FETZNER PARK RIPARIAN AREA RESTORATION PROJECT
IEPA 319 GRANT SUMMARY REPORT
FETZNER PARK, CRYSTAL LAKE, ILLINOIS

IEPA Agreement #3191614

Submitted to:

Illinois EPA Bureau of Water
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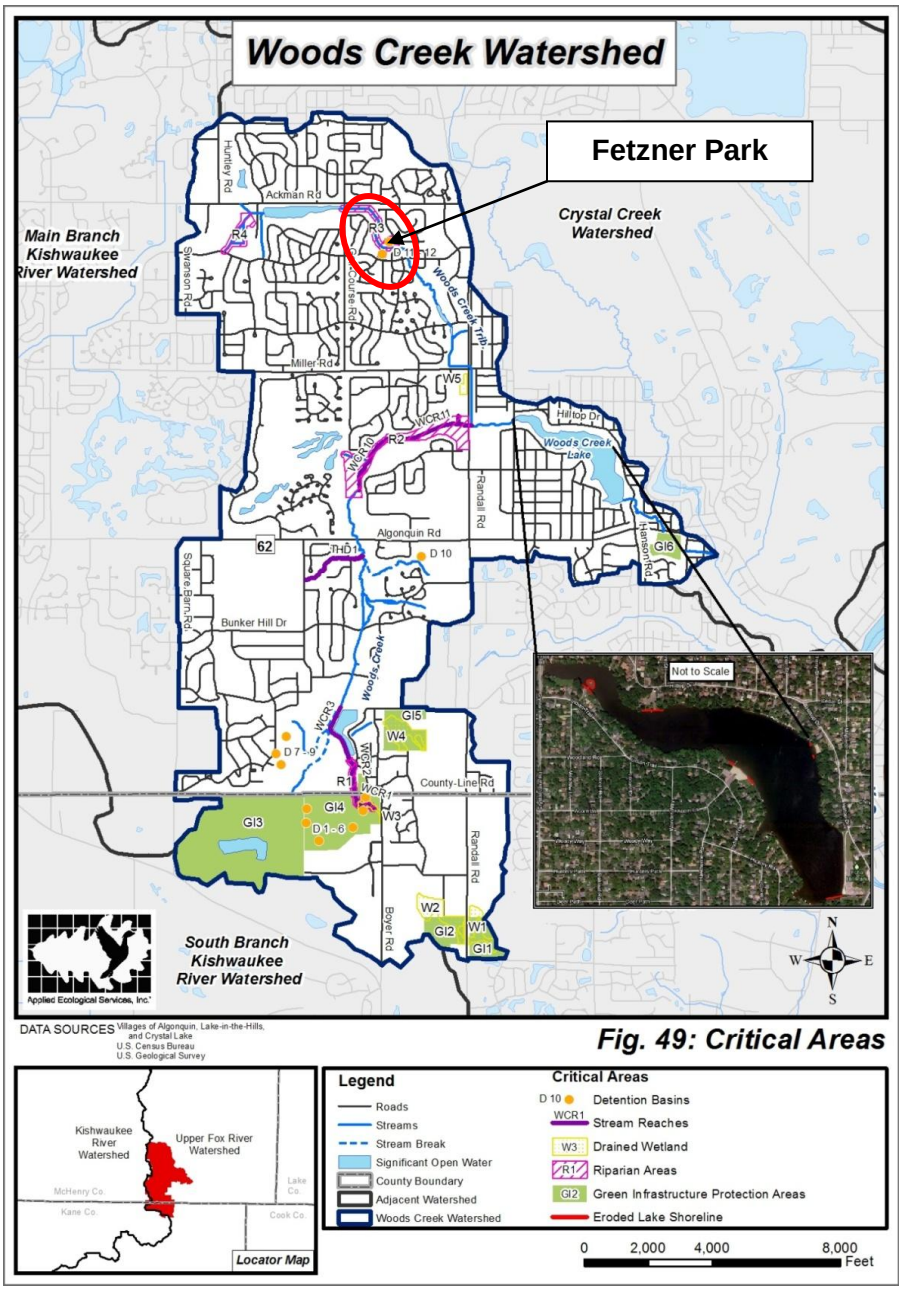
1.0 BACKGROUND & PRE-CONSTRUCTION CONDITION

Background

Fetzner Park is located within Woods Creek Watershed and is owned/managed by the Crystal Lake Park District (CLPD) (see Figure, below). This public park has several amenities including a playground, soccer field, basketball court, ball diamond, and picnic areas. Woods Creek Tributary flows southeast through the central portion of the park; Winding Creek Bike Path runs along the south portion of the stream. Woods Creek Tributary eventually joins Woods Creek then flows east to Woods Creek Lake. Water existing Woods Creek Lake joins Crystal Lake Outlet before reaching the Fox River in Algonquin Illinois.

Woods Creek watershed is located in southeast McHenry County, Illinois. In 2012, a group of partners consisting of Crystal Lake Park District, City of Crystal Lake, Village of Algonquin, and Village of Lake in the Hills applied for and received an EPA 319 Grant to prepare a watershed plan. Applied Ecological Services, Inc. (AES) was hired to write the plan entitled "Woods Creek Watershed-Based Plan (dated January 2013).



The Illinois EPA approved watershed plan lists (Section 4.2) and map (see Figure, above) of the identified "Critical Areas". The Site Specific Action Plan (Section 5.2) identifies a Critical Area "Riparian Area Restoration" need along 2,396 linear feet of Woods Creek Tributary, two adjacent (4.5 acres) Critical Area "Detention Basin Retrofit" needs, and a High Priority "Streambank & Channel Restoration" need all located within CLPD's Fetzner Park.

In 2015, Crystal Lake Park District applied for IEPA Section 319 water quality grant funding to implement, and maintain (3 years) a project to restore the entire riparian corridor with native vegetation with the primary goals of improving water quality, improving wildlife habitat, and improving aesthetic for people walking or biking along the adjacent paved trail. The application was accepted by the IEPA and Financial Assistant Agreement #3191614 was established between CLPD and IEPA Bureau of Water in the amount of $183,550. Thus, 60% of the project amount or $110,130, was granted by EPA with CLPD cash ($73,420 or 40%) making up the difference.

Pre-Construction Condition

The pre-construction condition of the 2,396 linear feet of Woods Creek Tributary, adjacent riparian corridor, and adjacent detention basins within Fetzner Park was highly degraded. Historical maps indicate that most of the area was prairie and/or oak savanna prior to European settlement in the 1830s. By 1940, Woods Creek Tributary was channelized for farming purposes. More recently, the area was developed to residential land uses and invasive native and non-native species such as box elder, cottonwood, buckthorn, and honeysuckle established along the entire stream corridor. As a result, the soils along the streambanks were eroding and two adjacent turf grass bottom detention basins did little to benefit green infrastructure or improve water quality originating from nearby residential developments. The photos below document the condition of Woods Creek Tributary prior to implementing the ecological restoration project.

Pre-Construction Photos

2.0 PROJECT DESCRIPTION & POST CONSTRUCTION CONDITION

Project Description

Streambanks and detention basin bottoms at Fetzner Park were restored using native prairie vegetation to improve filtration of the pollutants and provide a sustainable means of soil stabilization via the deep rooted vegetation. Four rock riffles (Cross Vanes) grade control structures were installed within the channelized segment of Woods Creek Tributary to improve the flow regime, increase instream habitat, and provide for more oxygenated water, not to mention the aesthetic improvement for people walking or biking along Winding Creek Bike Path located just south of the stream corridor.

The project also includes three-year maintenance of the native plant communities in order to ensure their establishment. This maintenance is essential since native plant communities take about three years to develop. Maintenance during the three year period includes mowing during the first year to control annual weeds, spot herbicide treatments to eradicate problematic perennial weeds, and a controlled burn conducted at the end of the third year to promote healthy growth of the native plants during the fourth growing season.

Project Implementation & Budget

The project was implemented in fall 2017 and spring 2018 and includes ecological restoration of 2,396 linear feet (4,792 linear feet both banks) of streambank, stream channel, riparian buffer, and two adjacent detention basins. The project was constructed following the steps below and as shown in the following budget table:

1) Site Preparation
   - Mobilization and Staging
   - Invasive Tree/Shrub/Debris Removal
   - Herbicide Existing Invasive Vegetation
   - Disc/Till Soils in Preparation for Seeding/Planting

2) Riffle (Cross Vanes) Installation
   - Excavation
   - Installation of Natural Stone

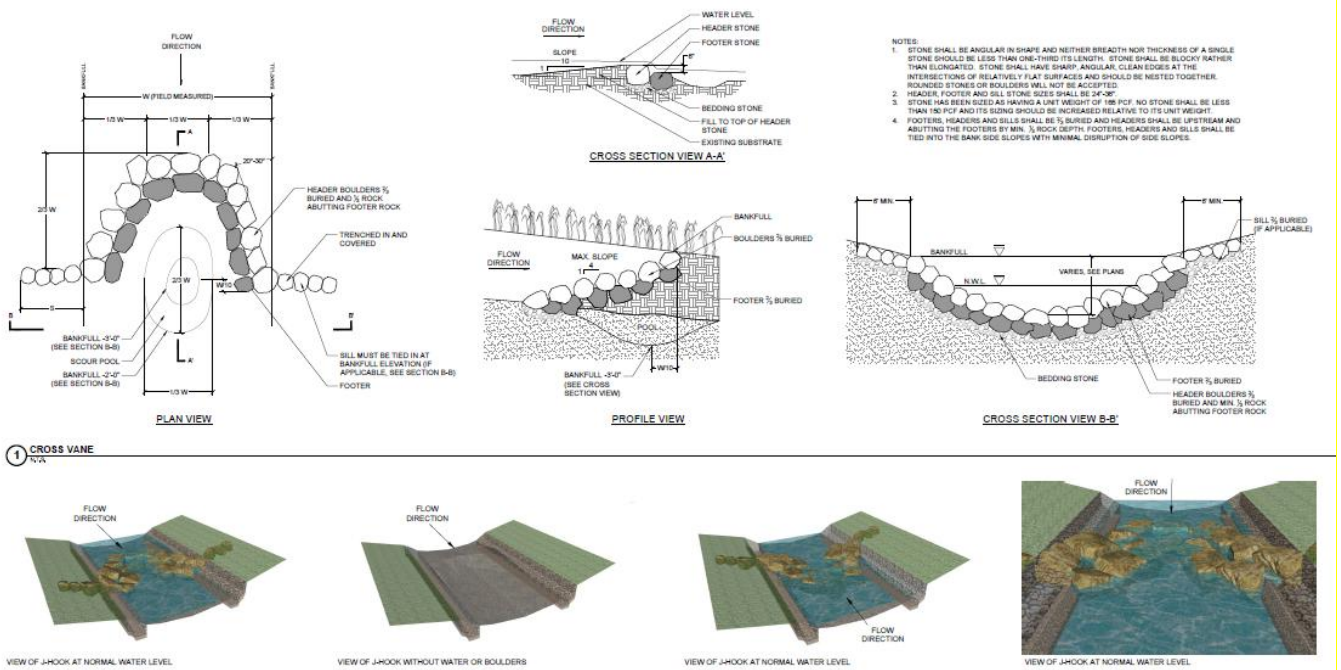
3) Erosion and Sediment Control
   - Straw Erosion Control Blanket
   - Straw Mulch

4) Ecological Restoration & Maintenance
   - Mesic Prairie, Wet Prairie, and Savanna Seeding
   - Native Tree & Shrub Planting
   - Three Years of Maintenance to Establish Native Prairie and Savanna

ITEM	DESCRIPTION	QUANTITY TOTAL	UNIT	UNIT COST	COST SUBTOTAL
1	**DESIGN DOCUMENTS, PERMITTING, & CONSTRUCTION OVERSIGHT**				
1.1	SITE VISIT WITH CLIENT	1	LS	$ 300.00	$ 300.00
1.2	WETLAND DELINEATION	1	LS	$ 2,200.00	$ 2,200.00
1.3	TREE SURVEY	1	LS	$ 1,500.00	$ 1,500.00
1.4	PRELIMINARY DESIGN & COST ESTIMATE	1	LS	$ 3,000.00	$ 3,000.00
1.5	FINAL DESIGN & COST ESTIMATE	1	LS	$ 2,000.00	$ 2,000.00
1.6	CORPS, IDNR, IHPA, & SWCD PERMITTING	1	LS	$ 3,000.00	$ 3,000.00
1.7	IEPA EDUCATIONAL SIGNAGE	1	LS	$ 2,000.00	$ 2,000.00
1.8	CONSTRUCTION OVERSIGHT	1	LS	$ 3,000.00	$ 3,000.00
	DESIGN DOCS, PERMITTING, & CONSTRUCTION OVERSIGHT SUBTOTAL				**$ 17,000.00**
2	**SITE PREPARATION**				
2.1	MOBILIZATION	1	LS	$ 2,000.00	$ 2,000.00
2.2	TREE/SHURB/DEBRIS REMOVAL & STUMP GRINDING	3	AC	$ 15,653.33	$ 44,000.00
2.3	HERBICIDE EXISTING VEGETATION	2	Trip	$ 2,000.00	$ 4,000.00
2.4	DISCING/TILLING	1	Trip	$ 2,500.00	$ 2,500.00
	SITE PREPARATION SUBTOTAL				**$ 52,500.00**
3	**CROSS VANE RIFFLE INSTALLATION**				
3.1	EXCAVATION	4	EA	$ 1,250.00	$ 5,000.00
3.2	NATURAL GLACIAL BOULDERS (24-36") (4 EA)	4	EA	$ 3,000.00	$ 12,000.00
	CROSS VANE SUBTOTAL				**$ 17,000.00**
4	**TEMPORARY EROSION AND SEDIMENT CONTROL**				
4.1	EROSION CONTROL BLANKET (S75) - ALL SLOPES	20,000	SY	$ 1.25	$ 25,000.00
4.2	STRAW MULCH - FLAT AREAS	6	AC	$ 1,000.00	$ 6,000.00
	TEMPORARY EROSION AND SEDIMENT CONTROL SUBTOTAL				**$ 31,000.00**
5	**ECOLOGICAL RESTORATION**				
5.1	MESIC PRAIRIE SEEDING	6.4	AC	$ 3,000.00	$ 19,200.00
5.2	WET PRAIRIE SEEDING	0.3	AC	$ 3,000.00	$ 900.00
5.3	SAVANNA SEEDING	3.4	AC	$ 3,500.00	$ 11,900.00
5.4	TURF SEED	1	AC	$ 2,500.00	$ 2,500.00
5.5	TREE PLANTING	13	EA	$ 600.00	$ 7,800.00
	ECOLOGICAL RESTORATION SUBTOTAL				**$ 42,300.00**
6	**MANAGEMENT OF PLANTINGS (ALL ZONES, 3 YEARS)**				
6.1	MOWING	2	Trip	$ 2,000.00	$ 4,000.00
6.2	SPOT HERBICIDING	4	Trip	$ 3,000.00	$ 12,000.00
6.3	CONTROLLED BURN	1	LS	$ 4,000.00	$ 4,000.00
	MANAGEMENT OF PLANTINGS SUBTOTAL				**$ 20,000.00**
	TOTAL PROJECT COST				**$ 179,800.00**

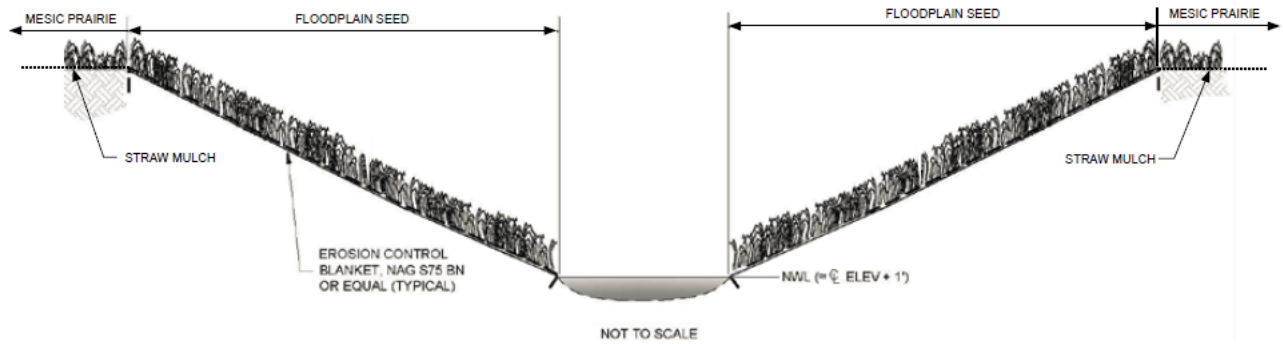
Type, Location, Design, and Implementation of BMPs

Riffle – Four Cross Vane riffles were installed throughout the 2,396 linear feet of stream stabilization. The Purpose of each riffle is to create a grade control, provide fish and macroinvertebrate habitat, oxygenate water, and provide an aesthetic amenity for public using the adjacent walking/bike path. Each riffle was installed by installing large (2-3 foot diameter) glacial stone placed at the correct elevations.



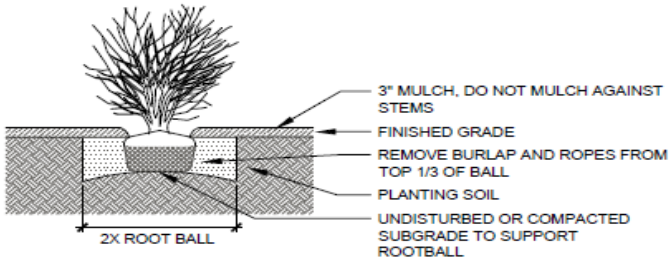
Native Prairie Riparian Buffer – The streambanks were planted with native seed mixtures to improve filtration of stormwater pollutants and provide a sustainable means of soil stabilization via the deep rooted vegetation. The native vegetation buffer also deters geese from foraging and defecating around the stream channel. Native seed was installed by first eradicating existing vegetation. The soils were then tilled to break up the dead root systems. A soil drag was then used to scarify exposed soils prior to hand seeding. Finally, NAG S75 biodegradable erosion control blanket and straw mulch was installed for erosion control.

TYPICAL PLANTING SECTION DETAIL ALONG STREAM CORRIDOR



Native Shrubs – 20 native shrubs were installed along the stream corridor to provide additional wildlife habitat and to provide screening for adjacent residents. Witchhazel, viburnum, and hazelnut were used.

SHRUB PLANTING DETAIL



NOTES:
1. REMOVE ROOT BALL CONTAINER. SET TOP OF BALL 3" ABOVE FINISHED GRADE.
2. FOR B&B SHRUBS, REMOVE ROOT BALL WRAPPING MATERIALS (BURLAP, TWINE, WIRE BASKET, ETC) AFTER SHRUB IS SET IN PLACE. REMOVE SYNTHETIC WRAPPING COMPLETELY.
3. SCARIFY EDGES OF PLANTING PIT.

Signage – Four interpretive signs were installed along the adjacent paved walking/biking path to educate the general public about riparian area restoration and use of native plants to improve water quality, stabilize soils, and improve wildlife habitat.

Post-Construction Photos

3.0 ESTIMATES OF POLLUTANT LOAD REDUCTION

Improvements in Water Quality and Sediment Transport

According the USESP's STEPL Model using the Dry Detention, Filter Strip, and Bank Stabilization options, the completed riparian area restoration project reduces nonpoint source pollution accordingly: 208 lbs/yr Phosphorus, 624 lbs/yr Nitrogen, 48,709 lbs/yr TSS, and 173 tons/yr Sediment.

Dry Detention Pollutant Load Reduction

	Load before BMP (lbs/yr)	Load after BMP (lbs/yr)	Load Reduction (lbs/yr)
BOD	2,780	2,029	751
COD	29,740	23,792	5,948
TSS	71,140	30,235	40,906
LEAD	72	36	36
COPPER	15	U	U
ZINC	138	110	28
TDS	170,560	U	U
TN	760	532	228
TKN	642	U	U
DP	26	U	U
TP	109	80	28
CADMIUM	1	U	U

Filter Strip Pollutant Load Reduction

	Load before BMP (lbs/yr)	Load after BMP (lbs/yr)	Load Reduction (lbs/yr)
BOD	600	438	162
COD	5,903	4,722	1,181
TSS	13,570	5,767	7,803
LEAD	13	6	6
COPPER	3	U	U
ZINC	28	23	6
TDS	34,140	U	U
TN	169	118	51
TKN	131	U	U
DP	7	U	U
TP	26	19	7
CADMIUM	0	U	U

Bank Stabilization Pollutant Load Reduction

	BMP Efficiency* Bank #1	BMP Efficiency* Bank #2	Bank #1	Bank #2
Sediment Load Reduction (ton/year)	1.0	1.0	57.5	57.5
Phosphorus Load Reduction (lb/year)			57.5	57.5
Nitrogen Load Reduction (lb/yr)			115.0	115.0

	BMP Efficiency* Bank #1	BMP Efficiency* Bank #2	Bank #1	Bank #2
Sediment Load Reduction (ton/year)	1.0	1.0	28.8	28.8
Phosphorus Load Reduction (lb/year)			28.8	28.8
Nitrogen Load Reduction (lb/yr)			57.5	57.5

4.0 EVALUATING PROJECT SUCCESS

The Fetzner Park Riparian Area Restoration Project was an overall success and was completed within budget and on schedule. The plan was designed and implemented within budget, future pollutant loading to the Fox River is reduced, and stream side slopes and adjacent detention basins are restored to a stable condition with the use of native plants. The stream channel has been improved via the installation of four cross van riffles.

According to the USEPA's STEPL model the project greatly reduces the estimated amounts of sediment, phosphorus, and nitrogen transported to the Fox River. The completed project is estimated to reduce sediment loading by as much as 173 tons/year and TSS by 48,709 lbs/yr. Phosphorus is expected to be reduced by about 208 lbs per year. Nitrogen is expected to be reduced by 624 lbs year. This decrease will result in fewer nutrients entering Crystal Creek and Fox River thereby reducing algal blooms and excessive vegetation growth. Like phosphorus, excessive nitrogen in water causes algal blooms and excessive vegetation growth. A decrease in nitrogen loading will result in less algal and vegetation growth downstream.

The streambanks and adjacent detention basins are restored to a more natural and stable condition by using ecological design approaches including cross vane riffles and banks vegetated with deep rooted native vegetation. These approaches are also environmentally sound and enhance habitat, improve water quality, and improve aesthetics. All of the work involves using ecological design restoration approaches that work to restore conditions to the equilibrium or stable form.