1

Depth Damage Curve - Loss of Function/Loss of Income

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

	BEFORE MITIGATION		AFTER MITIGATION	
Flood Depth (ft)	Days	Damage Value ($)	Days	Damage Value ($)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	3,082.19	45	3,082.19
2	90	6,164.38	90	6,164.38
3	135	9,246.57	135	9,246.57
4	180	12,328.76	180	12,328.76
5	225	15,410.95	225	15,410.95
6	270	18,493.15	270	18,493.15
7	315	21,575.34	315	21,575.34
8	360	24,657.53	360	24,657.53
9	405	27,739.72	405	27,739.72
10	450	30,821.91	450	30,821.91
11	450	30,821.91	450	30,821.91
12	450	30,821.91	450	30,821.91
13	450	30,821.91	450	30,821.91
14	450	30,821.91	450	30,821.91
15	450	30,821.91	450	30,821.91
16	450	30,821.91	450	30,821.91

Standard Benefits - Volunteer Costs

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	$0

Standard Benefits - Ecosystem Services

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Total Project Area (acres):	1
Percentage of Urban Green Open Space:	100.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$15,541

Benefits-Costs Summary

Floodplain and Stream Restoration @ 116 2nd St NW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Total Standard Mitigation Benefits:	$301,186
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$301,186
Total Mitigation Project Cost:	$906,747
Benefit Cost Ratio - Standard:	0.33
Benefit Cost Ratio - Standard + Social:	0.33

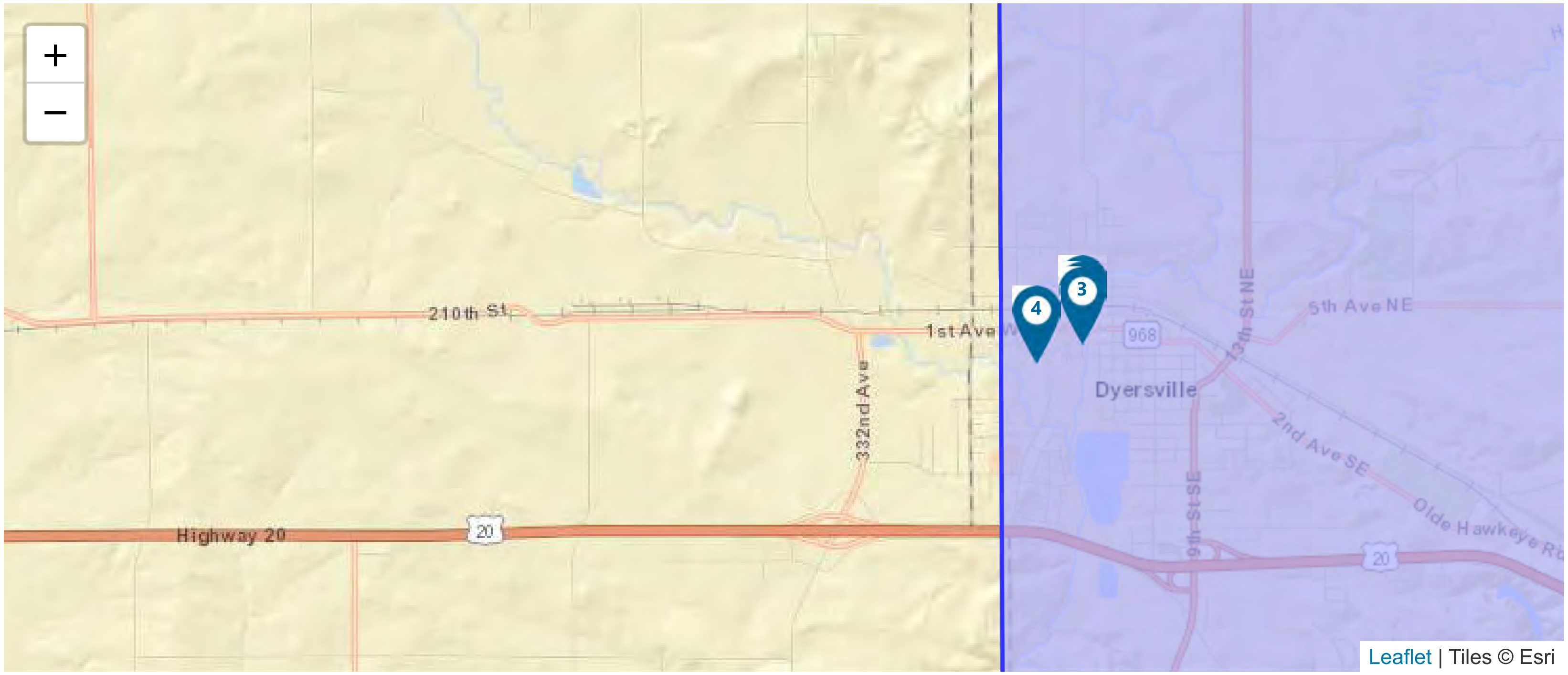
FEMA

Benefit-Cost Calculator

V.6.0 (Build 20241018.1218 | Release Notes)

Benefit-Cost Analysis

Project Name: NF-12 Property Acquisition/Relocation



Map Marker	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)	
1	Acquisition @ 114 1st St SW, Dyersville, Iowa, 52040 PB		Riverine Flood	3.1	$ 775,411	$ 84,900	9.13	PB
2	Acquisition @ 122 1st St SW, Dyersville, Iowa, 52040 PB		Riverine Flood	3.1	$ 775,411	$ 63,700	12.17	PB
3	Acquisition @ 214 1st St SW, Dyersville, Iowa, 52040 PB		Riverine Flood	3.1	$ 775,411	$ 59,900	12.95	PB

Map Marker	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)	
4	Acquisition @ 320 4th St SW, Dyersville, Iowa, 52040 PB		Riverine Flood	3.1	$ 775,411	$ 106,700	7.27	PB
TOTAL (SELECTED)					**$ 3,101,644**	**$ 315,200**	**9.84**	
TOTAL					**$ 3,101,644**	**$ 315,200**	**9.84**	

Property Configuration

Property Title:	Acquisition @ 114 1st St SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48425300348748, -91.12414401542588
Hazard Type:	Riverine Flood
Mitigation Action Type:	Acquisition
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Acquisition @ 114 1st St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	100
Project Cost:	$84,900
Number of Maintenance Years:	100 Use Default:Yes
Annual Maintenance Cost:	$0

Property Configuration

Property Title:	Acquisition @ 122 1st St SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48386601101788, -91.12413202930435
Hazard Type:	Riverine Flood
Mitigation Action Type:	Acquisition
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Acquisition @ 122 1st St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	100
Project Cost:	$63,700
Number of Maintenance Years:	100 Use Default:Yes
Annual Maintenance Cost:	$0

Property Configuration

Property Title:	Acquisition @ 214 1st St SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.48348501160902, -91.12413596879884
Hazard Type:	Riverine Flood
Mitigation Action Type:	Acquisition
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Acquisition @ 214 1st St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	100
Project Cost:	$59,900
Number of Maintenance Years:	100 Use Default:Yes
Annual Maintenance Cost:	$0

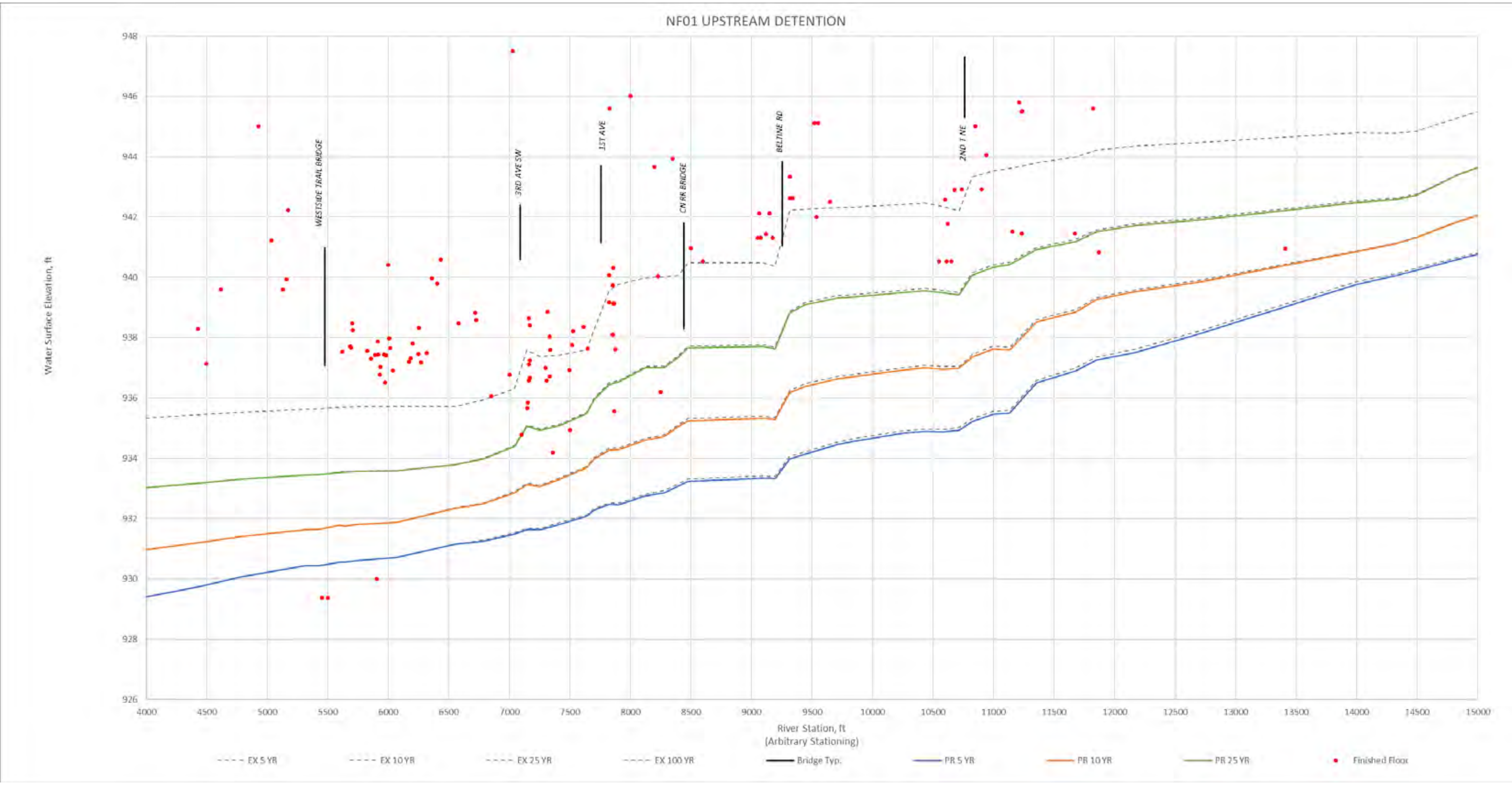
Property Configuration

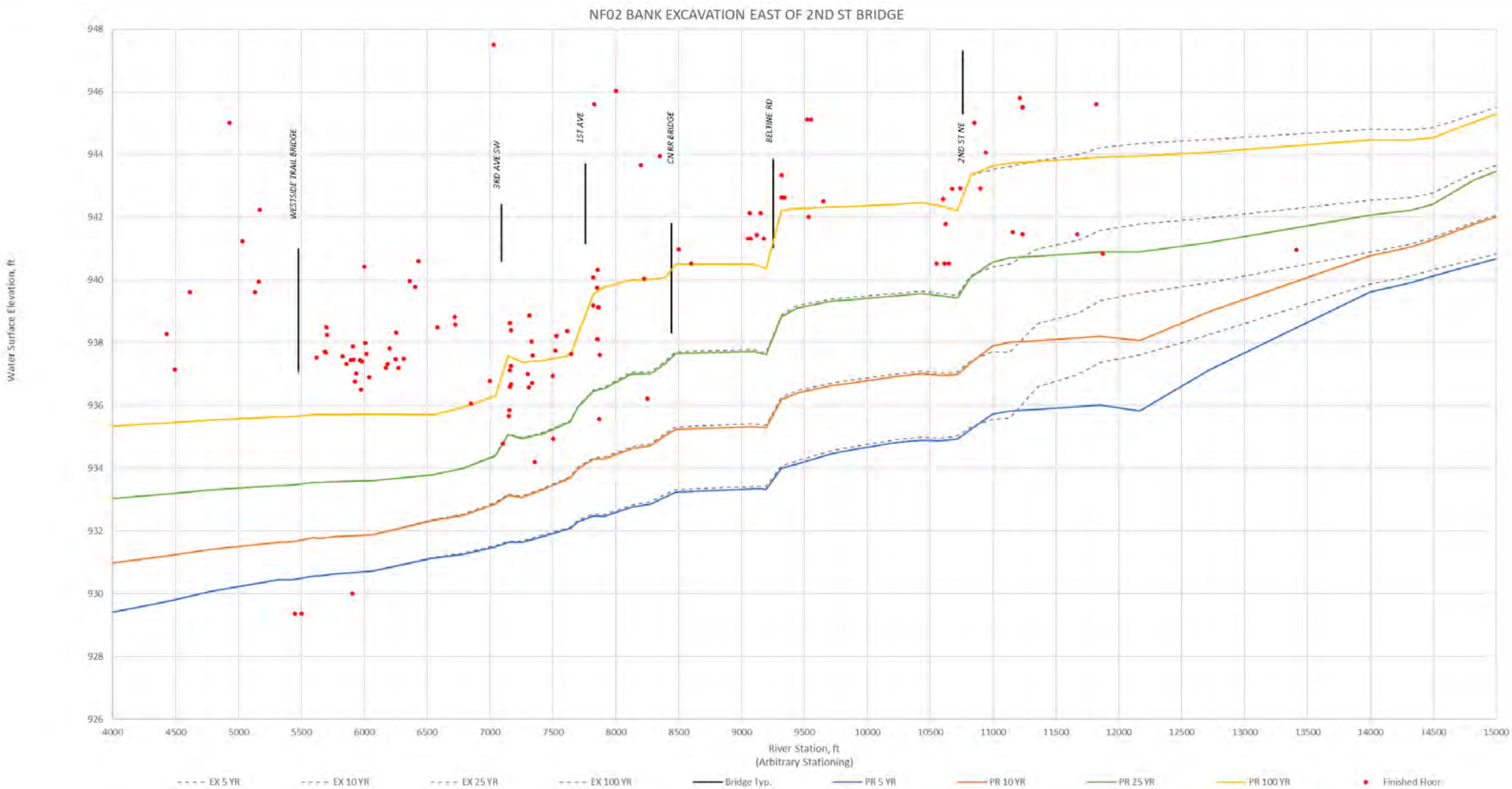
Property Title:	Acquisition @ 320 4th St SW, Dyersville, Iowa, 52040
Property Location:	52040, Dubuque, Iowa
Property Coordinates:	42.482204005346716, -91.12827998172877
Hazard Type:	Riverine Flood
Mitigation Action Type:	Acquisition
Property Type:	Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

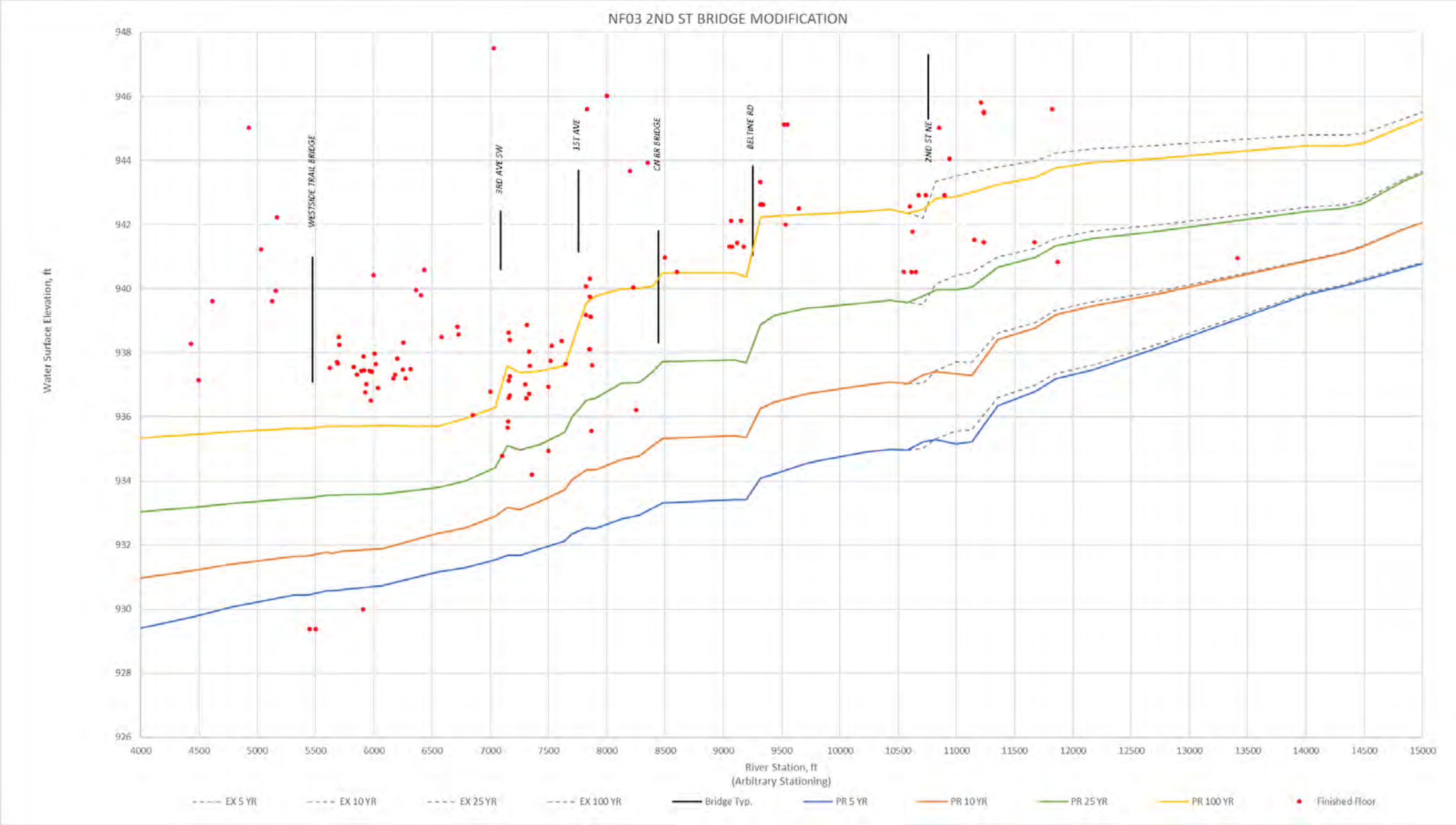
Acquisition @ 320 4th St SW, Dyersville, Iowa, 52040

Discount Rate (%):	3.1% Use Default:Yes
Project Useful Life (years):	100
Project Cost:	$106,700
Number of Maintenance Years:	100 Use Default:Yes
Annual Maintenance Cost:	$0

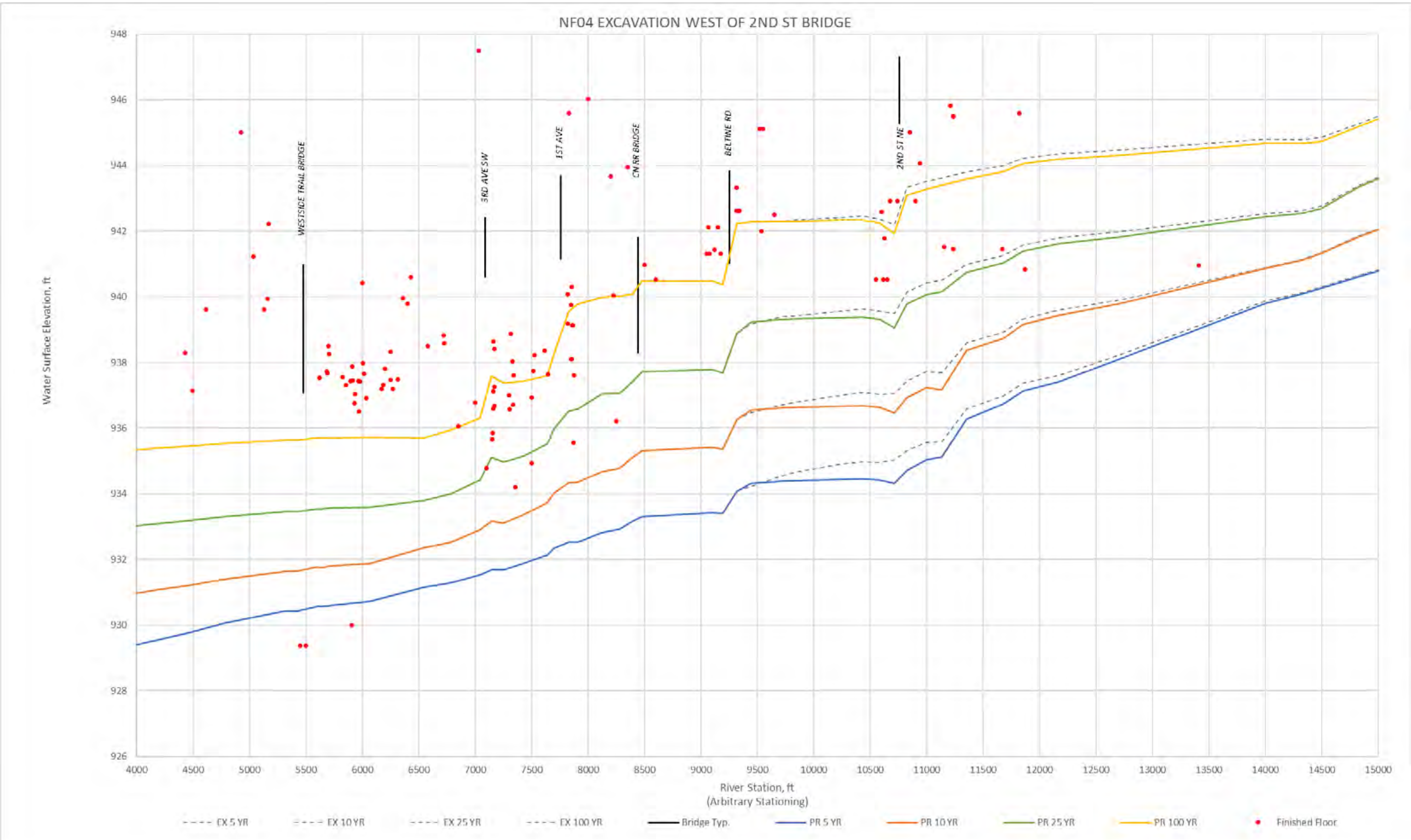

NF01 UPSTREAM DETENTION
Water Surface Elevation, ft
River Station, ft
(Arbitrary Stationing)
WESTSIDE TRAIL BRIDGE
3RD AVE SW
1ST AVE
CN RR BRIDGE
BELTINE RD
2ND ST NE
EX 5 YR
EX 10 YR
EX 25 YR
EX 100 YR
Bridge Typ.
PR 5 YR
PR 10 YR
PR 25 YR
Finished Floor



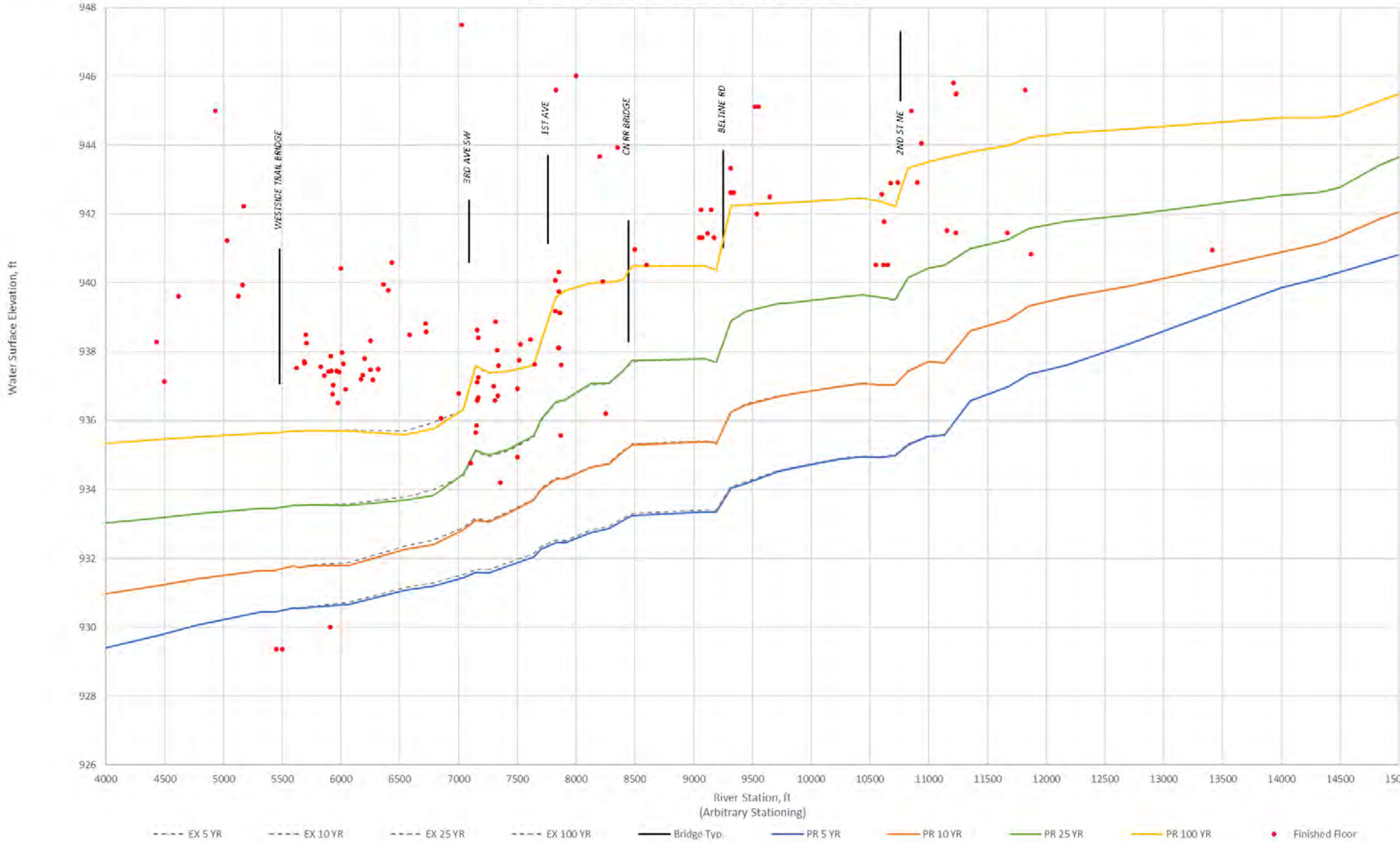
NF02 BANK EXCAVATION EAST OF 2ND ST BRIDGE
Water Surface Elevation, ft
River Station, ft
(Arbitrary Stationing)
WESTSIDE TRAIL BRIDGE
3RD AVE SW
1ST AVE
CN RR BRIDGE
BELTINE RD
2ND ST NE
926
928
930
932
934
936
938
940
942
944
946
948
4000
4500
5000
5500
6000
6500
7000
7500
8000
8500
9000
9500
10000
10500
11000
11500
12000
12500
13000
13500
14000
14500
15000
EX 5 YR
EX 10 YR
EX 25 YR
EX 100 YR
Bridge Typ.
PR 5 YR
PR 10 YR
PR 25 YR
PR 100 YR
Finished Floor

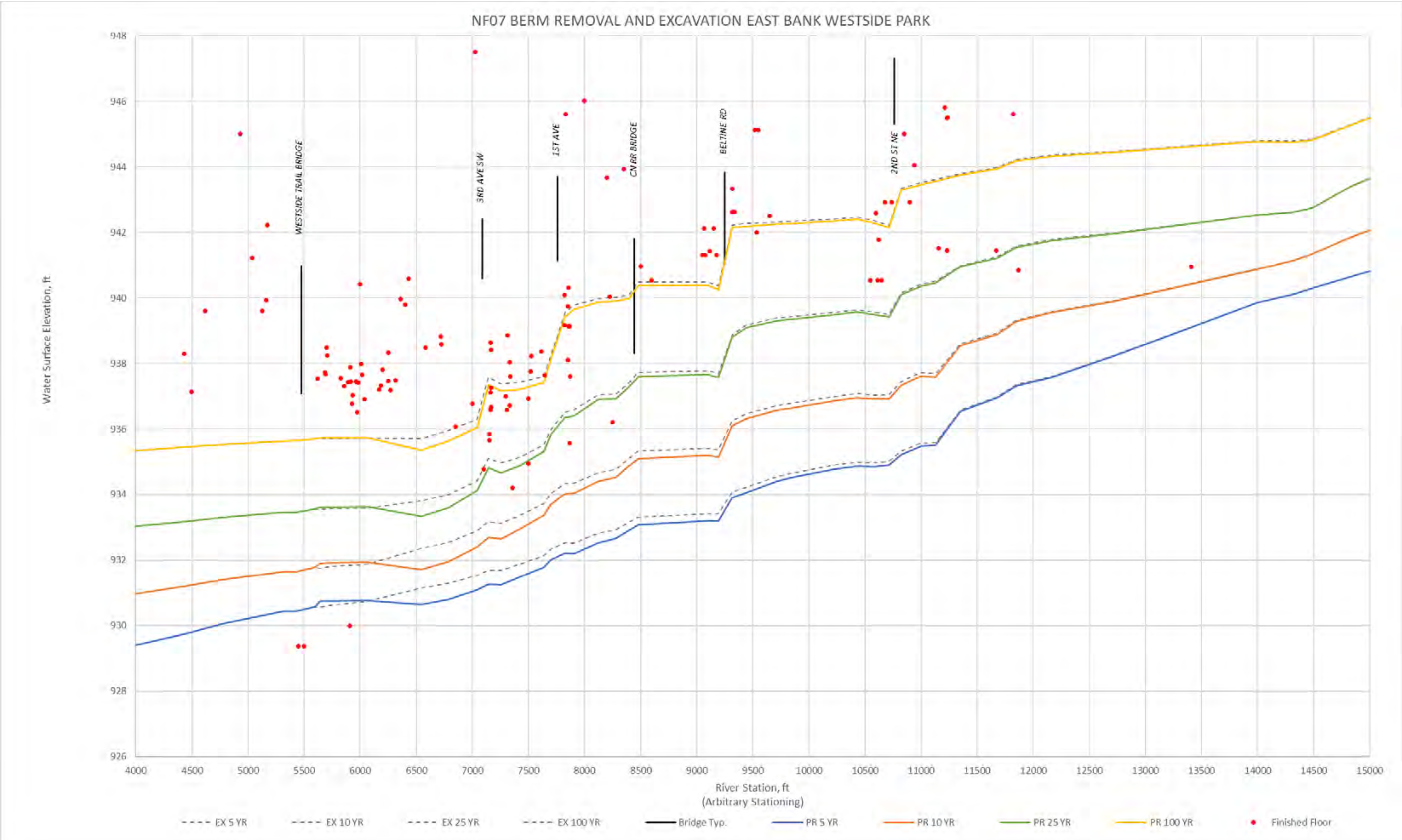


NF03 2ND ST BRIDGE MODIFICATION
Water Surface Elevation, ft
River Station, ft
(Arbitrary Stationing)
WESTSIDE TRAIL BRIDGE
3RD AVE SW
1ST AVE
CN RR BRIDGE
BELTINE RD
2ND ST NE
EX 5 YR
EX 10 YR
EX 25 YR
EX 100 YR
Bridge Typ.
PR 5 YR
PR 10 YR
PR 25 YR
PR 100 YR
Finished Floor

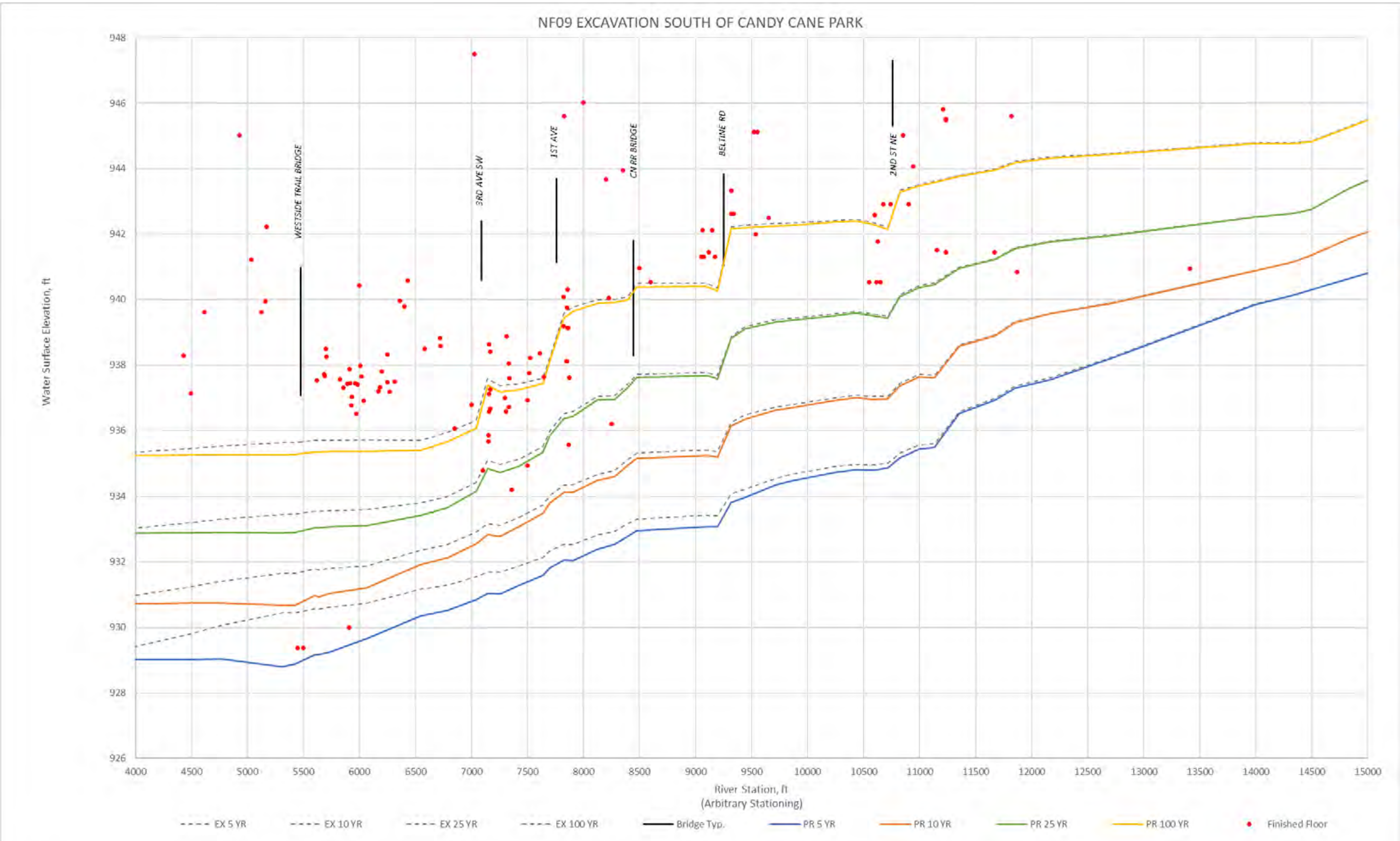

NF04 EXCAVATION WEST OF 2ND ST BRIDGE
Water Surface Elevation, ft
River Station, ft
(Arbitrary Stationing)
WESTSIDE TRAIL BRIDGE
3RD AVE SW
1ST AVE
CN RR BRIDGE
BELTINE RD
2ND ST NE
EX 5 YR
EX 10 YR
EX 25 YR
EX 100 YR
Bridge Typ.
PR 5 YR
PR 10 YR
PR 25 YR
PR 100 YR
Finished Floor

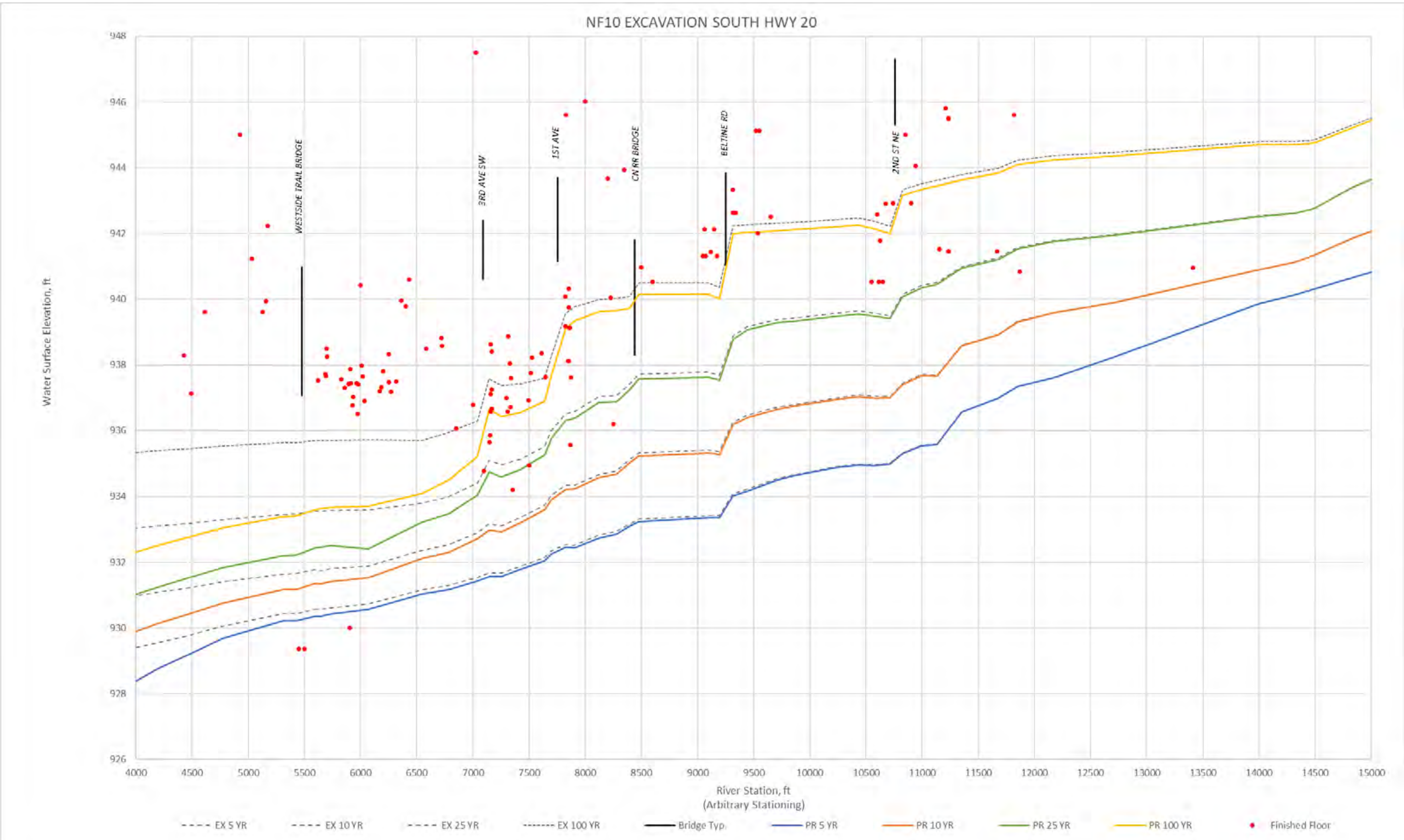
NF06 EXCAVATION WEST BANK WESTSIDE PARK



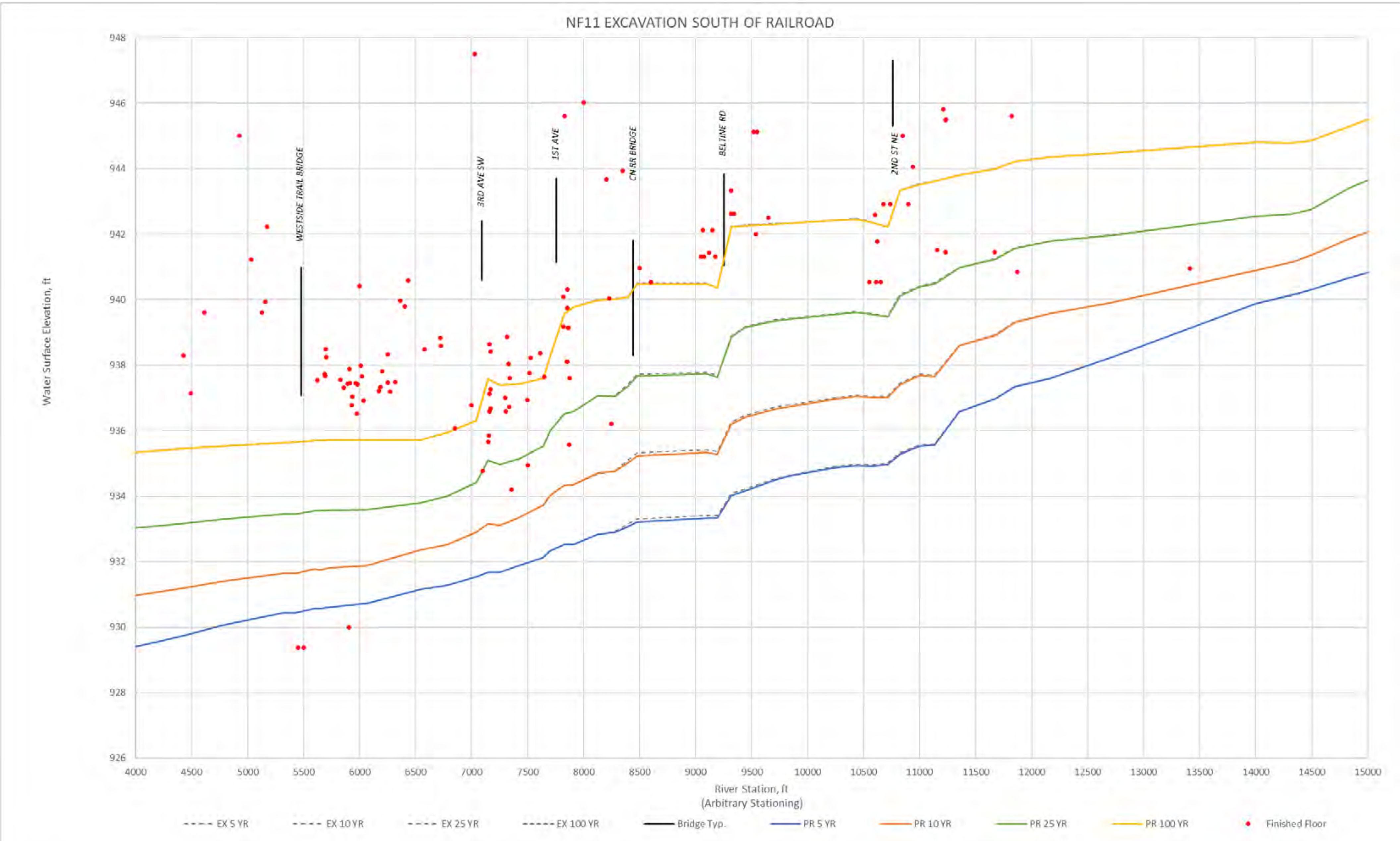


NF07 BERM REMOVAL AND EXCAVATION EAST BANK WESTSIDE PARK
Water Surface Elevation, ft
River Station, ft
(Arbitrary Stationing)
WESTSIDE TRAIL BRIDGE
3RD AVE SW
1ST AVE
CN RR BRIDGE
BELTINE RD
2ND ST NE
EX 5 YR
EX 10 YR
EX 25 YR
EX 100 YR
Bridge Typ.
PR 5 YR
PR 10 YR
PR 25 YR
PR 100 YR
Finished Floor


NF09 EXCAVATION SOUTH OF CANDY CANE PARK
Water Surface Elevation, ft
River Station, ft
(Arbitrary Stationing)
WESTSIDE TRAIL BRIDGE
3RD AVE SW
1ST AVE
CN RR BRIDGE
BELTINE RD
2ND ST NE
EX 5 YR
EX 10 YR
EX 25 YR
EX 100 YR
Bridge Typ.
PR 5 YR
PR 10 YR
PR 25 YR
PR 100 YR
Finished Floor



NF10 EXCAVATION SOUTH HWY 20
Water Surface Elevation, ft
River Station, ft
(Arbitrary Stationing)
WESTSIDE TRAIL BRIDGE
3RD AVE SW
1ST AVE
CN RR BRIDGE
BELTINE RD
2ND ST NE
EX 5 YR
EX 10 YR
EX 25 YR
EX 100 YR
Bridge Typ.
PR 5 YR
PR 10 YR
PR 25 YR
PR 100 YR
Finished Floor



NF11 EXCAVATION SOUTH OF RAILROAD
Water Surface Elevation, ft
River Station, ft
(Arbitrary Stationing)
WESTSIDE TRAIL BRIDGE
3RD AVE SW
1ST AVE
CN RR BRIDGE
BELTINE RD
2ND ST NE
EX 5 YR
EX 10 YR
EX 25 YR
EX 100 YR
Bridge Typ.
PR 5 YR
PR 10 YR
PR 25 YR
PR 100 YR
Finished Floor