



Agenda for Stream Mitigation Method Update and Site Tour

October 14, 2016

Urbandale Library and Centennial Park -Waukee

9:15 Introductions and Agenda Review
Opening Discussion

Site Overviews and Updated ISMM Scoring

9:30 Stream Straightening
Gilbert Iowa Site
Claire Hruby, Iowa DNR

10:10 CREP Wetland
Dallas County
Brandon Dittman, IDALS Shawn Richmond, AAI

10:50 BREAK

11:00 Iowa DOT: IA 31 Bridge Replacement Over Four-Mile Creek
Cherokee County
Mike Carlson, Iowa DOT

11:40 Grand Prairie Parkway/Centennial Park
Waukee, Iowa
Claire Hruby, Iowa DNR

12:15 Overview of the ISMM and the Public Comment Process
Matt Zehr, US Army Corps of Engineers

12:30 End of Urbandale Library portion of meeting

1:30 Meet at Centennial Park, Waukee, Iowa

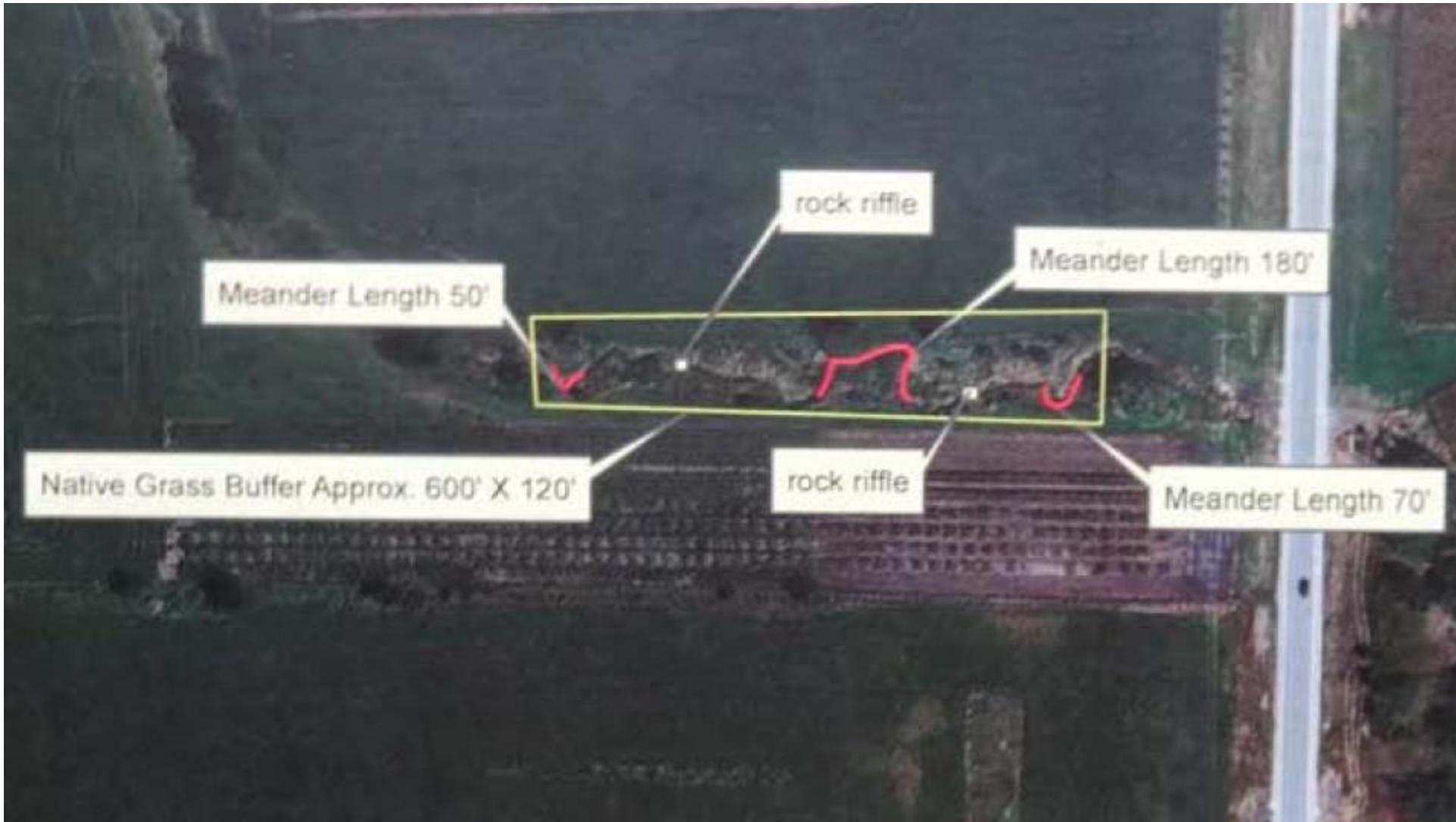
3:00 Anticipated End of Tour

Method Test Case: Leon Wuebker, Story County

Project Summary

- Location: Story County, IA
- PRM- primary, onsite (HUC 7)
- Unnamed tributary to S. Skunk River- perennial, 1st and 2nd order, tertiary waters
- Impact: ~300 linear feet (straightening stream channel, complete loss)
- In-Stream: ~144 linear ft (straightened channel length to reconnect stream)
- Buffer: ~66,000 sq ft total of buffer (on both stream sides)

Plan-view Drawing



2010 aerial photo, pre-construction



2016 google maps aerial photo



Adverse Impacts: Channelization

Mitigation: Riparian buffer



Oct 2016 Photo

Tim Hall

Rock Riffle Grade Control
Structure

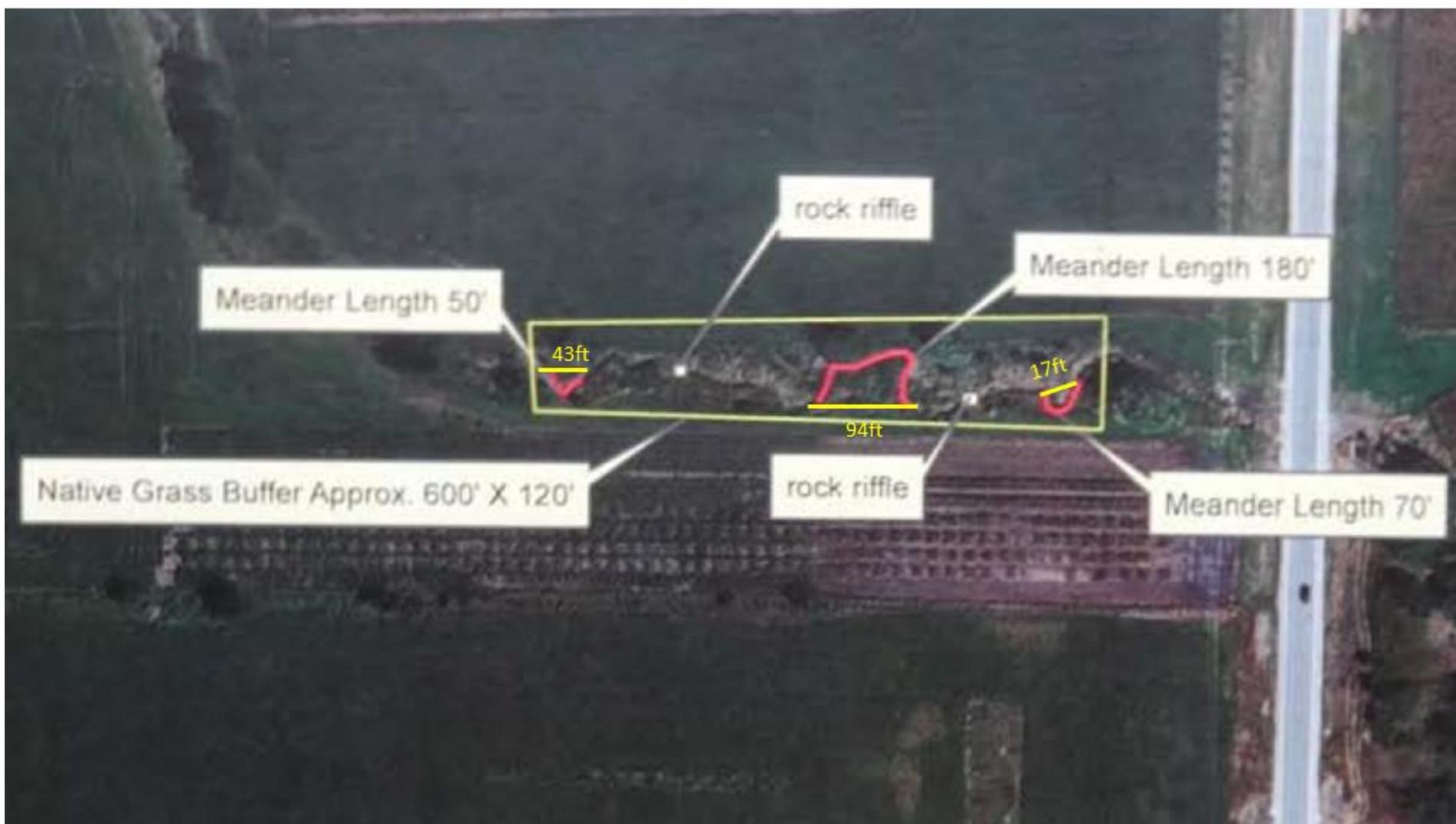


Oct 2016 Photo
Tim Hall

2016 Iowa Method
Adverse Impacts

1,800 credits required

ADVERSE IMPACTS WORKSHEET			
Project Name	Type Project Name		
Instructions - For each stream reach, type the name/description, choose factor ONLY change values in the blue boxes. All scores and values will be calculated.			
	Stream Reach 1		
Name/Description	Straightening Stream Channel		
Factor	Type	Score	
Stream Type	Perennial (1st and 2nd orders) ▾	0.60	
Priority Waters	Tertiary	0.10	
Existing Condition	Moderately Functional	0.80	
Impact Activity	7) Complete Loss	2.50	
Sum of Factors (M)		4.00	
Linear Feet of Impact (LF)	300		
Credits Needed (C)		1,200.00	
Compensation Ratio	Primary (PRM)	1.50	Pri
Total Credits Per Reach		1,800.00	
TOTAL MITIGATION CREDITS REQUIRED		1,800.00	



Meander Length 50'

rock riffle

Meander Length 180'

43ft

94ft

17ft

Native Grass Buffer Approx. 600' X 120'

rock riffle

Meander Length 70'

2016 Iowa Method
In-stream Mitigation

266.4 credits

IN-STREAM BENEFITS WORKSHEET		
Project Name	Type Project Name	
Instructions - For each stream reach, choose factor types from the dropdown menu. ONLY change values in the blue boxes. All scores and values will be calculated based on the selected values.		
	Stream Reach 1	
Name/Description	Rock riffles	
Factor	Type	Score
Stream Type	Perennial (1st and 2nd orders)	0.30
Priority Waters	Tertiary	0.05
Net Benefit	Moderate	1.20
Site Protection	3rd Party Grantee	0.20
Credit Schedule	Schedule 2	0.10
Sum of Factors (M)		1.85
Linear Feet of Benefit (LF)	144	
Reach Credits Generated (RC)		266.40
Project Credit Subtotal		266.40
In-Kind vs. Out-of-Kind	In-Kind	1.00
TOTAL MITIGATION CREDITS EARNED		266.40

2016 Iowa Method
Buffer Benefits

1,311.75 credits

RIPARIAN BUFFER WORKSHEET		
Project Name	Type Project Name	
Instructions - For each stream reach, enter dimensions of buffers and choose factor type ONLY change values in the blue boxes. All scores and values will be calculated automatically		
	Buffer Area 1	
Name/Description	600'x120'	
Buffer Dimensions (for info only)	all measurements in feet	
Average width of buffer (side A)	55	
Average width of buffer (side B)	55	
Stream length	572	
Factor	Type	Score
Net Benefit	B) Restoration/Re-establishment	1.20
Functional Zone	Zone 1	1.20
Site Protection	3rd Party Grantee	0.20
Credit Schedule	Schedule 2	0.05
Temporal Lag Factor	D) Emergent	0.00
Sum of Factors		2.65
Buffer area in square feet		33000
Buffer Credit Subtotal		874.50
Supplemental (Buffer on both sides)	2) Buffer on both sides	1.50
In-Kind vs. Out-of-Kind	In-Kind	1.00
Credits Generated		1311.75
Additional comments or description:		
	TOTAL MITIGATION CREDITS EARNED	1311.75

Method Comparisons

	2007 MSMM	ISMM – Oct 2016
Adverse Impacts	1,380	1,800
In-Stream Benefits	843 (30%)	266.4 (17%)
Riparian Benefits	1,950 (70%)	1,311.75 (83%)
Fish Passage Benefits	NA	NA
Debits-credits	+1,413 credits	-221.85 credits

Missouri 2007
 Adverse Impacts:
 1380 credits required

ADVERSE IMPACT
 FACTORS FOR RIVERINE SYSTEMS WORKSHEET

Stream Type Impacted	Ephemeral 0.1			Intermittent 0.4			Perennial 0.8		
Priority Area	Tertiary 0.1			Secondary 0.4			Primary 0.8		
Existing Condition	Functionally Impaired 0.1			Moderately Functional 0.8			Fully Functional 1.6		
Duration	Temporary 0.05			Recurrent 0.1			Permanent 0.3		
Activity	Clearing 0.05	Utility Crossing/Bridge Footing 0.15	Below Grade Culvert 0.3	Armor 0.5	Detention 0.75	Morpho-logic Change 1.5	Impoundment (dam) 2.0	Pipe 2.2	Fill 2.5
Linear Impact	<100' 0	100'-200' 0.05	201-500' 0.1	501-1000' 0.2	>1000 linear feet (LF) 0.1 reach 500 LF of impact (example: scaling factor for 5,280 LF of impacts = 1.1)				

Factor	Dominant Impact Type 1	Dominant Impact Type 2	Dominant Impact Type 3	Dominant Impact Type 4	Dominant Impact Type 5
Channelizing					
Stream Type Impacted	0.8				
Priority Area	0.1				
Existing Condition	0.8				
Duration	0.3				
Activity	2.5				
Linear Impact	0.1				
Sum of Factors	M = 4.6				
Linear Feet of Stream Impacted in Reach	LF = 300				
M X LF	1380				

Total Mitigation Credits Required * = (M X LF) = 1380

*This value may be applied to mitigation at a mitigation bank at a 1:1 ratio, when the impact area

**IN-STREAM WORK
STREAM CHANNEL / STREAM RESTORATION or ENHANCEMENT AND RELOCATION
WORKSHEET**

Missouri 2007
In-Stream Mitigation:

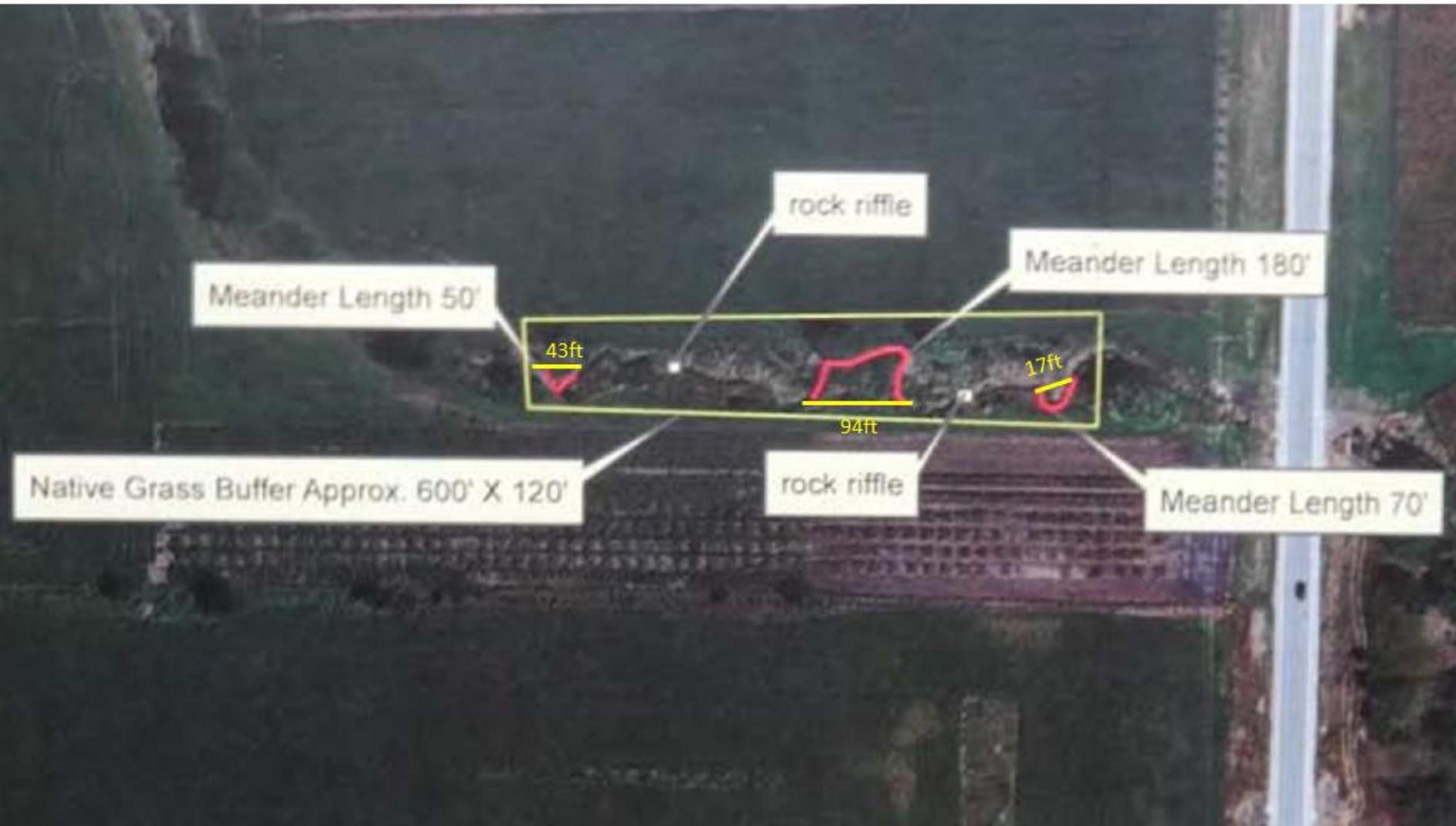
843 credits

Stream Type	Ephemeral 0.05	Intermittent 0.4	Perennial Stream			
			<15' 0.4	15'-30' 0.6	30'-50' 0.8	>50' 1.0
Priority Area	Tertiary 0.05		Secondary 0.2		Primary 0.4	
Existing Condition	Not Applicable 0		Functionally Impaired 0.4		Moderately Functional 0.05	
Net Benefit	Stream Relocation 0.1	Stream Channel Restoration / Stream Enhancement				
		Relocated Stream with In-Stream features 0.5	Moderate 1.0	Good 2.0	Excellent 3.5	
Monitoring/Contingency	Level I 0.05		Level II 0.3	Level III 0.5		
Control / Site Protection	Corps approved site protection without third party grantee 0.1		Corps approved site protection recorded with third party grantee, or transfer of title to a conservancy 0.4			
Mitigation Construction Timing	Schedule 1 0.3		Schedule 2 0.1	Schedule 3 0		

Factors	Reconnecting channels		Grade Control			
	Net Benefit 1	Net Benefit 2	Net Benefit 3	Net Benefit 4	Net Benefit 5	Net Benefit 6
Stream Type	1.0	1.0				
Priority Area	0.05	0.05				
Existing Condition	0.4	0.4				
Net Benefit	1.0	1.0				
Monitoring/Contingency	0.05	0.05				
Control/Site Protection	0.4	0.4				
Mitigation Construction Timing	0.1	0.1				
Sum Factors (M)=	3.0	3.0				
Stream length in Reach (do not count each bank separately) (LF)=	144ft	137ft				
Credits (C) = M X LF	432	411				
Total Credits Generated C X Mitigation Factor (MF) =	432 x 1 = 432	411 x 1 = 411				

Total Channel Restoration/Relocation Credits Generated = 843

144ft of straightened channel, only 137ft of which are upstream of the grade control structures



**RIPARIAN BUFFER CREATION, ENHANCEMENT, RESTORATION AND PRESERVATION
WORKSHEET**

Stream Type	Ephemeral 0.05	Intermittent 0.2	Perennial 0.4	
Priority Area	Tertiary 0.05	Secondary 0.2	Primary 0.4	
Net Benefit (for each side of stream)	Riparian Creation, Enhancement, Restoration, and Preservation Factors (select values from Table 1) (MBW = Minimum Buffer Width = 25' + 2' / 1% slope)			0.8
System Protection Credit	Condition : MBW restored or protected on both streambanks To calculate: (Net Benefit Stream Side A + Net Benefit Stream Side B) / 2 = 0.8			
Monitoring/Contingency (for each side of stream)	Level I 0.05	Level II 0.15	Level III 0.25	
Control / Site Protection	Corps approved site protection without third party grantee 0.05		Corps approved site protection recorded with third party grantee, or transfer of title to a conservation agency 0.2	
Mitigation Construction Timing (for each side of stream)	Schedule 1 0.15		Schedule 2 0.05	Schedule 3 0
Temporal Lag (Years)	Over 20 -0.3	10 to 20 -0.2	5 to 10 -0.1	0 to 5 0

Factors		Net Benefit 1	Net Benefit 2	Net Benefit 3	Net Benefit 4	Net Benefit 5	Net Benefit 6
Stream Type		0.4					
Priority Area		0.05					
Net Benefit	Stream Side A	0.8					
	Stream Side B	0.8					
System Protection Credit Condition Met (Buffer on both sides)		0.8					
Monitoring/Contingency	Stream Side A	0.05					
	Stream Side B	0.05					
Control /Site Protection		0.2					
Mitigation Construction Timing (none for primarily riparian preservation) < 10% requires planting)	Stream Side A	0.05					
	Stream Side B	0.05					
Temporal Lag		0					
Sum Factors (M)=		3.25					
Linear Feet of Stream Buffer (LF)= (don't count each bank separately)		600					
Credits (C) =M X LF		1950					
Total Credits Generated C X Mitigation Factor (MF) =		1950 x 1 = 1950					

Total Riparian Restoration Credits Generated = 1950

Missouri 2007
Buffer Benefits:

1950 credits

Approximately 55ft of buffer on each side of the stream was established and 51-100% of reed canary grass was removed and replaced with native grasses.

Buffer width (on one side of the stream) Equal to or greater than	% Buffer that needs planting		
	*Buffer Creation and Restoration Exotic Removal and (51-100%)Planting	Buffer Enhancement Exotic Removal and (10-50%)Planting	Buffer Preservation (<10%)Planting
300 feet	2.8	1.4	0.7
275 feet	2.7	1.35	0.675
250 feet	2.6	1.30	0.65
225 feet	2.5	1.25	0.625
200 feet	2.4	1.2	0.60
175 feet	2.2	1.1	0.55
150 feet	2.0	1.0	0.50
125 feet	1.8	0.9	0.45
100 feet	1.6	0.8	0.4
75 feet	1.2	0.6	0.3
50 feet	0.8	0.4	0.2
25 feet (minimum width)**	0.4	0.2	0.1

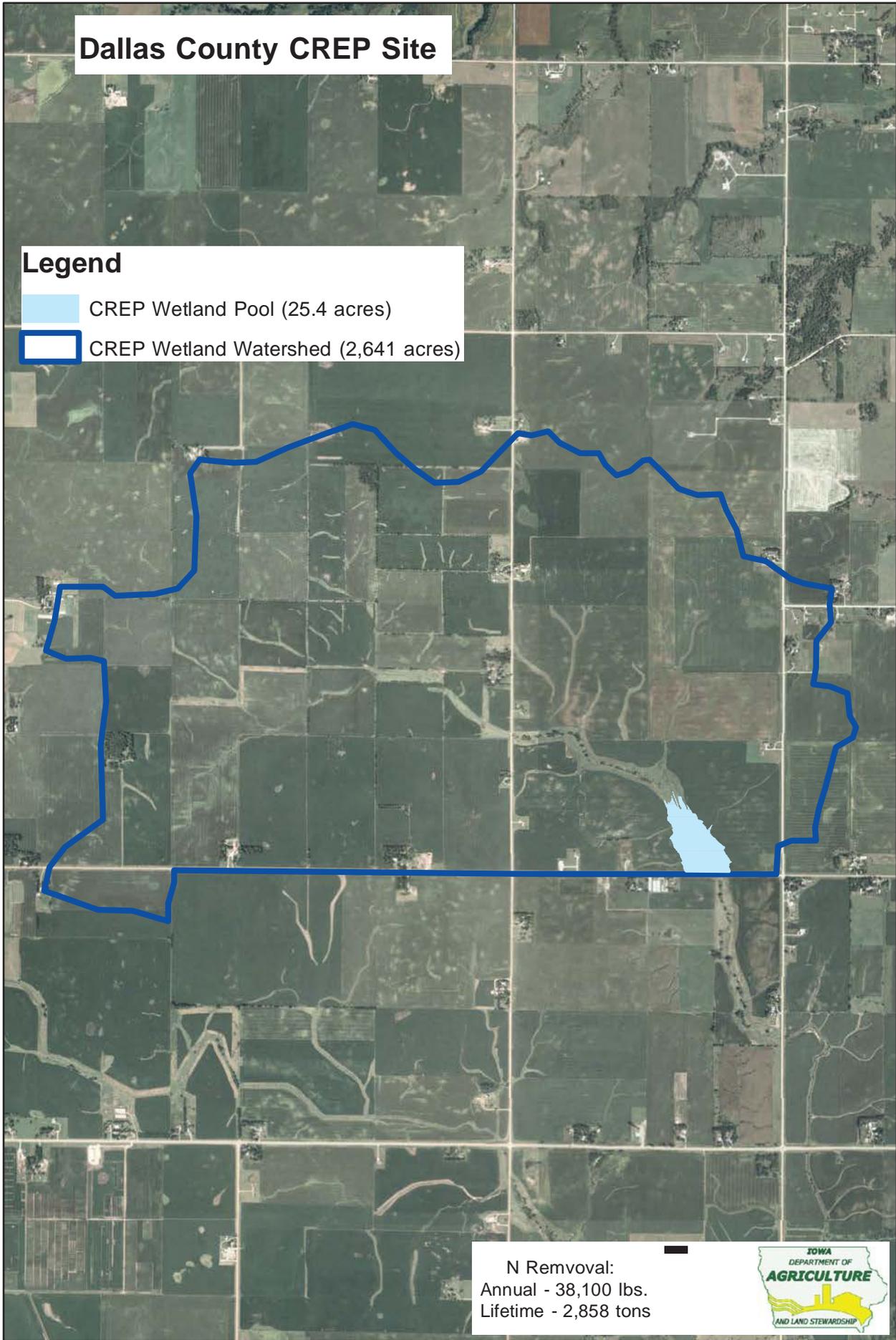


Table 1. Riparian Buffer Creation, Restoration, Enhancement, and Preservation

Dallas County CREP Site

Legend

-  CREP Wetland Pool (25.4 acres)
-  CREP Wetland Watershed (2,641 acres)



N Removal:
Annual - 38,100 lbs.
Lifetime - 2,858 tons



The Iowa Conservation Reserve Enhancement Program is a joint effort of the Iowa Department of Agriculture and Land Stewardship and the United States Department of Agriculture in cooperation with local Soil and Water Conservation Districts that provides incentives to landowners who voluntarily establish wetlands for water quality improvement in the heavily tile-drained regions of Iowa. The goal of the program is to reduce nitrogen loads and movement of other agricultural chemicals from croplands to streams and rivers. In addition to improving water quality, these wetlands provide high quality wildlife habitat and recreational opportunities.

Enrollment is on a continuous basis. Land must be in one of the 37 eligible counties in North-Central Iowa, and must meet CREP eligibility requirements. Specific eligibility criteria are as follows:

- Watershed area feeding to wetland must be between 500-4000 acres
- Wetland area must be between 0.5% and 2% of its watershed area (i.e. a 1000 acre watershed would require a wetland between 5 and 20 acres in size)
- The buffer to wetland ratio should not exceed 4:1
- Deep water area (>3ft deep) of the wetland should not exceed 25% of the total wetland area
- All tile drainage outlets entering the wetland must have at least 1 foot of separation above the design water level of the wetland in order to protect drainage rights

CREP wetland restoration entails creation of an earthen berm, steel sheet pile weir, and grouted riprap stilling basin along with a water level control structure to restore the wetland area. The other primary component is a buffer area surrounding the wetland that is seeded to native grasses and forbs. CREP wetland restorations work with existing topography to establish wetland areas and involve minimal excavation to accomplish this.

Landowners enrolling in CREP receive:

- 15 years of annual rental payments from USDA for all enrolled acres paid at a rate equal to 150% of the weighted average soil rental rate
- 100% cost-share for wetland restoration and buffer establishment
 - 90% of construction costs paid by USDA
 - 10% of construction costs paid by State
- A one-time, up-front incentive payment from the State to enter into either a 30-year or perpetual easement.

Research and ongoing monitoring by Iowa State University has demonstrated that strategically sited and designed CREP wetlands remove 40-90% of nitrates from cropland drainage waters.

- To date 95 CREP wetlands have been restored or are currently under construction or design.
- These sites total 891 acres of wetland pool treating a combined 122,300 acres of watershed.
- Over their lifetimes, it is estimated that they will remove over 100,300 tons of nitrate-nitrogen.
- Annually, they remove over 1.3M lbs of nitrogen.
- CREP wetlands have an average N-removal cost of \$0.26/lb.

Dallas County CREP site specific info:

- Wetland catchment drainage area (acres treated) – 2,641 acres
- Total estimated lbs. of N removed annually – 38,100 lbs.
- Total estimated tons of N removed over 150yr designed life of wetland – 2,858 tons
- Estimated cost/ lb. of N removed over 150yr designed life of wetland – \$0.33/ lb.
- If this 25 acre wetland is proved to be 40% efficient at removing N from water flowing through it, the land retirement equivalent amount for an equal reduction of N runoff is 1,243 row cropped acres.
- If this 25 acre wetland is proved to be 70% efficient at removing N from water flowing through it, the land retirement equivalent amount for an equal reduction of N runoff is 2,175 row cropped acres.

Wetland Project Summary



Year Completed: 2013

Program: Iowa Conservation Reserve Enhancement Program (CREP)

Watershed area: 2,641 acres

Wetland area: 25.4 acres (0.96% of watershed area)

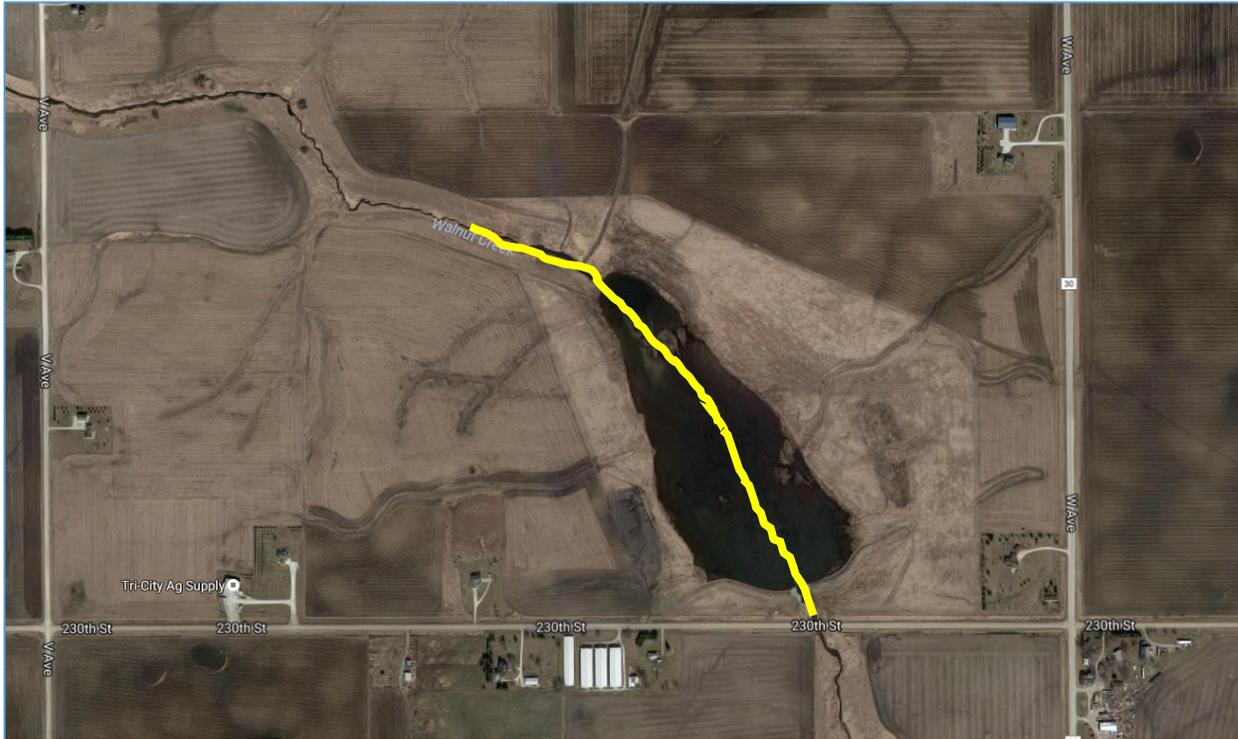
Buffer area: 73.45 acres

Average wetland depth: 1.2 feet

Estimated Annual N removal: 19 tons

Estimated Lifetime N removal: 2,858 tons

Impacts



Impoundment of Stream ~ 3000 feet

Benefits

Wetland area: 25.4 acres (0.96% of watershed area)

Buffer area: 73.45 acres

Estimated Annual N removal: 19 tons

Estimated Lifetime N removal: 2,858 tons



Photos courtesy of Iowa Department of Agriculture & Land Stewardship

2007 Missouri Method vs. 2016 Proposed Iowa Method



2007 Missouri Method:

- Total Mitigation Credits Needed: 13,800
- Buffer Area Needed to Generate Credits: 11.25 acres
- (150' wide buffer on both sides of stream for 1633')

2016 Proposed Iowa Method:

- Total Mitigation Credits Needed: 16,650
- Buffer Area Needed to Generate Credits: 8.36 acres
- (100' wide buffer on both sides of stream for 1820')

The Bottom Line

- Iowa has a bold and ambitious goal for achieving 45% N and P removal.
- Wetlands are shown in the NRS science assessment to be responsible for over half (55%) of the nutrient load reductions needed to achieve agriculture's share of the N goal.
- The Iowa NRS says we need 7,000 water quality wetlands (plus several other practices) to achieve the 45% goal and today we have about 80 of them.
- This scale of wetland development isn't going to happen if stream mitigation penalizes/prevents the type of massive conservation infrastructure change called for in the NRS from happening.
- Stream mitigation needs to adequately understand and recognize the value of projects done for water quality and habitat benefit and accept them as "self-mitigating" without imposing any additional burdensome requirements on them.

Iowa Method Test Case - Small Transportation Project:

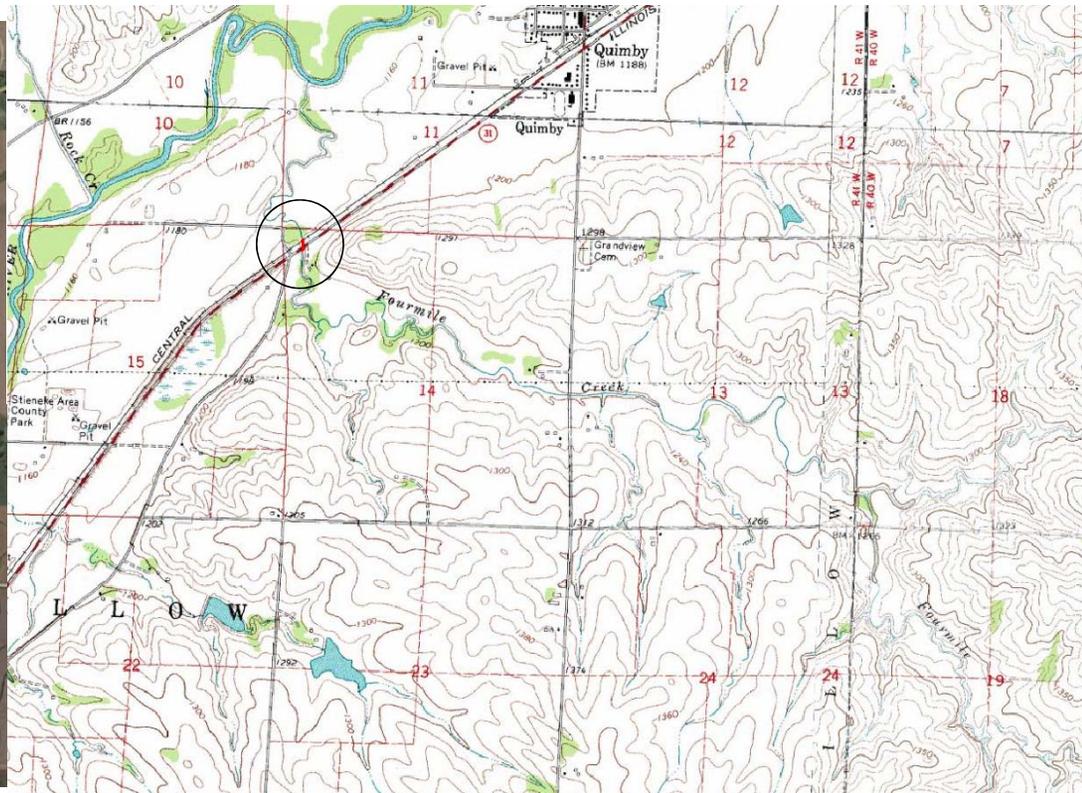
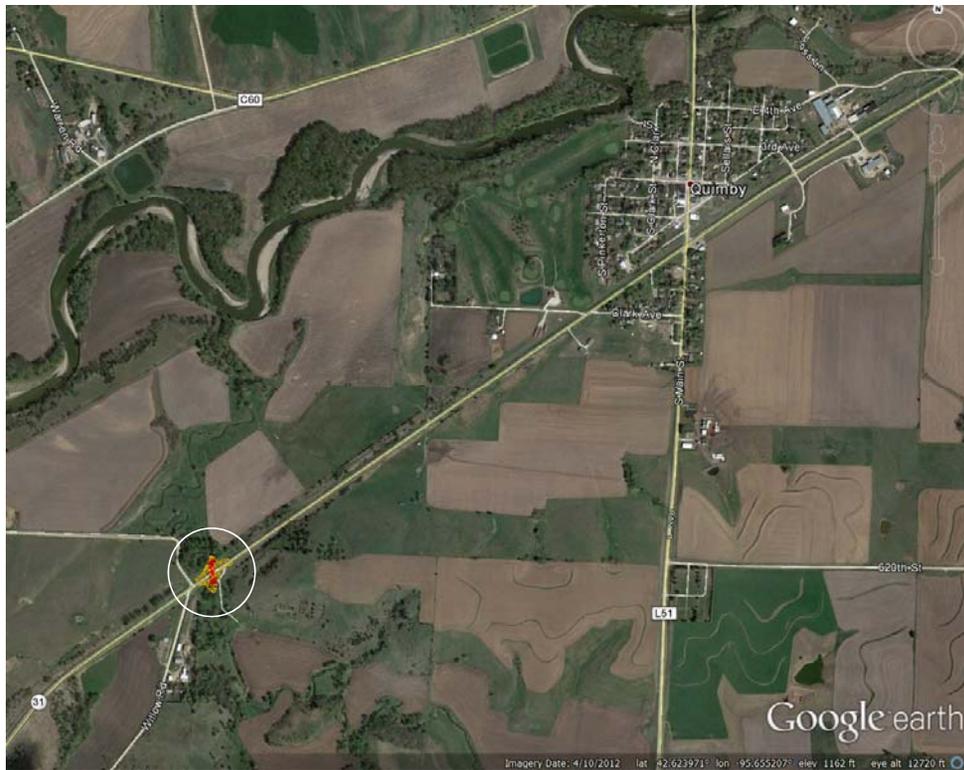
IA 31 Bridge Replacement Over Four-Mile Creek in Cherokee County



Iowa Dept. of Transportation – Office of Location and Environment

Project Location:

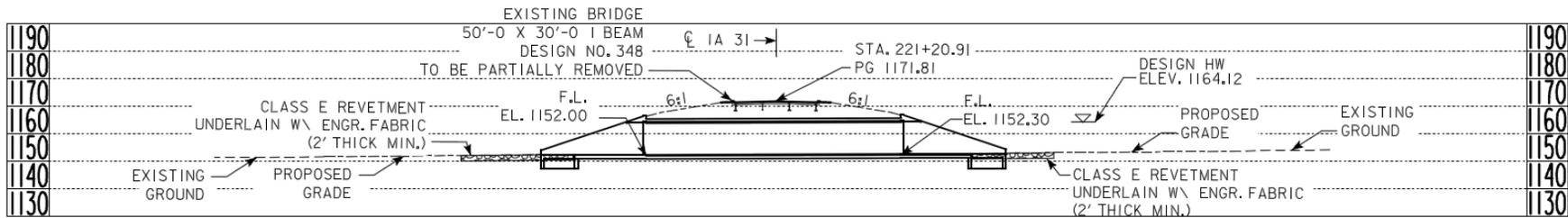
IA Hwy 31 approx. $\frac{3}{4}$ mile S. of Quimby in southern Cherokee County



Project Summary

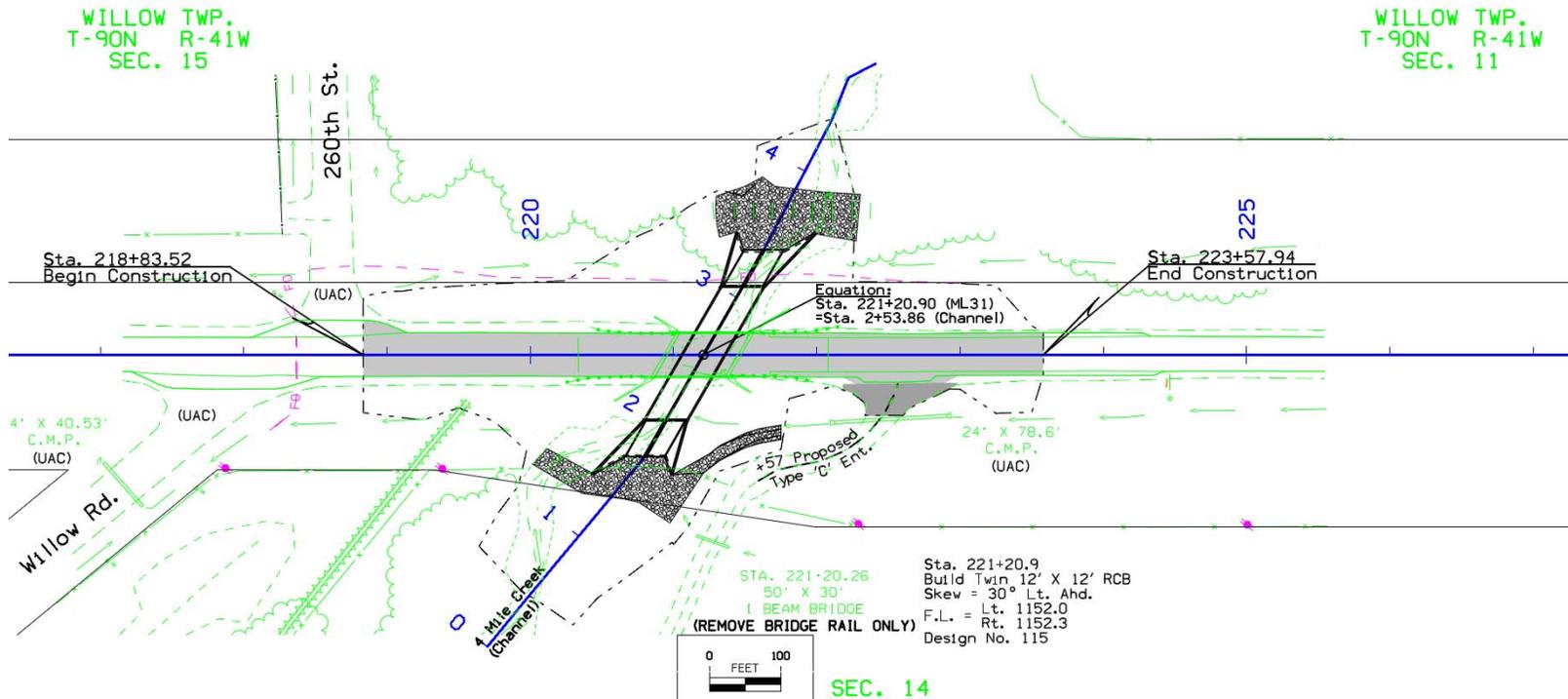
- 1948 bridge replaced with twin 12' x 12' x 107' box culvert (flowable mortar method)
- On-Site PRM mitigation: 1 instream structure & 0.95 ac. buffer preservation downstream
- Four-Mile Creek:
 - 2nd Order tributary of Little Sioux R.
 - 8-10' wide streambed
 - bank heights variable but 6-7' at bridge
 - 8.54 sq. mile D.A.
 - ~3.5' of streambed degradation since 1948
- Impact: 152' of stream put into box culvert, 162' realigned upstream, 122' shaped/realigned downstream
- Flowline of RCB buried for fish passage, channel stabilized with riprap on both inlet/outlet as "BMPs"
- Old RR Trestle Removed

Project Activities



LONGITUDINAL SECTION ALONG ϕ CULVERT

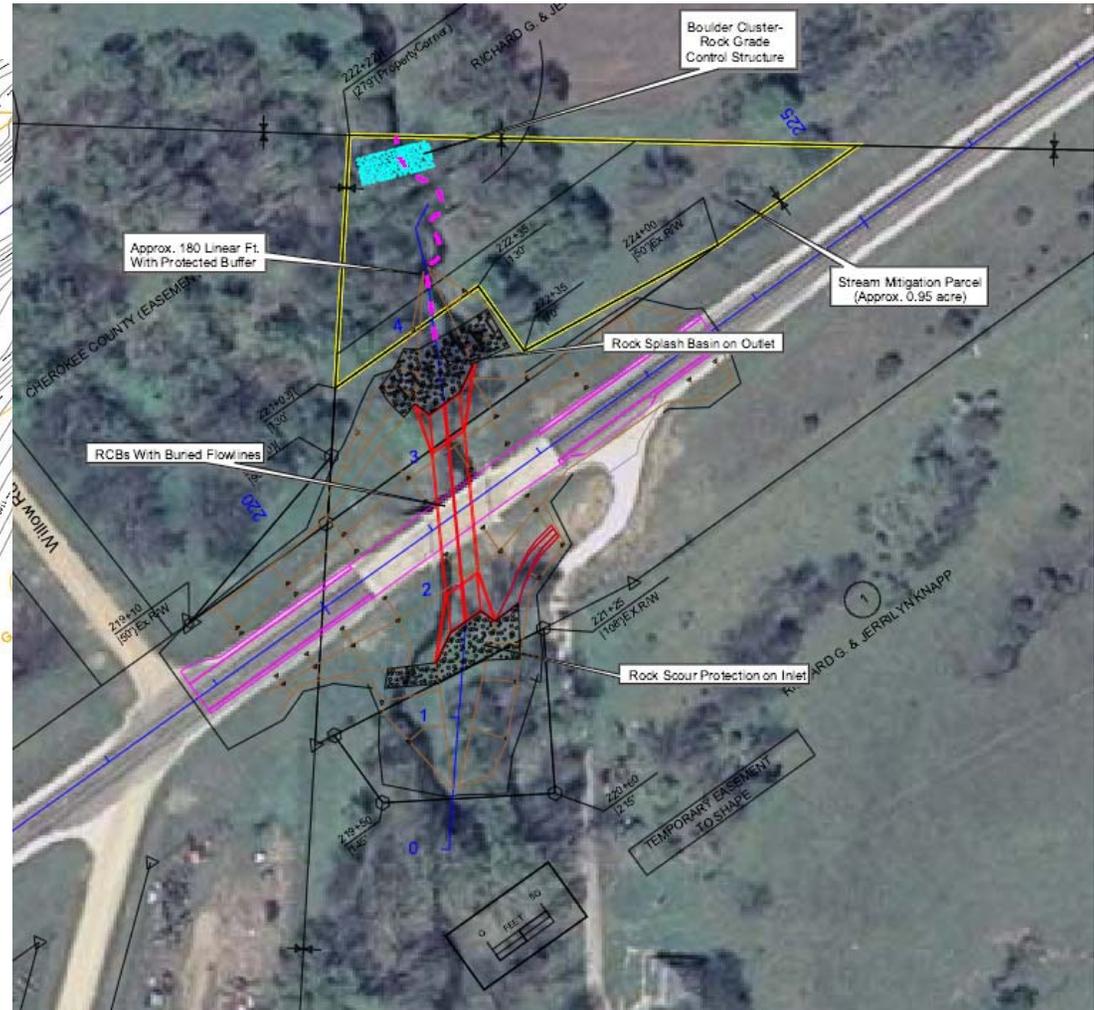
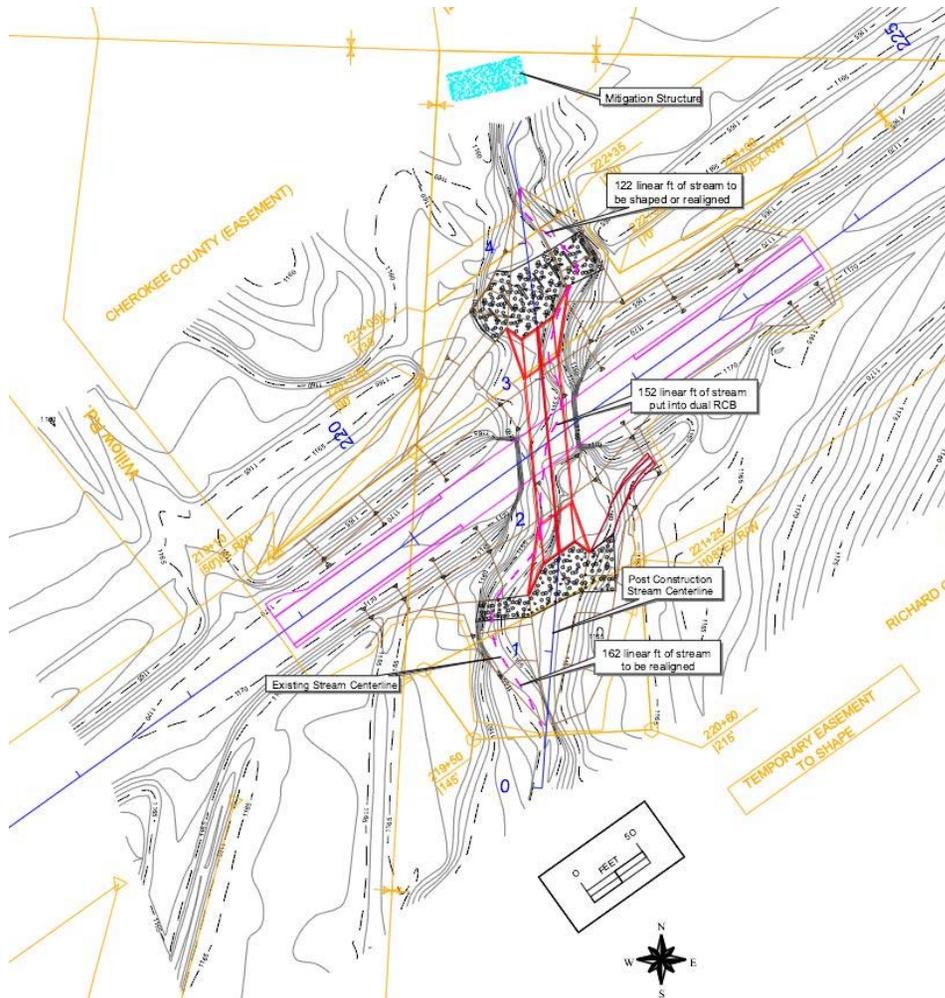
CULVERT FLOWLINE BURIED 6 INCHES BELOW NEW STREAM BOTTOM



Channel Alignment Issues...



Recap of Project Impacts/Mitigation



Pre and Post Construction Ground Photos



Looking downstream at channel and RR trestle – 05/22/2014.



Looking downstream at streambed – 06/14/2013.



Looking upstream at streambanks – 06/14/2013.



Looking downstream at shaped and armored outlet – 08/26/2016.



Looking at mitigation structure – 08/26/2016.



Looking upstream at relocated channel above inlet – 08/26/2016.

Video of In-Stream Structure at Work



Project Impacts Scores Under Draft Iowa Method

ADVERSE IMPACTS WORKSHEET						
Project Name	IA 31 over 4 Mile Creek			Date	10/1/2016	
Instructions - For each stream reach, type the name/description, choose factor types from the dropdown lists provided, and input linear feet of impact. ONLY change values in the blue boxes. All scores and values will be calculated automatically.						
	Stream Reach 1		Stream Reach 2		Stream Reach 3	
Name/Description						
Factor	Type	Score	Type	Score	Type	Score
Stream Type	Perennial (1st and 2nd orders)	0.60	Perennial (1st and 2nd orders)	0.60	Perennial (1st and 2nd orders)	0.60
Priority Waters	Tertiary	0.10	Tertiary	0.10	Tertiary	0.10
Existing Condition	Moderately Functional	0.80	Moderately Functional	0.80	Moderately Functional	0.80
Impact Activity	5) Pipe	2.00	7) Complete Loss	2.50	2) Armored revetments/walls	0.50
Sum of Factors (M)		3.50		4.00		2.00
Linear Feet of Impact (LF)	152		162		122	
Credits Needed (C)		532.00		648.00		244.00
Compensation Ratio	Secondary	2.00	**Choose One**	1.00	Secondary	2.00
Total Credits Per Reach		1,064.00		648.00		488.00
TOTAL MITIGATION CREDITS REQUIRED		2,200.00				

Project Mitigation Scores Under Draft Iowa Method

IN-STREAM BENEFITS WORKSHEET						
Project Name	IA 31 over 4 Mile Creek		Date	10/1/2016		
Instructions - For each stream reach, choose factor types from the dropdown lists provided and input linear feet of impact.						
ONLY change values in the blue boxes. All scores and values will be calculated automatically.						
Name/Description	Stream Reach 1		Stream Reach 2		Stream Reach 3	
Factor	Type	Score	Type	Score	Type	Score
Stream Type	Perennial (1st and 2nd orders)	0.30	**Choose One**	**	**Choose One**	**
Priority Waters	Tertiary	0.05	**Choose One**	**	**Choose One**	**
Net Benefit	Moderate	1.20	**Choose One**	**	**Choose One**	**
Site Protection	3rd Party Grantee	0.20	**Choose One**	**	**Choose One**	**
Credit Schedule	Schedule 1	0.30	**Choose One**	**	**Choose One**	**
Sum of Factors (M)		2.05		0.00		0.00
Linear Feet of Benefit (LF)	60		0		0	
Reach Credits Generated (RC)		123.00		0.00		0.00
Project Credit Subtotal		123.00				
In-Kind vs. Out-of-Kind	In-Kind	1.00				
TOTAL MITIGATION CREDITS EARNED		123.00				

RIPARIAN BUFFER WORKSHEET				
Project Name	IA 31 over 4 Mile Creek		Date	#####
Instructions - For each stream reach, enter dimensions of buffers and choose factor types from the dropdown lists provided.				
ONLY change values in the blue boxes. All scores and values will be calculated automatically.				
Name/Description	Buffer Area 1		Buffer Area 2	
Buffer Dimensions (for info only)	all measurements in feet		all measurements in feet	
Average width of buffer (side A)	53		0	
Average width of buffer (side B)	100		125	
Stream length	183		183	
Factor	Type	Score	Type	Score
Net Benefit	C) Buffer Preservation Zone 1	0.60	C) Buffer Preservation Zone 2	0.60
Functional Zone	Zone 1	1.20	Zone 2	0.60
Site Protection	3rd Party Grantee	0.20	3rd Party Grantee	0.20
Credit Schedule	Schedule 1	0.15	Schedule 1	0.15
Temporal Lag Factor	D)Emergent	0.00	D)Emergent	0.00
Sum of Factors		2.15		1.55
Buffer area in square feet		27878		15400
Buffer Credit Subtotal		599.38		238.70
Supplemental (Buffer on both sides)	2) Buffer on both sides	1.50	1) Buffer on one side	1.00
In-Kind vs. Out-of-Kind	In-Kind	1.00	In-Kind	1.00
Credits Generated		899.07		238.70
Additional comments or description:	Preservation=No Temporal Lag so Emergent selected to avoid a lag time penalty		Preservation=No Temporal Lag so Emergent selected to avoid a lag time penalty	
TOTAL MITIGATION CREDITS EARNED		1137.77		

Summary: Project is Short Mitigation Credit Under Draft Iowa Method

IOWA STREAM MITIGATION SUMMARY		
Project Name	IA 31 over 4 Mile Creek	
Date	10/1/2016	
Required Mitigation	Debits	
Adverse Impacts	2200.00	
Credit Summary	Credits	Percentage
In Stream Benefits	123.00	10%
Riparian Buffer Benefits	1137.77	90%
Fish Passage Credits	0.00	0%
Total Credits	1260.77	100%
Credits - Debits =	-939.23	

Possible Causes of Shortfall

- Over-valuation of some types of impacts?
- Method's inability to reflect aquatic benefit of mitigation measures
- Unambitious DOT mitigation proposal?

Questions?



Method Test Case: Waukee

Tested by DNR Stream Mitigation Team

Project Summary

- Location: Waukee, Dallas County (Alice's Rd)
- PRM – offsite (Terracon) within HUC 12
- Fox Creek (int/perennial stream, 1st and 2nd order)
- Impact: ~1850 linear ft. (impoundment, pipe, and fill)
- In-Stream: ~1356 ft trib of Sugar Creek in Centennial Park (streambank stabilization + rock riffles)
- Buffer: ~1356 ft (1.7 acres)

Impacts



2011



2015

Impacts – Upstream Detention



Impacts- Downstream Outlet



Impacts – Upstream Detention



Impacts – Pedestrian Tunnel



WOTUS

Table 2 - Waters of the U.S. Summary
 Alices Road and Waukee Greenway
 University Avenue to Ashworth Road
 Waukee, Iowa

Water of the U.S. (WUS)	Flow Description	Approximate Length On-site (feet)	Permanent Impact (feet)	Purpose of Impact
WUS-1	Farmed Drainage Swale	3,600		The farmed drainage swale is not regulated by the USACE.
	Intermittent/Ephemeral	215	215	Impoundment for the creation of a regional stormwater detention pond west of Alices Road.
	Perennial	2,055	155	Impoundment for the creation of a regional stormwater detention pond west of Alices Road.
			390	Installation of a culvert beneath Alices Road.
			490	Impoundment for the creation of a regional stormwater detention pond east of Alices Road.
			600	Fill/grading to create the berm for the regional stormwater detention basin east of Alices Road.
			5,870	1,850

Mitigation



Mitigation – Conservation Easement



Mitigation – North of University Ave.



Mitigation – Rock Riffle



Method Comparisons

	2007 MSMM	ISMM – Oct 2016
Adverse Impacts	6,634	8,691
In-Stream Benefits	4,201 (62%)	3,726 (54%)
Riparian Benefits	2,577 (38%)	3,166 (46%)
Fish Passage Benefits	NA	NA
Debits - Credits	+144 credits	-1,799 credits

Adverse Impacts

**Adverse Impact
Factors for Riverine Systems Worksheet
Alices Road and Waukee Greenway
Waukee, Iowa**

Stream Type Impacted	Ephemeral 0.1		Intermittent 0.4		Perennial 0.8	
Priority Area	Tertiary 0.1		Secondary 0.4		Primary 0.8	
Existing Condition	Functionally Impaired 0.1		Moderately Functional 0.8		Fully Functional 1.6	
Duration	Temporary 0.05		Recurrent 0.1		Permanent 0.3	
Impact Activity	Clearing 0.05	Utility Crossing /Bridge Footing 0.15	Below Grade Culvert 0.3	Armor 0.5	Detention 0.75	Morphologic Change 1.5
	Impoundment 2.0	Pipe 2.2	Fill 2.5			
Linear Impacts	<100'	100' - 200'	201 - 500'	501 - 1000'	>1000'	
	0	0.05	0.1	0.2	length x 0.1 / 500'	

Factor	Dominant Impact Type 1 WUS-1 Intermittent Impoundment	Dominant Impact Type 2 WUS-1 Perennial Impoundment	Dominant Impact Type 3 WUS-1 Perennial Pipe	Dominant Impact Type 4 WUS-1 Perennial Impoundment	Dominant Impact Type 5 WUS-1 Perennial Fill	Dominant Impact Type 6
Stream Type Impacted	0.4	0.8	0.8	0.8	0.8	
Priority Area	0.1	0.1	0.1	0.1	0.1	
Existing Condition	0.1	0.1	0.1	0.1	0.1	
Duration	0.3	0.3	0.3	0.3	0.3	
Activity	2.0	2.0	2.2	2.0	2.5	
Linear Impact	0.10	0.05	0.10	0.10	0.20	
Sum of Factors M=	3	3.35	3.6	3.4	4	0
Lineal Feet of Stream Impacted in Reach LF=	215	155	390	490	600	
M x LF	645	519	1,404	1,666	2,400	0

Total Mitigation Credit Required = (M x LF) 6,634

Total Length of Impact (LF) 1,850

	A	B	C	D	E	F	G	H	I	J	K	
1	ADVERSE IMPACTS WORKSHEET											
2	Project Name	Waukee Example			Date	8/16/2016						
3	Instructions - For each stream reach, type the name/description, choose factor types from the dropdown lists provided, and input linear feet of impact.											
4	ONLY change values in the blue boxes. All scores and values will be calculated automatically.											
5												
6		Stream Reach 1		Stream Reach 2		Stream Reach 3		Stream Reach 4		Stream Reach 5		
7	Name/Description											
8	Factor	Type	Score	Type	Score	Type	Score	Type	Score	Type	Score	
9	Stream Type	Intermittent	0.40	Perennial (1st + 2nd Orders)	0.60	Perennial (1st + 2nd Orders)	0.60	Perennial (1st + 2nd Orders)	0.60	Perennial (1st + 2nd Orders)	0.60	
10	Priority Waters	Tertiary	0.10	Tertiary	0.10	Tertiary	0.10	Tertiary	0.10	Tertiary	0.10	
11	Existing Condition	Functionally Impaired	0.20	Functionally Impaired	0.20	Functionally Impaired	0.20	Functionally Impaired	0.20	Functionally Impaired	0.20	
12	Impact Activity	6) Impoundment	2.20	6) Impoundment	2.20	5) Pipe	2.00	6) Impoundment	2.20	7) Total Resource Loss	2.50	
13	Sum of Factors (M)		2.90		3.10		2.90		3.10		3.40	
14	Linear Feet of Impact (LF)	215		155		390		490		600		
15	Credits Needed (C)		623.50		480.50		1,131.00		1,519.00		2,040.00	
16	Compensation Ratio	Primary (PRM)	1.50	Primary (PRM)	1.50	Primary (PRM)	1.50	Primary (PRM)	1.50	Primary (PRM)	1.50	
17	Total Credits Per Reach		935.25		720.75		1,696.50		2,278.50		3,060.00	
18												
19	TOTAL MITIGATION CREDITS REQUIRED		8,691.00									
20												

- Credits needed are lower than 2007 MM before the Compensation ratio is applied.

In-Stream

- Grouped all benefits

Stream Type	Ephemeral	Intermittent	Perennial Stream			
	0.05	0.4	<15' 0.4	15 - 30' 0.6	30 - 50' 0.8	>50' 1.0
Priority Area	Tertiary 0.05		Secondary 0.2		Primary 0.4	
Existing Condition	Not Applicable 0		Functionally Impaired 0.4		Moderately Functional 0.05	
Net Benefit	Stream Relocation 0.1	Stream Channel Restoration/Stream Enhancement				
		Relocated Stream with In-Stream Features 0.5	Moderate 1.0	Good 2.0	Excellent 3.5	
Monitoring/Contingency	Level I 0.05		Level II 0.3		Level III 0.50	
Control/Site Protection	Corps approved site protection without third party grantee 0.1			Corps approved site protection recorded with third party grantee, or transfer of title to a conservancy 0.4		
Mitigation Construction Timing	Schedule 1 0.3		Schedule 2 0.1		Schedule 3 0	
Mitigation Factor	In HUC 8 watershed or bank service area: 1.0 Out of kind, HUC 8 watershed, or bank service area: 0.5					

Factor	Net Benefit 1	Net Benefit 2	Net Benefit 3	Net Benefit 4	Net Benefit 5	Net Benefit 6
	Sugar Creek Tributary East Channel Improvement	Sugar Creek Tributary West Channel Improvement				
Stream Type	0.4	0.4				
Priority Area	0.05	0.05				
Existing Condition	0.4	0.4				
Net Benefit	2.0	2.0				
Monitoring/Contingency	0.05	0.05				
Control/Site Protection	0.1	0.1				
Mit. Construction Timing	0.1	0.1				
Sum Factors M=	3.1	3.1	0	0	0	0
Stream Length in Reach (do not count each bank separately) LF=	540	815				
Credits (C) = M x LF	1,674	2,527	0	0	0	0
Mitigation Factor (MF)	1	1				
Total Credits Generated = C x MF	1,674	2,527	0	0	0	0

Total Channel Restoration/Relocation Credits Generated = 4,201
Stream Length (LF) = 1,355

In-Stream Benefits

Questions:

- Is length of benefit done correctly?
- Does project meet qualifications for “good?”

	A	B	C	D	E
1	IN-STREAM BENEFITS WORKSHEET				
2	Project Name	Waukee Example			Date
3	Instructions - For each stream reach, choose factor types from the dropdown lists provided and input line				
4	ONLY change values in the blue boxes. All scores and values will be calculated automatically.				
5					
6		Stream Reach 1		Stream Reach 2	
7	Name/Description				
8	Factor	Type	Score	Type	Score
9	Stream Type	Intermittent	0.20	Intermittent	0.20
10	Priority Waters	Tertiary	0.05	Tertiary	0.05
11	Net Benefit	Good	2.40	Good	2.40
12	Site Protection	No 3rd Party Grantee	0.00	No 3rd Party Grantee	0.00
13	Credit Schedule	Schedule 2	0.10	Schedule 2	0.10
14	Sum of Factors (M)		2.75		2.75
15	Linear Feet of Benefit (LF)	540		815	
16	Reach Credits Generated (RC)		1485.00		2241.25
17					
18	Project Credit Subtotal		3726.25		
19	In-Kind vs. Out-of-Kind Mult.	In-Kind	1.00		
20	TOTAL MITIGATION CREDITS EARNED		3726.25		
21					

Buffer

- Total credits: 2,577
- Total length: 1,356 ft
- Net Benefit value of 0.4 given for creation of a minimum of 25 ft of buffer on each side
- Permit specified 1.7 acres of native grass buffer to be seeded concurrently with the impacts, with temporal lag anticipated at 0-5 years.

Waukesha, Iowa

Stream Type	Ephemeral 0.05	Intermittent 0.2	Perennial 0.4			
Priority Area	Tertiary 0.05	Secondary 0.2	Primary 0.4			
Net Benefit (for each side of stream)	Additional Improvements (select values from Table 1 times 1.2 multiplier)		Riparian Creation, Enhancement, Restoration, & Preservation Factors (select values from Table 1) (MBW=Minimum Buffer Width= 25' + 2 / 1% slope)			
System Protection Credit	Condition : MBW restored or protected on both streambanks To calculate: (Net Benefit Stream Side A + Net Benefit Stream Side B) / 2					
Monitoring/Contingency (for each side of stream)	Level I 0.05	Level II 0.15	Level III 0.25			
Control/Site Protection	Corps approved site protection without third party grantee 0.05		Corps approved site protection recorded with third party grantee, or transfer of title to a conservancy 0.2			
Mitigation Construction Timing (for each side of stream)	Schedule 1 0.15		Schedule 2 0.05	Schedule 3 0		
Temporal Lag (Years)	Over 20 -0.3	10 to 20 -0.2	5 to 10 -0.1	0 to 5 0		
Mitigation Factor	In HUC 8 watershed or bank service area: 1.0 Out of kind, HUC 8 watershed, or bank service area: 0.5					

Factors		Creation East*	Creation West*			
Stream Type		0.4	0.4			
Priority Area		0.05	0.05			
Net Benefit	Stream Side A (North)	0.4	0.4			
	Stream Side B (South)	0.4	0.4			
System Protection Credit		0.4	0.4	0	0	0
Monitoring/Contingency	Stream Side A	0.05	0.05			
	Stream Side B	0.05	0.05			
Control/Site Protection		0.05	0.05			
Mitigation Construction Timing (none for primary riparian preservation)	Stream Side A	0.05	0.05			
	Stream Side B	0.05	0.05			
Temporal Lag		0	0			
Sum of Factors M=		1.9	1.9	0	0	0
Lineal Feet of Stream Buffer LF=		541	815			
Credits (C) = M x LF		1,028	1,549	0	0	0
Mitigation Factors MF=		1	1			
Total Credits Generated MF x C=		1,028	1,549	0	0	0

Total Riparian Restoration Credits Generated = 2,577
Stream Length (LF) = 1,356

* Buffer Creation (51-100% planting) on a Perennial Stream - 25 feet on each side

Buffer Benefits

- Area multiplied by 0.01
- DRAFT ISMM (Oct 2016) requires deep-rooted native vegetation for buffer creation

1 RIPARIAN BUFFER WORKSHEET			
2	Project Name	Waukee Example	
3	Instructions - For each stream reach, enter dimensions of buffers and choose factor type:		
4	ONLY change values in the blue boxes. All scores and values will be calculated automatic		
5			
6		Buffer Area 1	
7	Name/Description	Centennial Park	
8	Buffer Dimensions (for info only)	all measurements in feet	
9	Average width of buffer (side A)	25	
10	Average width of buffer (side B)	25	
11	Stream length	1356?	
12			
13	Factor	Type	Score
14	Net Benefit	A) Establishment/Creation	1.60
15	Functional Zone	Zone A	1.20
16	Site Protection	No 3rd Party Grantee	0.00
17	Credit Schedule	Schedule 2	0.05
18	Temporal Lag Factor	D)Emergent	0.00
19	Sum of Factors		2.85
20	Buffer area in square feet		74052
21	Buffer Credit Subtotal		2110.48
22	Supplemental (Buffer on both sides)	2) Buffer on both sides	1.50
23	In-Kind vs. Out-of-Kind	In-Kind	1.00
24	Credits Generated		3165.72
25	Additional comments or description:	Permit stated 1.7 acres of buffer = 74052 sq ft 50 ft x 1356 = 67800 sq feet	
26			
27		TOTAL MITIGATION CREDITS EARNED	3165.72