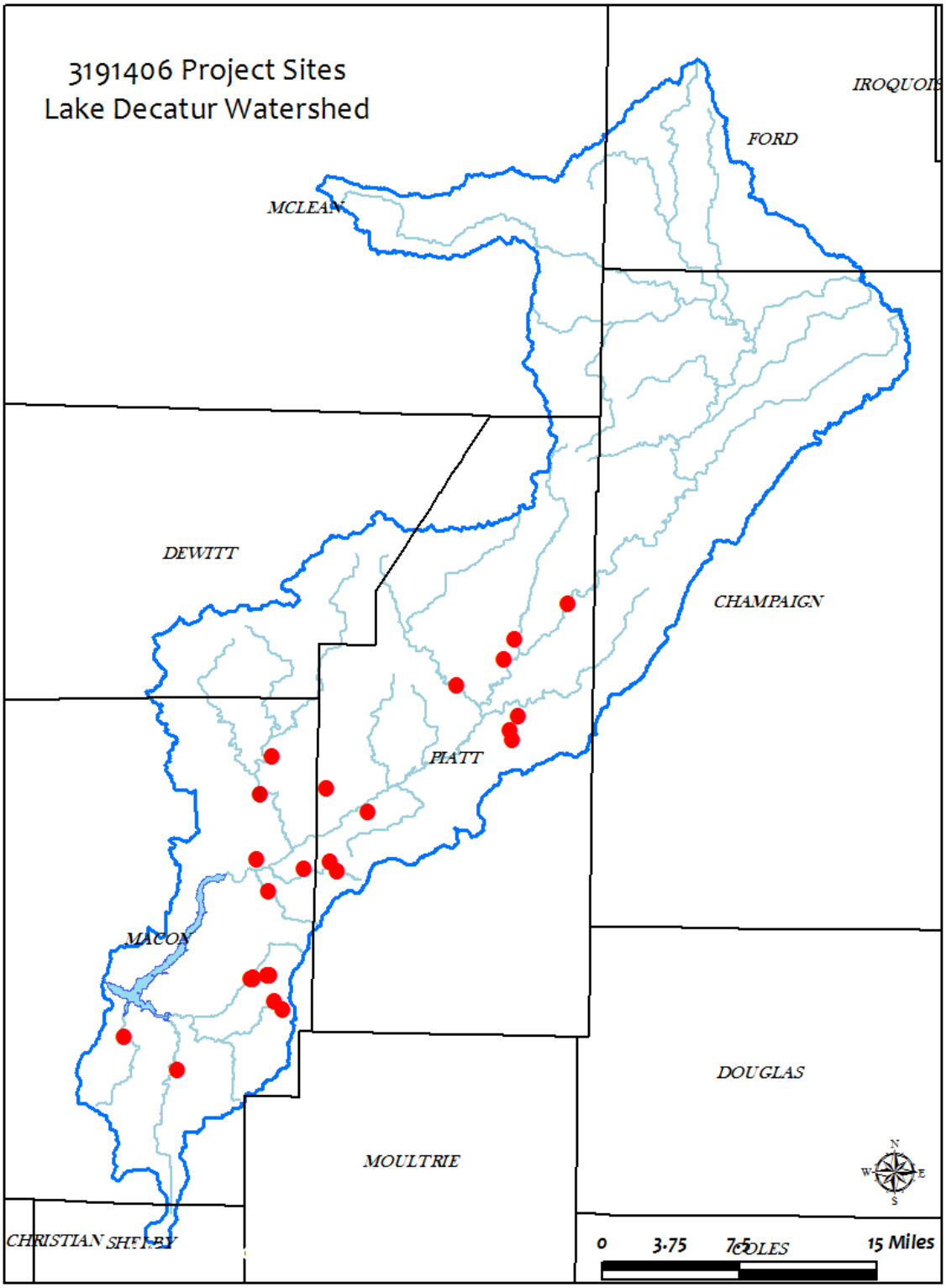
Final Report for Accelerating BMP Adoption for Lake Decatur

FAA 3191406

January 31, 2017



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Overview of FAA 3191406:

The Macon County Soil and Water Conservation District (SWCD) was the grant recipient for the "Accelerating BMP Adoption for Lake Decatur' Section 319 project. The project started June 4, 2014 and concluded November 30, 2016. The project included installation of best management practices (BMPs) to control nonpoint source pollution in multiple subwatersheds of Lake Decatur, a source water lake for over 80,000 residents of Decatur and Mount Zion.

The SWCD proposed to install BMPs at 18 project sites within the 925 square mile watershed, primarily in Macon and Piatt Counties, and primarily on ag lands. The watershed's land use is 83% row-crop production; so it's no surprise sediment, nitrates, and phosphorus are the main contaminants going into the Sangamon River/Lake Decatur. This proposal specifically targets the two main causes for impairment to Lake Decatur (IL_REA), as noted in the EPA's 303(d) Impaired Listing for Illinois Lakes-2013. Overall, if installed, these 18 projects would collectively capture 5,233 tons of sediment, 4,100 pounds of phosphorus, and 7,719 pounds of nitrogen.

From the time the application was submitted to the time the grant was awarded, some projects had changed in scope, feasibility, or landowner interest. Of the original 18 project sites, 8 were not implemented with this grant. Five were still implemented, but with different funding, and 3 were determined unfeasible to proceed with after further inspection and evaluations (I&E) were completed. With plenty of landowner interest, the SWCD was able to reallocate project funds to other sites within the watershed, with similar resource concerns and pollutant capturing potential. At the end of the project, 19 project sites were assisted with the installation of BMPs to control nonpoint source pollution, capturing a total of 6,123 tons of sediment, 4,804 pounds of phosphorus, and 9,544 pounds of nitrogen. The table on the next page shows the overview of projects proposed and installed.

Since 1985, the City of Decatur has generously provided funding, administered by the Macon County SWCD, to put conservation on the ground in the Lake Decatur Watershed. Even though the Lake Decatur Watershed Program is successful on its own, cost-share assistance given by the City of Decatur ($25,000/year) is used quickly, and it is usually not enough to entice bigger projects. Sixty percent assistance with no cap, how the SWCD proposed to allocate the 319 funds, was attractive to the landowners with bigger, more comprehensive projects.

All survey and design work for this project was completed by the Watershed Technician with the SWCD, assisted by the Resource Conservationist with the Piatt County SWCD. The funding built into this proposal for an outside PE was used for sealing of plans for BMP practices the area USDA NRCS staff did not have authority to approve. Outside PEs were used for 10 project sites, for practices such as streambank stabilization, ponds, and larger grade stabilization structures.

The Section 319 funding was directed quickly to implementing on-the-ground projects, making an already robust watershed protection program in the Lake Decatur Watershed even more so.

General Definitions of Conservation Practices used in this project:

Cover Crops: Cover crops are planted on ag land outside of the cash crop growing window to reduce erosion from wind and water, reduce water quality degradation by utilizing excessive soil nutrients, and to improve soil moisture use efficiency. Some cover crops will die off with the first cold frost, while other varieties will over winter to provide growing vegetation through the spring. These cover crops need to be terminated before the next cash crop grows.

Diversion: a channel generally constructed across the slope with a supporting ridge on the lower side. Diversions break up concentrations of water on long slopes, on undulating land surfaces, and on land that is generally considered too flat or irregular for terracing.

Grade Stabilization Structure: a structure used to control the grade in natural or constructed channels, to stabilize grade, reduce erosion, or improve water quality. In Central Illinois, many various grade stabilization structures are available, depending on site conditions: rock chutes, block chutes, aluminum toewalls. All safely convey water, non-erosively, through a significant grade change that cannot be graded out.

Grassed Waterway: a shaped or graded channel that is established with suitable vegetation to convey surface water at a non-erosive velocity using a broad and shallow cross section to a stable outlet. Grassed Waterways convey runoff from terraces, diversions, or other water concentrations without causing erosion or flooding, prevent gully formation, and protect/improve water quality. If a stable outlet is not present, a grade stabilization structure is used in conjunction with the grassed waterway.

Pond: a water impoundment made by constructing an embankment for erosion control, flow detention, and other uses such as improving water quality. Ponds capture roughly 90% of the sediment (and associated nutrients) that come to it from its watershed. With the proper topography, a pond can be a very cost efficient means of watershed control.

Sediment Basin: a basin constructed with an engineered outlet, formed by an embankment or excavation or a combination of the two, to capture and detain sediment laden runoff, or other debris for a sufficient length of time to allow it to settle out in the basin. In this project, a sediment basin was utilized at one site before a pond, to extend the lifetime of the pond, and to make sediment removal easier.

Streambank Stabilization: treatment used to stabilize and protect banks of streams or constructed channels, and shorelines of lakes, reservoirs, or estuaries. Streambank stabilization is used to prevent the loss of land or damage to land uses, maintain the flow capacity of streams, reduce the offsite or downstream effects of sediment resulting from bank erosion, and to improve or enhance the stream corridor for fish and wildlife habitat, aesthetics, recreation.

Terraces: earth embankments constructed across the field slope to reduce sheet and rill erosion and trap sediment. This practice applies where soil erosion caused by water and excessive slope length is a problem, and a suitable outlet can be provided.

Water and Sediment Control Basins (WASCOBs): ridge and channel constructed across the slope of minor watercourses to form a sediment trap and water detention basin with a stable outlet. While similar in appearance to terraces, WASCOBs control gully erosion, while terraces control sheet and rill erosion.

Most definitions and purposes come from the IL Natural Resources Conservation Service's Conservation Practice Standards.

Outreach/Education within 3191406:

The proposed education/outreach included in this grant was different than the education/outreach that occurred. At first, direct mailings to a specific sub-watershed of Lake Decatur were proposed, as a way to educate residents about the 319 program and perhaps identify candidates for future applications. As the project commenced, we decided to use 319 funds to assist in the speaker fees associated with our annual winter conference. The conference is sponsored by the Heart of the Sangamon River Ecosystem Partnership, and looks to promote conservation across Macon and Piatt counties. Hans Kok was the keynote speaker, and he did an excellent job promoting the use of conservation cropping systems—a way of farming that utilizes reduced tillage, cover crops, and nutrient management to benefit the producer and the environment. Over 40 were in attendance at this December 2015 workshop.

Education funds were also used to assist in the funding of an educational sign developed for BMP Site 4, as it is highly visible along a public hiking trail.

Hans Kok with the Maroa High School FFA Chapter.

Best Management Practice (BMP) Sites: *A summary of all BMPs on individual sites*

BMP/Site #	Proposed	1	2	3	4	5	7	8	9	10
Streambank (Ft)	1,300				600				8,300	
Waterway (Ac)	39.75		0.5	0.1		10.5	3.8		2.4	3.6
Cover Crops (Ac)	846	378								
Heavy Use (No.)	1									
WASCOBs (Ft)	1,100						3,495			
Terraces (Ft)	17,000		2,941				3,915			
Diversion (Ft)	5,280									
Structure (No.)	6		1		1		1		2	
Sed Basin/Pond (No.)	4							1		
Water Control (No.)	1									
Veg Est (Ac)	43.75		0.5	0.1		10.5	8.6		2.4	3.6

BMP/Site #	11	12	13	14	15	17	19	20	21	22	Total	(Dif)
Streambank (Ft)								225	350		9475	8175.00
Waterway (Ac)		13.4					3.1				37.35	(2.4)
Cover Crops (Ac)											378	(468)
Heavy Use (No.)		1									1	0.00
WASCOBs (Ft)											3495	2395.00
Terraces (Ft)		12,892				5,945					25693	8693.00
Diversion (Ft)		3,689									3689	(1591)
Structure (No.)			1			1	1				8	2.00
Sed Basin/Pond (No.)	1			2	1					1	6	2.00
Water Control (No.)	1										1	0.00
Veg Est (Ac)	1	14.6	0.5	1.5	2	3.6	3.1			1	52.95	9.20

Sites 6, 16, and 18 are not represented in this table because site 6 got rolled into Site 5, and Sites 16/18 were not feasible.

Overall, more practices got installed then originally proposed in the grant application...this is great news! More conservation was applied on the ground, with no changes to the overall budget.

All the practices installed under this grant required the landowner to sign a landowner agreement and to implement an operation and maintenance plan for at least ten years, from the date of implementation, to ensure the effectiveness of the installed BMPs.

Note: The 'Veg Est' line indicates the vegetation establishment for Grassed Waterways and critical area plantings for Grade Stabilization Structures.

Project Summary—BMP Site 1

Cover Crops

Eight hundred acres of cover crops were originally planned over two years at BMP Site 1. In August 2014, 378 acres over cover crops were planted, with the following mixes: crimson clover and cereal rye, cereal rye, cereal rye and turnip, and oilseed radish. All acres except 20 were applied aerially into standing corn or soybeans; the remaining 20 acres were drilled into standing wheat stubble.

The radish and turnip are winter-kill species, meaning they died with the first few frosts. The rye and clover over wintered, and were chemically terminated in the spring. The included photos, taken in October 2014, show the covers with at least 4 inches of growth. They probably grew even more that fall, went dormant over winter, and then grew some more in the spring before being killed. This extra biomass creates great cover for the soil, limiting erosion into our downstream waterways!

The landowner elected not to proceed with the remaining 422 acres of cover crops for the fall of 2015. While the biomass of the 2014 covers was plentiful to limit erosion, it was not enough biomass for the producer to also graze his cattle on, another benefit he was hoping to capture from the practice.

The table below summarizes the final BMP costs for Site 1.

Practice Component	Unit Type	Amount	Cost/Unit	Total
Seed, Fields 2-4 (287 acres)	Lump Sum	1	-	$6,392.75
Aerial Application	Lump Sum	1	-	$2,475.00
Seed, Field 1 (91 acres)	Lump Sum	1	-	$2,372.50
Aerial Application	Lump Sum	1	-	$1,221.00
			Total	**$12,461.25**
			IEPA Share:	$7,476.75	60%
			Landowner Share:	$4,984.50	40%

Project Summary—BMP Site 2

Grassed Waterway, Structure, and Terraces

Plans for Site 2 included a 0.5 acre grassed waterway and rock pad outlet to eliminate a gully working from the intermittent stream up into the pastureland. The land was shaped according to the grassed waterway designs and specifications. The rock pad outlet was installed to provide a stable outlet for the water coming down the grassed waterway into the stream. A tile was also installed underneath the waterway to allow the centerline of the waterway to remain dry enough to maintain vegetation. Without it, the centerline could become soggy, lose its ability to maintain vegetation, and another gully would form.

In the field directly to the east of the waterway site, 5 terraces that had been overtopping, causing sheet and rill erosion, were rebuilt. By rebuilding the terraces to function properly, they will temporarily store the runoff from a 10 year storm and release this runoff (using the existing underground tile outlets), effectively retaining 70% of the sediment from the cropland above each terrace, totaling 23 acres of watershed. At the time of the application, no survey had been done, so an estimate of 5,000 ft was submitted. After surveying, actual feet of terraces needed totaled 2,941 feet. The terraces were rebuilt to be farmable, meaning there is no permanent vegetation on the ridges, and the farmer will plant the cash crop on the terraces themselves. Photos below show the completed practices, and the table summarizes the final BMP costs. The landowner's share is above 40% due to the final costs of the practices exceeding the established county average cost established at the time the contract was signed by all parties. Originally, a scour basin was also proposed for this producer, at a different field, but the plans were abandoned after no feasible solution was found.

Waterway immediately after completion, left, and one year later, right.

Practice Component	Unit Type	Amount	Cost/Unit	Total
Grassed Waterway	Acre	0.5	$5,130.00	$2,565.00
Vegetation Establishment	Acre	0.5	$533.38	$266.69
6" CPT	Foot	740	$2.56	$1,895.10
Rock Outlet Pad	Tons	10.28	$90.05	$925.74
Terraces (includes risers, outlets)	Foot	2,941	$0.99	$2,937.75
			Total	**$8,590.38**
		IEPA Share:	$4,168.41	49%
		Landowner Share:	$4,421.97	51%

Project Summary—BMP Site 3

Urban Grassed Waterway

On Site 3, a 175 foot long, 12 foot wide swale was designed to carry concentrated flows safely across an urban backyard, eliminating a gully that had formed to be 1 foot deep and over 2 feet wide in some areas. The swale was surveyed and redesigned to be a trapezoidal waterway with four rock checks and an underground tile.

This project site was unique in the overall project because it was the only site in a homeowner's backyard. The conservation practices we utilized are very common on our agricultural lands, but are not so common in the suburban/urban sphere, even though the same resource concerns exist: concentrated flows of water scouring gullies onto the landscape. We hope to use this site in the future as a reference site if other homeowners express the same resource concerns, and are looking for solutions. The table below shows the costs associated with the 0.05 ac urban waterway and rock checks. The landowner's share is above 40% due to the final costs of the practices exceeding the established county average cost established at the time the contract was signed by all parties.

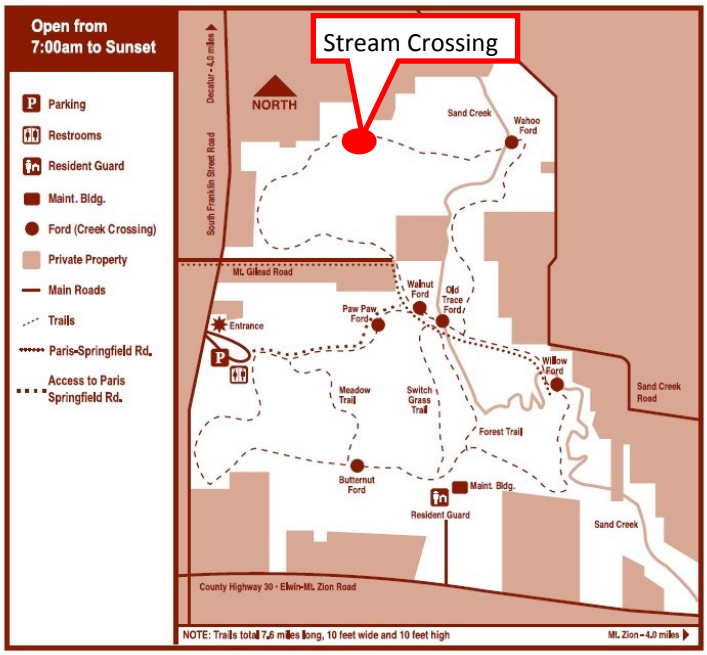
Practice Component	Unit Type	Amount	Cost/Unit	Total
Grassed WW	Ac	0.05	-	$1,440.00
Vegetation Est.	Ac	0.05	-	$319.98
Erosion Control Blanket	Yard (sq)	225.00	$2.32	$522.73
Tile/Guard	Lump Sum	1.00	$1,748.49	$1,748.49
Tile Inlet	Lump Sum	1.00	$129.14	$129.14
Rock checks in ww	Tons	4.70	$254.43	$1,195.84
			Total	**$5,356.18**
		IEPA Share:	$1,661.10	31%
		Landowner Share:	$3,695.08	69%

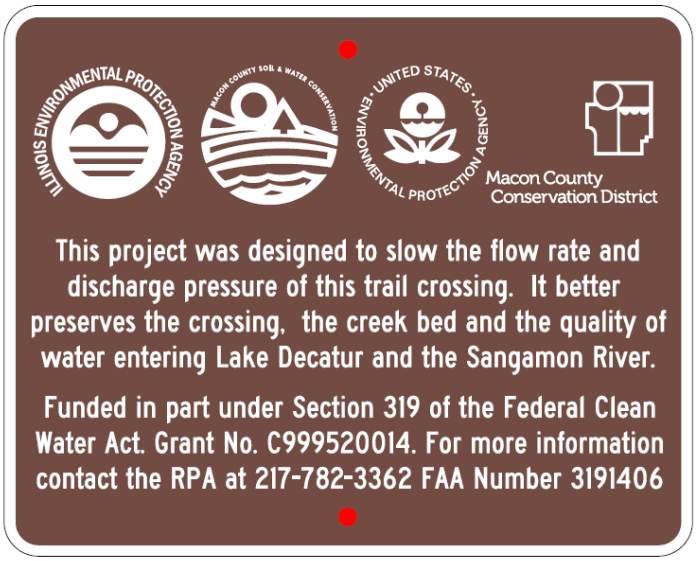
Project Summary—BMP Site 4

Grade Stabilization Structure and Streambank Stabilization with Riffles

Sand Creek Conservation Area is one of six public lands owned and operated by the Macon County Conservation District; a 755-acre site south of Decatur, IL with over 7 miles of hiking and horseback trails. In 2012, it became clear to land managers at Sand Creek that one of the trails crossing over a tributary to Sand Creek was causing excessive erosion. This continued for many years, until finally it was able to be addressed through this program.

The undersized culvert in the crossing was not set at the right elevation, causing water to go through a grade change with no stable outlet. The Watershed Technician at the SWCD was able to survey and design a pipe drop structure to replace the existing crossing, while also installing two riffles downstream to stabilize the stream channel. These designs were sealed by an outside PE, and were ready for implementation by November 2014, and fully installed by November 2015. Being such a public project, an educational sign was installed at the crossing letting hikers understand what they're crossing over, and how it benefits the trail, the creek, and Lake Decatur.





Practice Component	Unit Type	Amount	Cost/Unit	Total
Pipe Structure	Lump Sum	1	$17,722.62	$17,722.62
Earthwork-tree removal, shaping	Lump Sum	1	$3,300.00	$3,300.00
Concrete-Flat Work	Lump Sum	1	$590.00	$590.00
Vegetation Establishment	Lump Sum	1	$155.75	$155.75
Rock Riffles (2)	Tons	97.00	$70.00	$6,790.00
			Total	**$28,558.37**
		IEPA Share:	$17,135.02	60%
		Landowner Share:	$11,423.35	40%

Project Summary—BMP Site 4, Continued

Grade Stabilization Structure and Streambank Stabilization with Riffles

Incised streambank, and eroding trail seen above. To the right and below show the installed pipe drop structure and riffles...protecting the banks of the stream.

Project Summary—BMP Site 5

Grassed Waterways and Grade Stabilization Structures

Six waterways, totaling 10.5 acres, were built or rebuilt at Site 5, over 4 separate fields for one landowner. Waterway 8 involved two adjoining landowners. All waterways were needed to stop gully erosion from occurring in those areas where concentrated flows traversed across crop fields. Of the six waterways, 2 were completely new (1.2 acres), and 4 were rebuilds (9.3 acres). At one of the rebuilds, two new laterals were added (0.9 acres).

At 3 of the waterways, grade stabilization structures were added or repaired to function properly. These structures protect the waterway's outlet, providing stability. Two 'structures' for Waterways 4 & 6 were simply erosion control blankets, and the concrete structure on Waterway 8 was stabilized with the addition of concrete blocks around its weir. The concrete blocks stop any scouring at the lip of the structure.

The table below shows the costs associated with the 6 waterways. The landowner's share is above 40% due to the final costs of the practices exceeding the established county average cost established at the time the contract was signed by all parties.

At this site, the importance of communication was felt. Waterways 2, 4, & 6 were sprayed with herbicide in the spring of 2015, then seeded. None of this seed was viable, and it had to be reseeded. These hiccups could have been solved with stronger communications between farm manager, tenant, and contractor.

Gully erosion is apparent at the site of what would become Waterway 4.

Practice Component	Unit Type	Amount	Cost/Unit	Total
Waterway 1 —All components	Acre	0.2	$2,721.65	$544.33
Waterway 2— All components	Acre	2.7	$3,901.43	$10,533.85
Waterway 3— All components	Acre	4.3	$4,341.92	$18,670.26
Waterway 4— All components	Acre	0.1	$5,021.70	$502.17
Waterway 6— All components	Acre	0.3	$2,920.83	$876.25
Waterway 8— All components	Acre	2.9	$5,583.62	$16,192.50
			Total	**$47,319.36**
		IEPA Share:	$22,091.90	47%
		Landowner Share:	$25,227.46	53%

Project Summary—BMP Site 5, Continued

Grassed Waterways and Grade Stabilization Structures

Left: A common sight on many of the Site 5 waterways...erosion along the sides of the waterways shows the water Is not able to enter, and scours alongside it. Reshaping the waterway, and farming perpendicular to it, stops this from occurring.

Right: A need for a lateral waterway off of the main on Waterway 2 is apparent...as ephemeral gullying begins before the water comes to the established waterway.

6 new waterways were established on Site 5. To the right, a rock check was built to limit gullying while the vegetation on Waterway 3 was established.

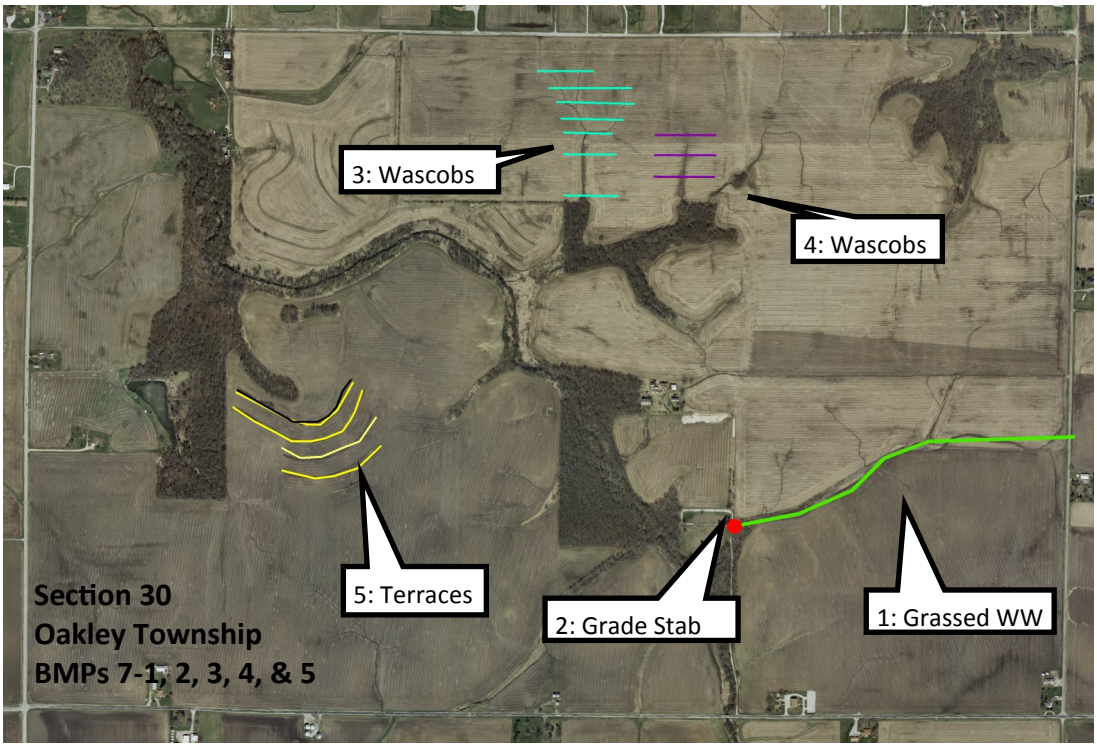
Project Summary—BMP Site 7

Grassed Waterways, Grade Stabilization Structure, WASCOBs, and Terraces

A comprehensive planning effort was undertaken to implement conservation on this entire section of land in Macon County. The biggest concerns were addressed first—extreme gully erosion on the north and east sides of the farm, along with sheet and rill erosion occurring where old terraces were overtopping on the southern end. Preliminary planning was done by the local Natural Resources Conservation Service staff when an EQIP application was plausible, but the SWCD took surveying/design over when the 319 program was selected as the most appropriate funding mechanism.

BMPs 1 & 2 handle a watershed over 300 acres large, and the pipe drop structure designed to provide the waterway a stable outlet is one of the larger structures built in the county. Completed in the spring of 2015, it handled the monumental rains of December 2015 (over 5”) perfectly, a testament to the sound design!

Both WASCOB systems on the north end of the farm were newly designed and built, treating multiple ephemeral gullies leading to the creek that winds through the section. The wascobs are spaced with farmability in mind, on 120’ spacing to accommodate a range of planter widths.



Practice Component	Unit Type	Amount	Cost/Unit	Total
Cemetery Grassed Waterway	Acre	3.8	$3,870.15	$14,706.57
Cemetery WW’s Pipe Drop Structure	Number	1	$52,836.08	$52,836.08
North Wascobs	Linear Feet	2,825	$10.00	$28,254.86
Northeast Wascobs	Linear Feet	670	$10.92	$7,318.53
South Terraces	Linear Feet	3,915	$1.65	$6,455.00
			Total	**$109,571.04**
		IEPA Share:	$43,916.13	40%
		Landowner Share:	$65,654.91	60%

Project Summary—BMP Site 7, Continued

Grassed Waterways, Grade Stabilization Structure, WASCOBs, and Terraces

Before: Cemetery WW & Grade Stabilization Structure

After: Cemetery WW & Grade Stabilization Structure

Water and Sediment Control Basins

Project Summary—BMP Site 8

Pond

A 5 acre pond was designed and built at BMP Site 8 to capture roughly 90% of the sediment and nutrients coming off of a 201 acre drainage area, all in row crops. The landscape lends itself to a pond site, as a relatively short dam was able to be built to capture that much water. The dam will back water onto some of the steepest areas of this watershed, stopping new gully erosion from forming.

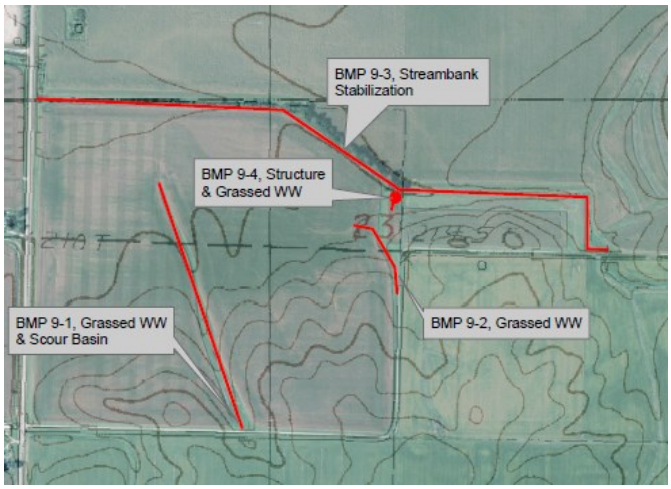
The pond was surveyed and designed by SWCD staff, with an outside PE sealing the plans. Plans were completed in September 2015, and the pond was completed August 2016.

The table below shows the costs associated with the pond. The landowner's share is above 40% due to the final costs of the practices exceeding the established county average cost established at the time the contract was signed by all parties.

Practice Component	Unit Type	Amount	Cost/Unit	Total
Earthwork	Cubic yard	14,069	$3.50	$51,131.50
Riser/Barrel/Racks	Lump Sum	1.00	-	$11,003.38
Timber Prop	Number	1	$970.83	$970.83
Concrete	Lump Sum	1	-	$313.50
Rock around riser	Lump Sum	1	-	$1,691.19
Fabric under rock	Lump Sum	1	-	$180.00
Seeding	Acre	1	$800.00	$800.00
			Total	**$66,090.40**
		IEPA Share:	$34,864.82	53%
		Landowner Share:	$31,225.58	47%

Project Summary—BMP Site 9

Streambank Stabilization, Grassed Waterways, and Grade Stabilization Structures



Complaints of streambank erosion brought the SWCD to this farm, and by including the southern neighbor in the discussions on ways to stabilize the stream, conservation was expanded onto the neighboring field as well, including two grassed waterways and structures. The relatively new landowners were open to hearing conservation options, and were willing participants in the programs. The streambank was treated with 11 riffles to stop the head-cutting observed in the 4,150' reach of the tributary to Lake Decatur. One existing waterway was reworked to stop the gully erosion seen on both sides of the waterway, and a new waterway and structure were designed on the east end of the field. Conservation tillage methods were discussed as a way to extend the lifespan of the waterways, and the viability of the soil in general. While the waterways were surveyed, designed, and approved in-house, the streambank stabilization plans were approved by an outside PE, and proper Army Corps of Engineers permits were obtained as well.

Practice Component	Unit Type	Amount	Cost/Unit	Total
BMP 1: Waterway with Scour Basin	Ac	1.90	$7,845.29	$14,906.06
BMP 2: Waterway	Ac	0.4	$5,406.25	$2,162.50
BMP 3: Streambank Stabilization	Tons (rock)	644	$50.47	$32,502.68
BMP 4: Grade Stab. Structure*	No.	1	$2,409.00	$2,409.00
**Includes 0.1 Ac WW & Veg Est*			**Total**	**$51,980.24**
		IEPA Share:	$30,399.47	58%
		Landowner Share:	$21,580.77	42%

Project Summary—BMP Site 9, Continued

Streambank Stabilization, Grassed Waterways, and Grade Stabilization Structures

Above: Clear erosion on banks. Below: Implemented waterway, grade stabilization structure, and riffles at Site 9.

Project Summary—BMP Site 10

Grassed Waterway

A very simple project, this grassed waterway was rebuilt to provide adequate storage. The existing waterway did not have capacity, allowing water to erode the sides of the waterway. The waterway is rather large, providing capacity for a 328-acre watershed above it. The outlet at the property line was stable, so no additional grade stabilization structures were needed.

Costs for the implementation of the practice came in under the County Average Costs, so the payment was made at 60% of the actual cost.

Practice Component	Unit Type	Amount	Cost/Unit	Total
Grassed Waterway (includes vegetation)	Acre	3.60	$2,905.56	$10,460.00
			Total	**$10,460.00**
			IEPA Share:	$6,276.00	60%
			Landowner Share:	$4,184.00	40%

Project Summary—BMP Site 11

Grade Stabilization Structure/Wetland Development

This project consists of a sediment basin structure with capabilities for water level management using a stop-log structure.

With the very large drainage area coupled with a small pool area, the trap efficiency was limited. By excavating the pool, the trap efficiency was increased by approximately 20%. By allowing the pool to drawdown using the stoplog structure, the sediment is consolidated increasing the sediment storage up to 50% by allowing the sediments to aerate.

The sediment pool elevation is limited at the upstream property line. A weir structure was used in lieu of a pipe spillway due to this limitation. The aluminum toewall structure provided a large weir with low head flow.

All survey and design work for this project was completed by the SWCD staff, with an outside PE sealing the plans. The grade stabilization structure used at this site is a double wingwall aluminum toewall, somewhat unusual for the area. The site will be used as an educational piece for contractors and landowners who may wish to install a similar structure in the future.

Practice Component	Unit Type	Amount	Cost/Unit	Total
Aluminum Outlet Structure	Lump Sum	1	-	$16,560.00
Water Control Structure	Number	1	-	$1,500.00
Outlet Pipe– 6”	Lump Sum	1	-	$500.00
Rock and Fabric	Lump Sum	1	-	$1,210.00
Excavation	Lump Sum	1	-	$16,170
Seeding/Mulching	Acre	1	-	$750
			Total	**$36,690**
		IEPA Share:	$27,517.50	75%
		Landowner Share:	$9,172.50	25%

Project Summary—BMP Site 11

Grade Stabilization Structure/Wetland Development

Earthwork begins to create a dam across the existing gully.

The dam is built across the gully, now ready for the aluminum toewall.

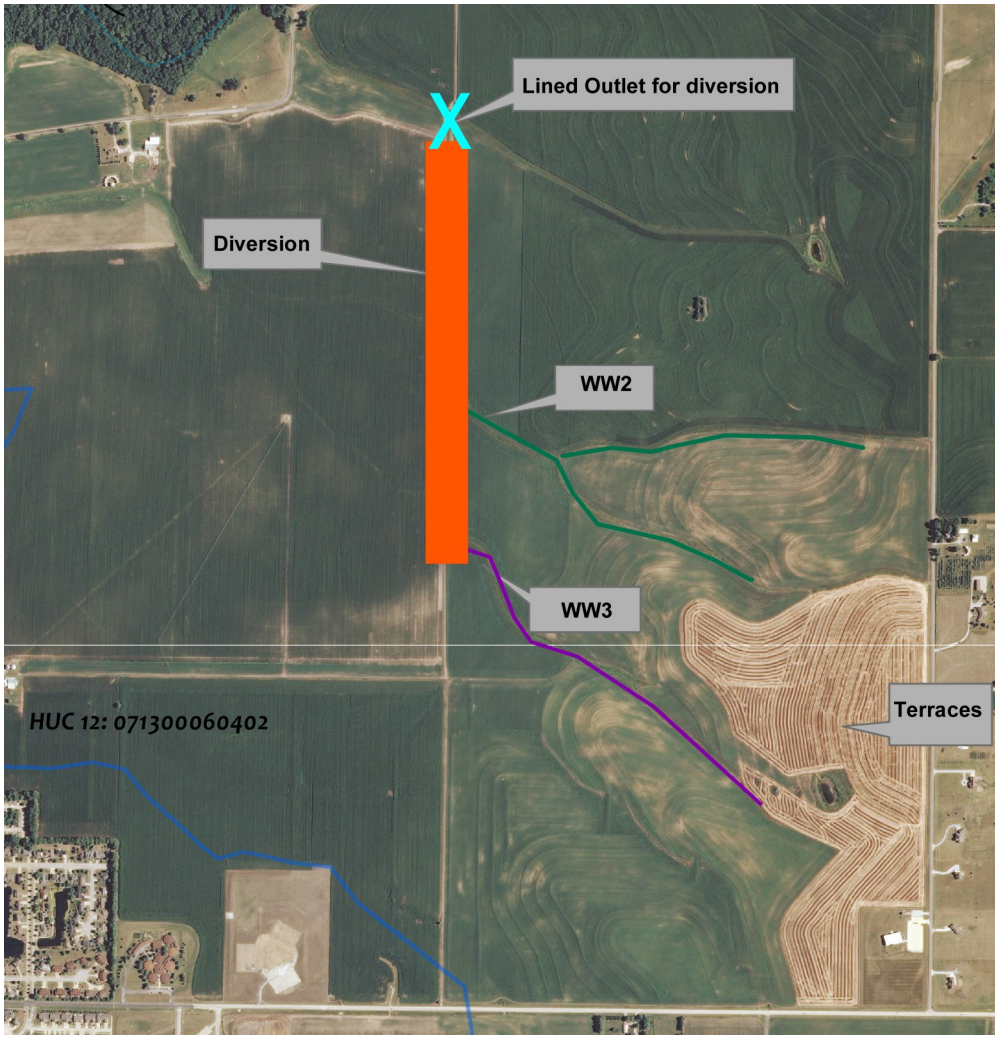
The toewall is placed in the dam, with a rock apron. A water control structure is also installed to regulate pool levels.

Looking upstream at the toewall and the seeded/ mulched dam.

Project Summary—BMP Site 12

Diversion, Lined Outlet, Grassed Waterways, and Terraces

The practices planned and installed at BMP Site 12 represent the culmination of many years of comprehensive planning on this farm. Almost at the top of the watershed, this farm is fairly steep for the area, with 2-5% slopes over much of the land. Terraces on the eastern side of the field are a natural fit to slow down and store water, while waterways downstream are large enough to handle the watershed size and safely convey water to the property line. The diversion also helps convey the water to its stable outlet. SWCD staff surveyed and designed the terraces, waterways, and lined outlet. An outside PE surveyed, designed, and sealed the plans for the diversion.



The table below shows the costs associated with the 4 practices. The landowner's share is above 40% due to the final costs of the practices exceeding the established county average cost established at the time the contract was signed by all parties.

Practice Component	Unit Type	Amount	Cost/Unit	Total
Waterway 2– All Components	Acre	5.5	$2,387.64	$13,132.02
Waterway 3– All Components	Acre	4.1	$2,387.64	$9,789.32
Diversion with Lined Outlet	Lump Sum	-	-	$24,662.02
Terraces	Feet	12,892	$3.44	$44,303.60
			Total	**$91,886.96**
			IEPA Share:	$53,918.57	59%
			Landowner Share:	$37,968.39	41%

Project Summary—BMP Site 12, Continued

Diversion, Lined Outlet, Grassed Waterways, and Terraces

Above, the diversion is installed, left, along with its rock outlet, right. Below the installed terraces are shown finished and seeded.

Project Summary—BMP Site 13

Grade Stabilization Structure

Above, the existing berm was undersized and overtopping, allowing untreated water to leave the field. Below, the contractor snapped this picture of the berm nearing completion.

85 acres of cropland with roughly 2.5% slopes is being treated by this grade stabilization structure, using a hooded inlet. The berm stores water for roughly 24 hours, and then it is released through a stable outlet, allowing roughly 30-40% of the sediment and associated nutrients to settle out of the water. The storage area upstream of the berm will need to be cleaned out roughly every 10 years to maintain capacity.

Prior to this design, the field had a much smaller berm that was being overtopped, and terraces that were also undersized for the watershed coming to them.

The table below shows the costs associated with the practice. The landowner's share is above 40% due to the final costs of the practices exceeding the established county average cost established at the time the contract was signed by all parties.

Practice Component	Unit Type	Amount	Cost/Unit	Total
18" 16 gage Aluminum Pipe	Feet (linear)	74	$26.89	$1,990.19
Earthwork	Yard (cubic)	2,050	$6.27	$12,855.00
Anti-Seep Collars	Feet (Square)	72	$7.00	$504.00
Trash Rack	Number	1	$475.00	$475.00
Vegetation Establishment	Acre	0.50	$526.00	$263.00
			Total	**$16,087.19**
		IEPA Share:	$5,945.51	37%
		Landowner Share:	$10,141.68	63%

Project Summary—BMP Site 14

Pond and Sediment Basin

In the winter of 2013, the operator for site 14 came to the SWCD to explore options to stop the gully erosion in his pasture. Over 7-10' deep cuts were observed, and gullies were actively moving further uphill. Given the appropriate topography, ponds are a suitable practice to treat this type of gully erosion, while also capturing up to 90% of the sediment and associated nutrients coming to that point from the watershed.

The operator was open to installing a pond, along with a sediment basin above the pond to enhance the lifespan of the pond. By capturing a larger portion of the sediment in a smaller area, maintenance becomes easier and less expensive through the years. This sediment basin also has a water control structure, which helps drain the pond for sediment storage/maintenance.

All survey and design work was completed by SWCD staff, with an outside PE sealing the plans. Construction began in the fall of 2014, with completion by December 2015. The table below shows the costs associated with the practice. The landowner's share is above 40% due to the final costs of the practices exceeding the established county average cost established at the time the contract was signed by all parties.

Practice Component	Unit Type	Amount	Cost/Unit	Total
Pond, all components	Lump Sum	1	-	$33,890.13
Sediment basin, all components	Lump Sum	1	-	$24,266.55
			Total	**$58,156.68**
			IEPA Share:	$29,012.21	50%
			Landowner Share:	$29,144.47	50%

Project Summary—BMP Site 15

Pond

Similar to Site 14, a pond was utilized at Site 15 to curb gully erosion and capture 90% of the sediment/ nutrients in the watershed. This pond (1.4 acres) is situated near Friends Creek, a creek which has Full Use Attainment for Aquatic Life (582) and Aesthetic Quality (590), according to the 2016 Integrated Water Quality Report. The implementation of this BMP will assist in preserving the Creek's high water quality.

All survey and design work for the pond was completed by SWCD staff, with an outside PE sealing the plans. Construction began in early spring 2015, and earthwork and seeding was completed by August 2015. The table below shows the costs associated with the practice. The landowner's share is above 40% due to the final costs of the practices exceeding the established county average cost established at the time the contract was signed by all parties.

Practice Component	Unit Type	Amount	Cost/Unit	Total
Earthwork	Yard (cubic)	6,634	$2.90	$19,238.60
Inlet/Outlet Pipe, 12"	Lump Sum	1	-	$2,750.00
Anti Seep Collar	Lump Sum	1	-	$540.21
Vegetation Establishment	Lump Sum	1	-	$1,748.67
Mulching	Lump Sum	1	-	$1,432.64
			Total	**$25,710.12**
		IEPA Share:	$14,451.96	56%
		Landowner Share:	$11,258.16	44%

Project Summary—BMP Site 17

Terraces and Grade Stabilization Structure

Situated just south of BMP Site 12, SWCD staff was able to include this property in the 319 program, as its resource concerns were very similar to BMP Site 12s, with similar topography. Existing terraces were overtopping and needed to be reshaped, and a grade stabilization structure was added at the property line to control the watershed not treated by the terraces.

This site was surveyed, designed, and sealed by an outside PE. Construction layout and oversight was done by SWCD staff. The City of Monticello collaborated on this effort, to enhance flood control for the City, less than a mile downstream.

The landowner's share is above 40% due to the final costs of the practices exceeding the established county average cost established at the time the contract was signed by all parties.

Grade Stabilization Structure

Terraces

Practice Component	Unit Type	Amount	Cost/Unit	Total
Terraces	Feet (linear)	5,945	$3.30	$19,618.50
Inlets for Terraces	Number	13	$150.00	$1,950.00
Vegetation	Ac	3.6	$350.00	$1,260.00
Grade Stab Str.	Lump Sum	1	-	$8,139.37
			Total	**$30,967.87**
			IEPA Share:	$16,222.25	52%
			Landowner Share:	$14,745.62	48%

Project Summary—BMP Site 19

Grassed Waterways and Grade Stabilization Structure

Within a mile of the Sangamon River in Piatt County, BMP Site 19 had two waterways with excessive gullies on each side, an indication water was not getting into the waterway, but scouring its side. The two waterways came together at the bottom of the field, where an active headcut was working its way upstream from the drainage channel. The waterways did not have a stable outlet. With SWCD survey/design work, 2 new waterways were planned, along with an aluminum toewall at their junction. The toewall provides a stable outlet. The table below shows the costs associated with the practice. The landowner's share is above 40% due to the final costs of the practices exceeding the established county average cost established at the time the contract was signed by all parties.

Right and below: Before photos show scouring. Left: The Aluminum Toewall in place with the newly graded waterway upstream.

Practice Component	Unit Type	Amount	Cost/Unit	Total
Grassed Waterway	Acre	3.10	$5,162.90	$16,005.00
Vegetation Establishment	Acre	3.10	$350.00	$1,085.00
Aluminum Toewall	Lump Sum	1	-	$22,126.89
Concrete	Lump Sum	1	-	$$2,064.00
			Total	**$41,280.89**
		IEPA Share:	$20,559.53	50%
		Landowner Share:	$20,721.36	50%

Project Summary—BMP Site 20

Streambank Stabilization

With streambank erosion threatening to undermine a fence, the landowner at BMP Site 20 looked to curb the erosion with help from the Piatt County SWCD. Piatt County reached out to IDOA Stream Specialist Wayne Kinney, and he designed a remedy: 225 feet of stonetoe protection on this stretch of Goose Creek, along with one stream barb. The whole project used 279 tons of rock, a combination of RR-4 and RR-5.

The survey, design, plan approval, and construction oversight was all done in conjunction with the IDOA stream program. Although unable to provide implementation funding, the survey/design resources were welcome!

Top: Streambank erosion is evident. Bottom: The completed stone toe protection is in place at BMP Site 20. The stone will move slightly through the years, but will mostly be covered by sediment dropped out behind the stone, with vegetation taking hold.

Left: A field day was held at the site July 2016. This brought attention to the practice and the funding programs available throughout the state.

Practice Component	Unit Type	Amount	Cost/Unit	Total
Rock-RR4	Tons	279	$68.11	$19,002.69
			Total	**$19,002.69**
		IEPA Share:	$11,401.61	60%
		Landowner Share:	$7,601.08	40%

Project Summary—BMP Site 21

Streambank Stabilization

350 feet of streambank stabilization, at three separate reaches, was implemented along a small unnamed tributary to the Sangamon River. Stone toe protection (STP), utilizing RR-4 rock at this site, protects the currently eroding bank, allowing the bank to stabilize and vegetate. STP is providing control of the lateral erosion, as no downcutting was seen during the investigation. This practice will stop the channel from eroding into adjacent farmland.

The survey, design, and construction oversight was all done by IDOA Stream Specialist Wayne Kinney, through the IDOA stream program. The plans were sealed by an outside PE, also funded by the IDOA stream program. Besides the landowner's contribution to the project, The Illinois Farm Bureau assisted with partial funding, through the 2016 IL Farm Bureau Nutrient Stewardship Grant.

Above: Erosion evident in the streambank. Right: Stone toe protection is quickly becoming a part of the stream, as sediment is dropping out and allowing vegetation to grow.

Practice Component	Unit Type	Amount	Cost/Unit	Total
Rock-RR4	Tons	157	$76.75	$12,049.75
			Total	**$12,049.75**
			IEPA Share: $6,594.00	55%
			Landowner Share: $5,455.75	45%

Project Summary—BMP Site 22

Pond

In Mt. Zion Township, a pond has been implemented to curtail gully erosion and trap sediment from 99 acres of cropland above. Two draws had eroded paths through the owner's timber ground over the years, making their way to Finley Creek less than a mile downstream. Given the topography of the land, a pond dam fits the landscape, making a roughly 3 acre pond. Conservation planning will continue on this farm on well. Future wildlife habitat enhancement may be planned for the area, through the local NRCS office.

All survey work and designs were done in-house by the SWCD staff. An outside PE sealed the plans.

The IEPA cost share is less than 60% due to this project just using remaining 319 funds from other projects coming in under budget. Funding from the Lake Decatur Watershed Program, within the SWCD, will fund the rest of the project costs up to 75%, the special cost share rate for the Finley Creek subwatershed.

Looking upstream from the owner's property, it is clear there is erosion/sediment coming from the upstream neighbor. This is where the gullies begin on the owner's property. The installed pond will capture 90% of the nutrients and sediments from the watershed.

Practice Component	Unit Type	Amount	Cost/Unit	Total
Earthwork-Dam, Core Trench	Yard (cubic)	6,100	$3.30	$20,130.00
Pipe, Materials, and Labor	Lump Sum	1	$8,200.00	$8,200.00
Concrete, Flat Work	Yard (Cubic)	1	$240.00	$240.00
Timber Prop	Number	1	$1,000.00	$1,000.00
Scour Basin (rock)	Ton	44.70	$70.00	$3,129.00
Geotextile Fabric	Yard (Square)	121	$3.50	$423.50
Land Clearing	Hours	45	$135.00	$6,075.00
Seeding/Mulching	Acre	1.5	$790.00	$1,185.00
			Total	**$40,382.50**
		IEPA Share:	$6,732.82	17%
		Landowner Share:	$33,649.68	83%

Above shows the pond dam location, across the natural draw. Below the pond dam is being constructed.

Overall Project Cost Summary

Individual BMP Unit Budget

BMP Site #	IEPA	In-kind Match/Cash	Total
1	$ 7,476.75	$ 4,984.50	$ 12,461.25
2	$ 4,168.41	$ 4,421.87	$ 8,590.28
3	$ 1,661.10	$ 3,695.08	$ 5,356.18
4	$ 17,135.02	$ 11,423.35	$ 28,558.37
5	$ 22,091.90	$ 25,227.46	$ 47,319.36
7	$ 43,916.13	$ 65,654.91	$ 109,571.04
8	$ 34,864.82	$ 31,225.58	$ 66,090.40
9	$ 30,399.47	$ 21,580.77	$ 51,980.24
10	$ 6,276.00	$ 4,184.00	$ 10,460.00
11	$ 27,517.50	$ 9,172.50	$ 36,690.00
12	$ 53,918.57	$ 37,968.39	$ 91,886.96
13	$ 5,945.51	$ 10,141.68	$ 16,087.19
14	$ 28,934.81	$ 29,221.87	$ 58,156.68
15	$ 14,451.96	$ 11,258.16	$ 25,710.12
17	$ 16,222.25	$ 14,745.62	$ 30,967.87
19	$ 20,559.53	$ 20,721.36	$ 41,280.89
20	$ 11,401.61	$ 7,601.08	$ 19,002.69
21	$ 6,594.00	$ 5,455.75	$ 12,049.75
22	$ 6,732.85	$ 24,267.50	$ 31,000.00
Totals	**$ 360,268.19**	**$ 342,951.43**	**$ 703,219.27**

Overall Budget

Expense	Budget	Actual
Administration	$ 73,411.00	$ 82,815.00
Equipment/Material/Supplies	$ 1,000.00	$ -
BMP Design	$ 30,000.00	$ 23,306.81
BMP Implementation	$ 600,447.00	$ 703,219.27
Outreach	$ 4,000.00	$ 1,483.50
Total	**$ 708,858.00**	**$ 810,824.58**

The total cost (local and Illinois EPA) of project implementation is $810,824.58. Local partners contributed approximately 48% ($385,509.58) and Illinois EPA contributed approximately 52% of the total project cost with Section 319 grant funds ($425,315.00).

Overall Project Summary

As the grant administrator, the Macon County Soil & Water Conservation District would like to thank all the project partners, including all the respective landowners and operators where the Best Management Practices were installed, as well as the U.S. Environmental Protection Agency and Illinois Environmental Protection Agency for providing and administering the funding.

For the next 10 years and beyond, the BMPs implemented with this funding will continue to be maintained, as they help achieve the sediment, phosphorus, and nitrogen pollutant loading reductions, as calculated in their respective summaries, and summarized below:

3191406- Projected Pollutant Load Reductions- Post Project			
BMP Site #	Sediment Load Reduction (tons/yr)	Phosphorus Load Reduction (lb/yr)	Nitrogen Load Reduction (lb/yr)
1	213	238	476
2	215	215	428
3	4	4	9
4	82	82	164
5	413	402	824
7	585	467	935
8	323	31	61
9	1243	477	944
10	177	177	354
11	223	223	446
12	1034	1175	2277
13	147	147	294
14	232	99	199
15	94	11	23
17	254	173	347
19	261	261	520
20	35	35	70
21	6	6	11
22	582	581	1162
Totals	**6123**	**4804**	**9544**