CRABTREE CREEK CORRIDOR STABILIZATION – UPSTREAM PROJECT AREA & DOWNSTREAM PROJECT AREA

Section 319 Project Report

Illinois EPA Section 319 Financial Assistance Agreement 3191509

Illinois Environmental Protection Agency
Bureau of Water
Watershed Management Section
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CRABTREE CREEK CORRIDOR STABILIZATION – UPSTREAM PROJECT AREA & DOWNSTREAM PROJECT AREA PROJECT EVALUATION AND FINAL REPORT

ILLINOIS EPA FAA # 3191509

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CRABTREE CREEK CORRIDOR STABILIZATION – UPSTREAM PROJECT AREA & DOWNSTREAM PROJECT AREA

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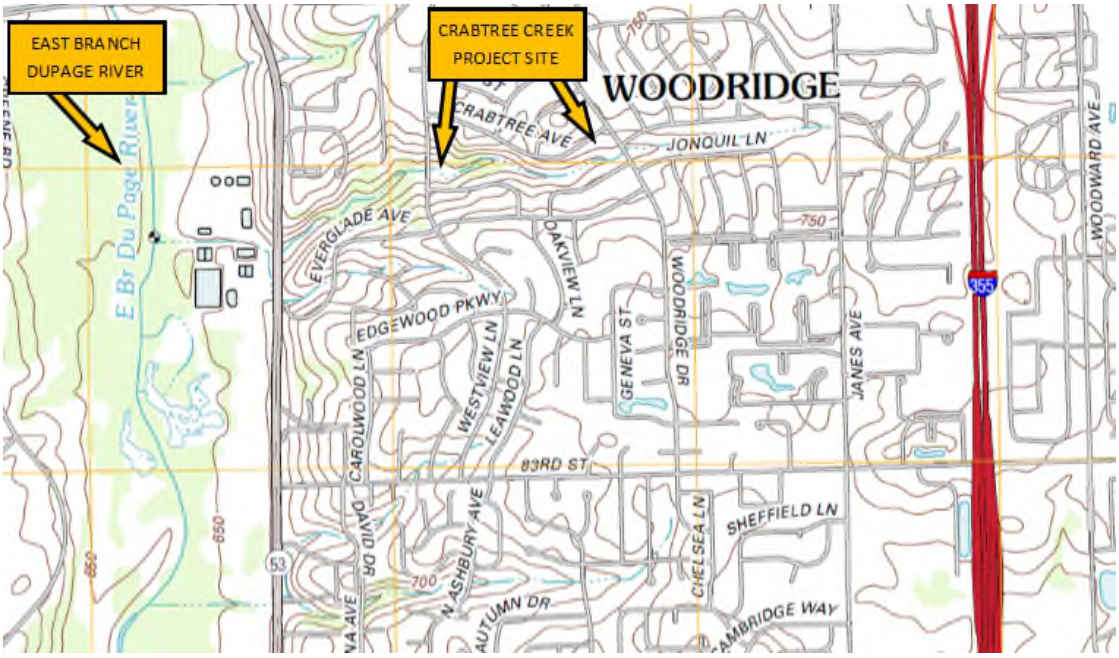
Summary:
The Crabtree Creek Corridor Stabilization Project was funded in part through USEPA's Section 319(h) of the Clean Water Act funds administered through Illinois EPA. The Woodridge Park District completed the Crabtree Creek Corridor Stabilization Project – Upstream Project Area in order to protect against severe streambank erosion, to provide nonpoint source pollution control along Crabtree Creek and to improve water quality of the downstream East Branch DuPage River. Selected stream stabilization techniques includes rock toe, re-shaped slopes, rock riffle structures, native plantings, and other measures. Installed stream stabilization techniques have provided effective and environmentally sound bank protection and channel stability for the Project reach. Selected nonpoint source pollutant loading reduction benefits include but are not limited to the following: Sediment Load Reduction = 72.1 tons / year; Total Phosphorus Reduction = 72.9 lb / year; and Total Nitrogen Reduction = 147.9 lb / year. The Woodridge Park District will provide long-term maintenance for the project site. Public involvement to date includes public meetings, awareness of adjacent homeowners, awareness of the Village of Woodridge officials, and numerous vehicular and pedestrian passersby near existing signage.

The Village of Woodridge completed the Downstream Project Area. Selected stream stabilization techniques include rock toe, re-shaped banks, rock riffle structures, gabion baskets, native plantings, and outlet structure protection. Installed stream stabilization techniques have provided effective and environmentally sound bank protection and channel stability for the project's downstream reach. Selected nonpoint source pollutant loading reduction benefits include but are not limited to the following: Sediment Load Reduction = 111 tons/year; Total Phosphorus Reduction = 111 lbs/year; and Total Nitrogen Reduction = 223 lbs/year. The Village of Woodridge will provide long-term maintenance for the downstream portion of the project. Public involvement to date includes public meetings, awareness of adjacent homeowners, awareness of the Village of Woodridge and Village Park District officials, and numerous vehicular and pedestrian passersby near existing signage.

Introduction:
The Crabtree Creek Corridor Restoration Project – Upstream Project Area is located on common space owned by the Woodridge Park District in Woodridge, DuPage County, Illinois. The Upstream Project Area is located immediately upstream of and adjacent to the Downstream Project Area on Crabtree Creek completed by the Village of Woodridge. The Downstream Project Area is owned by the Village of Woodridge.

The Crabtree Creek Corridor Stabilization Project was funded in part through USEPA's Section 319(h) of the Clean Water Act funds administered through Illinois EPA. The remaining funds for the Upstream Project Area were provided by the Woodridge Park District. The remaining funds for the Downstream Project area were provided by the Village of Woodridge.



Project Location Map

Crabtree Creek has a 1.53 square mile watershed. The watershed is primarily comprised of single family and multi-family residential areas. Crabtree Creek is a Tributary of the East Branch DuPage River. The East Branch DuPage River is located approximately 5,000 linear feet downstream (west) of the project site.

Vicinity Map:
Crabtree Creek is located south of 75th Street, west of Woodridge Drive, east of Rt. 53, between Crabtree Avenue to the north and Jonquil Lane to the south in Woodridge Illinois.

The Upstream Project Area is owned by the Woodridge Park District. It is located immediately downstream of an area stabilized previously with gabions by the Village of Woodridge. The Village of Woodridge owns area along Crabtree Creek along the Downstream Project Area. The channel erosion prior to this Project was causing increased pollutant loading including TSS, reduced dissolved oxygen, and increased total phosphorus in Crabtree Creek and the downstream East Branch DuPage River.

Severe streambank erosion was due several factors. Due in part to extensive watershed development and site characteristics, Crabtree Creek has have experienced a flashy streamflow, with rapid increases in streamflows and stage, and rapid draining of the stream channel after the flow event. The streambeds become dry each year, with intermittent flow during summer. A cross section survey was completed for the Crabtree Creek project area in December, 2012. The Crabtree Creek reach slope is moderately steep for DuPage County, approximately 0.0109 ft/ft, or one foot of vertical fall every 92 linear feet of horizontal distance. The steepest slope within the project reach is 0.0280 ft/ft, or one foot of fall for every 36 feet. The dominant soil type in the project area is Ozaukee silt loam (530 D2). The Crabtree Creek stream channel had dramatically incised into the landscape. Significant channel migration had been occurring, and the channel had widened significantly. This had caused significant streambank erosion and sediment delivery to the East Branch of the DuPage River. Trees had become severely eroded and undercut at several locations. The severe streambank erosion had resulted in significant sediment delivery to the East Branch of the DuPage River. Moreover, the streambank riparian corridor had become encroached with a dense canopy of invasive shrubs including Buckthorn

(Rhamnus cathartica). This had provided little functional benefit to the site, and has contributed to site degradation as discussed below (under Proposed Stabilization Plan).

The primary objective of the Crabtree Creek Corridor Stabilization Project was to address current and future erosion on Crabtree Creek to improve the water quality and to reduce nonpoint source pollution and sediment transport inputs into Crabtree Creek and the East Branch of the DuPage River. This objective was accomplished by extensive streambank stabilization, installation of channel grade control structures, vegetation management in the riparian area, and installation of native plantings along the stabilized streambanks and within the riparian area.

Project Schedule

Table 1 below indicates the project schedule and completion requirements.

Table 1a: Project Schedule Crabtree Creek Corridor Stabilization – Upstream Project Area, Illinois EPA FAA 3191509.

Action Item	Start Date	Completion Date
FAA 3191509 Award	July 1, 2015	July 15, 2017
Design Engineering	July 15, 2015	March 2, 2016
Permitting	December 1, 2015	August 10, 2016
Bidding	June 29, 2016	August 9, 2016
Construction Contract Award	August 9, 2016	Sept. 30, 2016
Vegetation management	August 19, 2016	August 29, 2016
Streambank Stabilization Construction	August 28, 2016	September 26, 2016
Native Plantings	September 26, 2016	September 30, 2016
Project Evaluation and Final Report	August 19, 2016	June 19, 2017

Table 1b: Project Schedule Crabtree Creek Corridor Stabilization – Downstream Project Area, Illinois EPA FAA 3191509.

Action Item	Start Date	Completion Date
FAA 3191509 Award	July 1, 2015	July 15, 2017
Design Engineering	July 15, 2015	March 2, 2016
Permitting	December 1, 2015	August 10, 2016
Bidding	June 29, 2016	August 9, 2016
Construction Contract	August 9, 2016	Sept. 30, 2016
Award	August 18, 2016	November 11, 2016
Streambank Stabilization	September 26, 2016	January 2, 2017
Construction Native Plantings	August 19, 2016	February 28, 2017
Project Evaluation and Final Report	August 19, 2016	June 19, 2017

Project Description and Stabilization Techniques – Upstream Project Area

The Crabtree Creek Corridor Stabilization - Upstream Project Area stream stabilization design, engineering, survey, native planting selection, construction observation, and maintenance observation was provided with assistance from Living Waters Consultants. The Woodridge Park District provided project management, oversight, construction observation, public coordination, and contract administration. Nettle Creek Nursery provided construction services and is under contract to provide a minimum of 3 years of site maintenance. The best management practices described below were utilized to restore the riparian corridor and to stabilize the streambanks of the Project area.

Restoration of Riparian Corridor

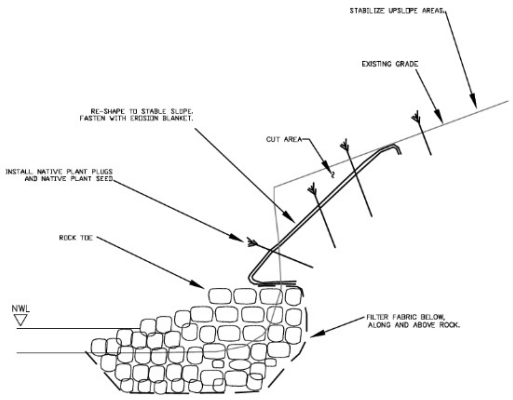
Crabtree Creek Corridor Restoration included vegetation management with replacement of 0.24 acres of dense stands on non-native and invasive shrubs and trees (such as Buckthorn) with native plants, shrubs, and trees. The replacement of undesirable vegetation with native species prevents loss of bank soils and promotes bank stability. This will reduce non-point source pollutant loadings to the downstream East Branch DuPage River. Replacement of invasive species with native tree and shrub clusters, grasses, and forbs will also promote filtration and assimilation of nutrients as well as contaminated runoff that can be discharged from surrounding upland areas. Aquatic habitat along the Crabtree Creek riparian corridor will be enhanced and diversified.

Table 2a: Quantities & Locations of Crabtree Creek Corridor Stabilization - Upstream Project Area see Table 2c for Grand Total Quantities).

Rock Toe (Typ. 0.6 Ton / LF; Detail # 4)			
	STN. 2+50 RB = 96 LF	LF	96
	Total Rock Toe	LF	96
Re-Shape Slope (Omitting Areas Where Overlap Occurs With Rock Toe)			
	STN. 2+50 LB = 85 LF	LF	85
	STN. 4+00 LB = 106 LF	LF	106
	Total Re-Shape Slope (Omitting LF Where Overlap With Rock Toe Occurs)	LF	191
Rock Riffles (Detail # 1)			
	STN. 3+10 = 1 Structure 15 LF x 2 Banks = 30 LF per structure	LF	30
	STN. 2+40 = 1 Structure 15 LF x 2 Banks = 30 LF per structure	LF	30
Augment Exist. Rock Riffle (Detail # 2)			
	STN. 4+40 = 1 Structure 15 LF x 2 Banks = 30 LF per structure	LF	30
	STN. 3+60 = 1 Structure 15 LF x 2 Banks = 30 LF per structure	LF	30
	Total Rock Riffles & Augment Exist. Riffle	LF	120
Remove Invasive Vegetation & Install Native Plantings			
	Stn. 1+60 to 0+50 LB; Stn. 2+25 to 1+50 RB. Remove Invasive Veg. & Install Native Plantings	LF	185
	Total Remove Invasive Vegetation & Install Native Plantings	LF	185
	TOTAL STREAMBANK LENGTH	**LF**	**592**
	TOTAL NATIVE VEGETATED BUFFER	**AC**	**0.24**

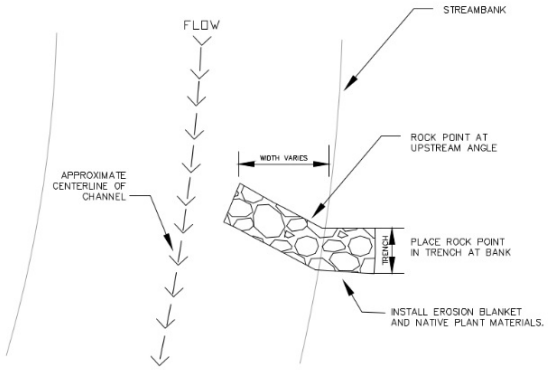
Rock Toe, Rock Points, and Re-Shaped Slopes (472 LF)

Streambank stabilization was provided to prevent additional soil pollutant transport throughout Crabtree Creek and the downstream East Branch DuPage River. In the more severely eroded areas, the streambank toe of slope was protected with 96 linear feet of rock toe. Above the rock toe, slopes were re-shaped to a stable slope (typically 2.5:1 H:V or flatter) and stabilized using erosion blanket (NAG SC150-BN). In areas exhibiting moderate streambank erosion, the streambanks were lightly graded back, seeded/planted, and covered with erosion control blanket (NAG SC150-BN). All slopes were stabilized with native plant seed, native plant plugs, and erosion blanket.



ROCK TOE / RE-SHAPE SLOPE CONCEPT
NOT TO SCALE

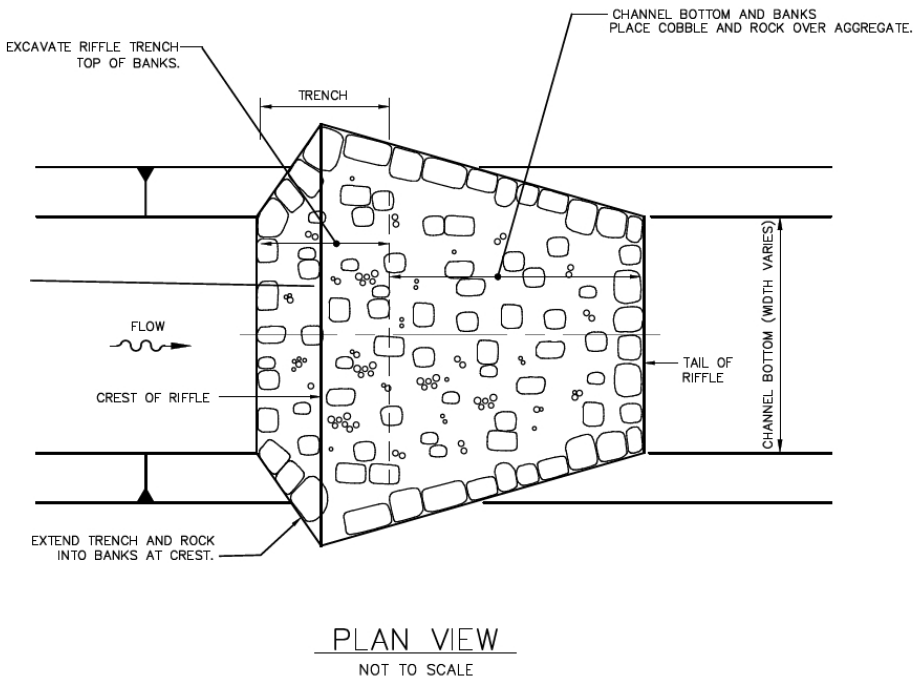
Three (3) rock points were constructed adjacent to installed rock toe. Rock toe structures deflect flows away from the eroding banks. They also provide a stable mass at the base of the slope to prevent bank slumping and sliding of saturated soils. This type of soil stabilization will facilitate the establishment of native plantings. The rock will help to protect against bank erosion.



ROCK POINT – PLAN VIEW
NOT TO SCALE

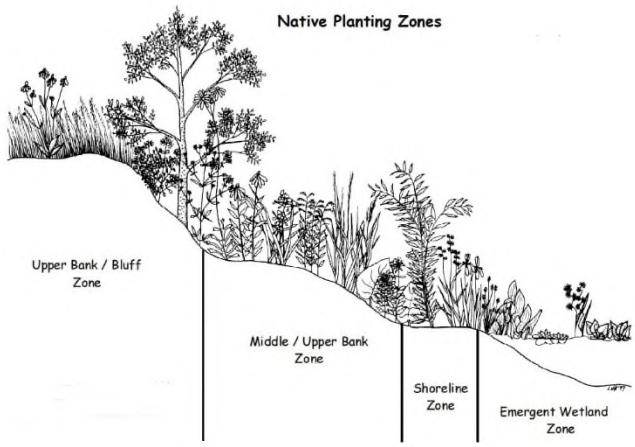
Rock Riffles

Four (4) rock riffles extending a total of 96 linear feet along both streambanks were installed to protect the channel from future downcutting and erosion. The rock riffles will increase re-aeration and oxygenation of the water column. Lack of DO was identified as a water quality concern in the East Branch DuPage River TMDL Study. Riffles will also help to dissipate excess stream energy and reduce high erosive forces against the streambanks. Riffles will also facilitate keeping scouring flows away from eroding banks, and towards the center of the channel. Previously, after major storm events large amounts of rock rubble were relocated across the width of the channel. With riffle structures, a more stable channel reach will result. Riffles also enhance in-stream aquatic habitat.



Re-Shaped Slope / Native Plantings

Areas exhibiting low to moderate erosion were stabilized by re-shaping bank slopes, seeding and planting with native vegetation, and installing erosion control blanket (see Attachment 1 - Photos). Plant communities were improved by removing the non-native / invasive vegetation, as well as introducing native potted plant plugs. Approximately 191 linear feet of re-shaped slopes were installed.



Restoration / Erosion Blanket / Native Plantings

Access routes were restored using re-grading with erosion blanket (NAG S75BN). Not only is selection and installation of native plantings and seed instrumental to project success, but long-term native plant maintenance is essential for success as well. Native seed and plantings were installed along all stabilized streambank areas. Approximately 185 linear feet of stream channel was stabilized using native plantings alone without other streambank stabilization treatments. Effective native plant installations improve long-term streambank stabilization, pollutant filtration, wildlife habitat, dissipation flow energy, and improvement of site aesthetic values. Shoreline native seed and plug lists, middle to upper slope native seed and plug lists, and shrub and tree lists are provided in Tables 3 and 4 below. Approximately 2,400 native potted plant plugs have been installed throughout the riparian area.

Table 3. Native Herbaceous Plant Plugs Species List.

Scientific Name	Common Name	Percent of Total
SHORELINE NATIVE PLANT PLUGS		
ACORUS CALAMUS	SWEET FLAG	4%
CAREX COMOSA	BRISTLY SEDGE	3%
CAREX EMORYII	RIVERBANK TUSSOCK SEDGE	4%
CAREX GRANULARIS	MEADOW SEDGE	3%
CAREX MOLESTA	FIELD OVAL SEDGE	10%
CAREX SPARGANOIDES	BURRED SEDGE	1%
CAREX STIPATA	COMMON FOX SEDGE	6%
CAREX TRIBULOIDES	POINTED OVAL SEDGE	1%
CAREX VULPINODEA	FOX SEDGE	11%
ELYMUS VIRGINICUS	VIRGINIA WILD RYE	8%
IRIS VIRGINICA SHREVEI	BLUE FLAG IRIS	15%
JUNCUS TORREYI	TORREY'S RUSH	4%
PANICUM VIRGATUM	SWITCH GRASS	10%
SPARTINA PECTINATA	PRAIRIE CORD GRASS	20%
		100%
MIDDLE / UPPER BANK NATIVE PLANT PLUGS		
AQUILEGIA CANADENSIS	COLUMBINE	5%
CAREX EMORYII	RIVERBANK TUSSOCK SEDGE	6%
CAREX FRANKII	FRANK'S SEDGE	3%
CAREX MOLESTA	FIELD OVAL SEDGE	4%
CAREX VULPINODEA	FOX SEDGE	8%
ECHINACEA PURPUREA	PURPLE CONEFLOWER	6%

ELYMUS CANADENSIS	PRAIRIE WILD RYE	8%
ELYMUS VIRGINICUS	VIRGINIA WILD RYE	9%
EUPATORIUM MACULATUM	JOE PYE WEED	3%
EUPATORIUM PERFOLIATUM	COMMON BONESET	2%
HYSTRIX PATULA	BOTTLEBRUSH GRASS	4%
IRIS VIRGINICA SHREVEI	BLUE FLAG IRIS	10%
HELIANTHUS DIVARTICUS	WOODLAND SUNFLOWER	3%
PANICUM VIRGATUM	SWITCH GRASS	5%
PHLOX DIVARTICA	BLUE PHLOX	3%
RUDBECKIA SUBTOMENTOSA	SWEET BLACK-EYED SUSAN	3%
SOLIDAGO FLEXICAULIS	ZIGZAG GOLDENROD	3%
SPARTINA PECTINATA	PRAIRIE CORD GRASS	10%
ZIZEA AUREA	GOLDEN ALEXANDER	5%
		100%

Table 4. Native Plant Seed List.

Scientific Name	Common Name	Lb/Acre
SHORELINE NATIVE PLANT SEED		
ASTER PUNICEUS	SWAMP ASTER	0.25
ASTER SIMPLEX	MARSH ASTER	0.25
CAREX COMOSA	BRISTLY SEDGE	0.50
CAREX FRANKII	FRANK'S SEDGE	0.50
CAREX GRANULARIS	MEADOW SEDGE	0.50
CAREX MOLESTA	FIELD OVAL SEDGE	0.50
CAREX STIPATA	COMMON FOX SEDGE	1.25
CAREX VULPINOIDEA	FOX GRASS	1.25
ELYMUS CANADENSIS	CANADA WILD RYE	1.25
ELYMUS RIPARIUS	RIVERBANK WILD RYE	1.00
ELYMUS VIRGINICUS	VIRGINIA WILD RYE	1.25
GLYCERIA STRIATA	FOWL MANNA GRASS	0.50
JUNCUS EFFUSUS	SOFT RUSH	0.50
JUNCUS TORREYI	TORREY'S RUSH	1.50
LEERSIA ORYZOIDES	RICE CUTGRASS	1.50
PANICUM VIRGATUM	SWITCH GRASS	1.00
SPARTINA PECTINATA	PRAIRIE CORD GRASS	2.00
VERBENA HASTATA	BLUE VERVAIN	0.50
		16.00 LB/ACRE

MIDDLE / UPPER BANK NATIVE PLANT SEED

AQUILEGIA CANADENSIS	COLUMBINE	0.2
ASCLEPIAS INCARNATA	BUTTERFLY WEED	0.2
ASTER NOVAE-ANGLIAE	NEW ENGLAND ASTER	0.3
BOUTELOUA CURTIPENDULA	SIDE OATS GRAMA	0.5
CALAMOGROSTIS CANADENSIS	BLUE JOINT GRASS	0.3
CAREX SPP.	SEDGES	0.7
CAREX FRANKII	FRANK'S SEDGE	0.5
CAREX GRANULARIS	MEADOW SEDGE	0.5
CAREX VULPINODEA	FOX SEDGE	0.4
ECHINACEA PURPUREA	PURPLE CONEFLOWER	0.4
ELYMUS CANADENSIS	PRAIRIE WILD RYE	2.0
ELYMUS VIRGINICUS	VIRGINIA WILD RYE	2.0
EUPATORIUM ALTISSIMUM	TALL BONESET	0.2
EUPATORIUM MACULATUM	JOE PYE WEED	0.2
EUPATORIUM PERFOLIATUM	COMMON BONESET	0.2
EUPATORIUM SEROTINUM	LATE BONESET	0.2
GLYCERIA STRIATA	FOWL MANNA GRASS	0.1
HELIANTHUS DIVARICATUS	WOODLAND SUNFLOWER	0.1
HELIANTHUS RIGIDUS	STIFF SUNFLOWER	0.1
HYSTRIX PATULA	BOTTLEBRUSH GRASS	1.0
IMPATIENS CAPENSUS	ORANGE JEWELWEED	0.2
JUNCUS TORREYI	TORREY'S RUSH	0.3
PANICUM VIRGATUM	SWITCH GRASS	2.0
PHYSOSTEGIA VIRGINIANA	OBEDIENT PLANT	0.2
POLYGONUM SPP.	SMARTWEED	0.4
POLYGONUM VIRGINIATUM	VIRGINIA KNOTWEED	0.2
RUDBECKIA HIRTA	BLACK-EYED SUSAN	0.3
RUDBECKIA SUBTOMENTOSA	SWEET BLACK-EYED SUSAN	0.3
SOLIDAGO SPECIOSA	SHOWY GOLDENROD	0.2
SPARTINA PECTINATA	PRAIRIE CORD GRASS	2.0
		16.20 LB/AC

Project Description and Stabilization Techniques – Downstream Project Area

The Crabtree Creek Corridor Stabilization - Downstream Project Area stream stabilization design, engineering, survey, native planting selection, construction observation, and maintenance observation was a combined effort between the Village of Woodridge and V3 Companies of Illinois. The Village of Woodridge provided project management, oversight, construction observation, public coordination, utility coordination, and contract administration. Nettle Creek Nursery provided construction services and is under contract to provide a minimum of 3 years of site maintenance. The best management practices described below were utilized to restore the riparian corridor and to stabilize the streambanks of the Project area.

Restoration of Riparian Corridor

Crabtree Creek Corridor Restoration included bank re-shaping which eliminated dense stands of non-native and invasive shrubs and trees (such as Buckthorn) and replacement them with native plants, shrubs, and trees. The replacement of undesirable vegetation with native species prevents loss of bank soils and promotes bank stability. This will reduce non-point source pollutant loadings to the downstream East Branch DuPage River. Replacement of invasive species with native tree and shrub clusters, grasses, and forbs will also promote filtration and assimilation of nutrients as well as contaminated runoff that can be discharged from surrounding upland areas. Aquatic habitat along the Crabtree Creek riparian corridor will be enhanced and diversified.

Table 2b: Quantities & Locations of Crabtree Creek Corridor Stabilization - Downstream Project Area (see Table 2c for Grand Total Quantities).

Rock Toe Stabilization			
	Area 3	LF	325
	Area 2	LF	125
	Area 1	LF	130
	Total Rock Toe	LF	580
Re-Shape Slope (Omitting Areas Where Overlap Occurs With Rock Toe)			
	Area 4	LF	70
	Total Re-Shape Slope (Omitting LF Where Overlap With Rock Toe Occurs)	LF	70
Rock Riffles / Cross Vanes			
	Area 1	LF	72
	Area 3	LF	49
Outlet Structure Protection			
	Area 3	LF	11
	Total Rock Riffles / Cross Vanes	LF	132
Gabion Basket Installation w/ Native Vegetation Installation			
	Area 1	LF	156
	Total Gabion Baskets	LF	156
	TOTAL STREAMBANK LENGTH	**LF**	**938**
	TOTAL NATIVE VEGETATED BUFFER	**AC**	**0.32**

Rock Toe and Re-Shaped Slopes (580 LF)

Streambank stabilization was provided to prevent additional soil pollutant transport throughout Crabtree Creek and the downstream East Branch DuPage River. In the more severely eroded areas, the streambank toe of slope was protected with 580 linear feet of rock toe. Above the rock toe, slopes were re-shaped to a stable slope (typically 2:1 H:V or flatter) and stabilized using erosion blanket. In areas exhibiting moderate streambank erosion, the streambanks were lightly graded back, seeded/planted, and covered with erosion control blanket. All slopes were stabilized with native plant seed, cover crop, and erosion blanket.

Gabion Baskets (156 LF)

Streambank stabilization using gabion baskets was provided to prevent additional soil pollutant transport throughout Crabtree Creek and the downstream East Branch DuPage River. Gabions were utilized by the Village of Woodridge on 156 linear feet of eroding streambank where the migrating stream channel was encroaching onto private property. The gabion baskets were installed to provide earth retention and upper slope stabilization. Above the gabion baskets, the streambanks were lightly graded back, seeded/planted, and covered with erosion control blanket. All slopes were stabilized with native plant seed, cover crop, and erosion blanket.

Rock Riffles

Four (4) rock riffles / rock vanes extending a total of 121 linear feet into / across the stream bed were installed to protect the channel from future downcutting and erosion. The rock riffles will increase re- aeration and oxygenation of the water column. Lack of DO was identified as a water quality concern in the East Branch DuPage River TMDL Study. Riffles will also help to dissipate excess stream energy and reduce high erosive forces against the streambanks. Riffles will also facilitate keeping scouring flows away from eroding banks, and towards the center of the channel. Previously, after major storm events large amounts of rock rubble were relocated across the width of the channel. With riffle structures, a more stable channel reach will result. Riffles also enhance in-stream aquatic habitat.

Re-Shaped Slope / Native Plantings

Areas exhibiting low to moderate erosion were stabilized by re-shaping bank slopes, seeding and planting with native vegetation, and installing erosion control blanket (see Attachment 1 - Photos). Plant communities were improved by removing the non-native / invasive vegetation, as well as introducing native potted plant plugs. Approximately 500 linear feet of re-shaped slopes were installed (with and without stone toe).

Restoration / Erosion Blanket / Native Plantings

Access routes were restored using re-grading with erosion blanket (NAG S75BN). Not only is selection and installation of native plantings and seed instrumental to project success, but long- term native plant maintenance is essential for success as well. Native seed and plantings were installed along all stabilized streambank areas. Approximately 70 linear feet of stream channel was stabilized using native plantings alone without other streambank stabilization treatments. Effective native plant installations improve long-term streambank stabilization, pollutant filtration, wildlife habitat, dissipation

flow energy, and improvement of site aesthetic values. Mesic prairie native seed, tree, shrub, vine, and live stake mixes, are provided in the tables below.

Table 2c: Quantities & Locations of Crabtree Creek Corridor Stabilization – Grand Total Upstream & Downstream Project Area.

Streambank Stabilization		
Total Streambank Stabilization - Upstream Project Area	LF	472
Total Streambank Stabilization - Downstream Project Area	LF	806
Grand Total Streambank Stabilization	**LF**	**1,278**
Streambed Stabilization (Grade Control)		
Total Streambed Stabilization - Upstream Project Area	LF	120
Total Streambed Stabilization - Downstream Project Area	LF	70
Grand Total Streambed Stabilization (Grade Control)	**LF**	**190**
Native Vegetated Buffer		
Total Native Vegetated Buffer - Upstream Project Area	AC	0.24
Total Native Vegetated Buffer - Downstream Project Area	AC	0.32
Grand Total l Native Vegetated Buffer	**AC**	**0.57**

Tree Mix

SCIENTIFIC NAME	COMMON NAME	PLANT FORM/SIZE	SPACING	QUANTITY
Celtis occidentalis	hackberry	5 gallon, minimum ¾" dbh & 6' height	30' centers	2
Gymnocladus dioica	Kentucky coffee tree	5 gallon, minimum ¾" dbh & 6' height	30' centers	2
Juglans nigra	black walnut	5 gallon, minimum ¾" dbh & 6' height	30' centers	2
Quercus bicolor	swamp white oak	5 gallon, minimum ¾" dbh & 6' height	30' centers	2
Quercus muhlenbergii	Chinkapin oak	5 gallon, minimum ¾" dbh & 6' height	30' centers	2
TOTAL				**10**

Mesic Prairie Seed Mix

SCIENTIFIC NAME	COMMON NAME	QUANTITY (lbs./acre)
Cover Crop		
Avena sativa	Oats	32
Lolium multiflorum	Annual Rye	5
TOTAL		**37 lbs.**
Permanent Seed Matrix		
Andropogon gerardii	big bluestem grass	2
Andropogon scoparius	little bluestem grass	3
Asclepias incarnata	marsh milkweed	0.25
Aster laevis	smooth blue aster	0.063
Aster novae-angliae	new england aster	0.13
Bouteloua curtipendula	side-oats grama	3
Carex cristatella	crested oval sedge	0.125
Carex vulpinoidea	brown fox sedge	0.25
Cassia fasciculata	partridge pea	0.25
Coreopsis tripteris	tall coreopsis	0.063
Echinacea purpurea	broad-leaved purple coneflower	0.25
Elmus canadensis	Canada wild rye	2
Elymus virginicus	Virginia wild rye	3
Eryngium yuccifolium	rattlesnake master	0.125
Eupatorium perfoliatum	common boneset	0.25
Helenium autumnale	sneezeweed	0.25
Heliopsis helianthoides	false sunflower	0.125
Juncus torreyi	torrey's rush	0.25
Leersia oryzoides	rice cut grass	0.25
Monarda fistulosa	wild bergamot	0.125
Panicum virgatum	switch grass	2
Petalostemum purpureum	purple prairie clover	0.063
Ratibida pinnata	yellow coneflower	0.25
Rudbeckia hirta	black-eyed susan	0.25
Scirpus atrovirens	dark green rush	0.25
Silphium integrifolium	rosin weed	0.125
Silphium laciniatum	compass plant	0.125
Silphium perfoliatum	cup plant	0.25
Sorghastrum nutans	Indian grass	3
Vernonia fasciculata	ironweed	0.063
Verbena hastata	blue vervain	0.25
TOTAL		**22.382**

Shrub Mix

SCIENTIFIC NAME	COMMON NAME	PLANT FORM/SIZE	SPACING	QUANTITY
Cornus obliqua	silky dogwood	5 gallon; 36' - 48" height	50' spacing between groups; groups of 3	6
Corylus Americana	american hazelnut	5 gallon; 36' - 48" height	50' spacing between groups; groups of 3	6
Viburnum prunifolium	black haw	5 gallon; 36' - 48" height	50' spacing between groups; groups of 3	6
TOTAL				**18**

Vine Mix

SCIENTIFIC NAME	COMMON NAME	PLANT FORM/SIZE	SPACING	QUANTITY
Parthenocissus quinquefolia	Virginia creeper	1 gallon	3' centers	50
TOTAL				**50**

Live Stakes Mix

SCIENTIFIC NAME	COMMON NAME	PLANT FORM/SIZE	SPACING	QUANTITY
Salix interior	sandbar willow	0.5" to 1.5'' diameter; 2 to 3 feet in length	1' centers; two rows along toe of slope	150
TOTAL				**150**

Project Costs and Quantities

A summary of quantities and costs are listed below.

Table 6a: Summary of Quantities and Costs – Upstream Project Area.

ITEM	DESCRIPTIONS	UNITS	BASE BID QUANTITY	UNIT COST	EXTENDED COST
	Streambank Treatments				
1	Rock Toe (Typ. 0.6 Ton / LF; Detail # 4)	LF	96	$125.00	$12,000.00
2	Rock Points (3 Structures; Extension Off Rock Toe; Detail # 5)	TON	7.5	$145.00	$1,087.50
4	Re-Shape Slope Where Designated on Plans (See Re-Shape Slope in Detail # 4)	LF	181	$60.00	$10,860.00
4b	Re-Shape Slope Where Designated on Plans (See Re-Shape Slope in Detail # 4). (ADDT'L. AREA)	LF	106	$60.00	$6,360.00
5	Install Shoreline and Middle-Upper Bank Native Plant Seed Within 25 Feet of Edge of Water from South Bank Stn. South Bank 1+60 to 0+50, and North Bank 2+25 to 1+50.	LF	185	$4.00	$740.00
	Grade Control				
6	Rock Riffle (2 Structures; Detail # 1)	TON	66	$145.00	$9,570.00
7	Augment Exist. Rock Riffle (Augment 1 Structure; Detail # 2)	TON	18.4	$140.00	$2,576.00
7b	Augment Exist. Rock Riffle - Far Upstream (Augment 1 Structure; Detail # 2)	TON	14	$150.00	$2,100.00
	Earthwork / Shift Channel Banks				
8	Earthwork / Shift Channel Banks & Bottom Material Per Section # 2, Plans, Details & Specifications.	INCIDENTAL TO BID ITEM # 4 RE-SHAPE SLOPE			
	Tree / Shrub Removal				
9	Remove Trees / Invasive Shrubs within 25 Feet of Edge of Water at All Graded Areas, Riffles, Rock Points, etc.	LS	1	$4,500.00	$4,500.00
9b	Remove Trees / Invasive Shrubs / Fallen Trunks / Debris within 25 Feet of Edge of Water at All Graded Areas, Riffles, Rock Points, etc. (ADDT'L. AREA)	LS	1	$8,000.00	$8,000.00
10	Remove Invasive Shrubs Only (No Tree Removal) Within 25 Feet of Edge of Water for Bid Item # 5 seeded areas. This Includes But Is Not Limited to South Bank 1+60 to 0+50, and North Bank 2+25 to 1+50.	LS	1	$2,500.00	$2,500.00
	Woody Debris Removal (2-In. or Larger) Within Banks				
11	Remove Fallen Trunks / Fallen Debris 2-in. Diam. Or Larger In Channel Banks From Stn. 4+50 to Stn. 1+25	LS	1	$1,100.00	$1,100.00
	Other				
14	Native Plant Maintenance	LS	3	$3,000.00	$9,000.00
14b	Native Plant Maintenance	LS	3	$560.00	$1,680.00
15	Silt Fence	LF	250	$3.00	$750.00
16	Stabilized Construction Entrance	EA	1	$98.00	$98.00
17	Orange Construction Fence	LF	250	$3.00	$750.00
18	Soil Erosion Control / Sediment Control Per Specifications	INCIDENTAL TO TOTAL PROJECT COST			
19	Construction Access Restoration, Site Cleanup, and Erosion Blanket (NAG S75 BN) Through Base Bid Area Indicated on Plans	SY	1300	$2.00	$2,600.00
19b	Construction Access Restoration, Site Cleanup, and Erosion Blanket (NAG S75 BN) Through Base Bid Area Indicated on Plans	SY	200	$3.00	$600.00
	Haul Off Excess Dirt	CY	110	$22.00	$2,420.00
20	As-Built Survey	LS	1	$2,000.00	$2,000.00
20b	As-Built Survey - Add 1 As-Built Cross Section for Upstream Area	LS	1	$700.00	$700.00
	TOTAL COST				**$81,991.50**

Total Project Contractor Bid Costs: $81,991.50

Table 6b: Summary of Quantities and Costs – Downstream Project Area.

Item No.	SP	Item and Specification Reference	Unit Price	Unit	Quantity	Increase / Decrease Quan.	Final Quantities Quan	Final Quantities Total
	SP-1	SITE ACCESS / RESTORATION	$ 6,000.00	LS	1	0	1.00	$ 6,000
	SP-2	IN-STREAM WORK PLAN	$ 4,000.00	LS	1	0	1.00	$ 4,000
	SP-7	MOBILIZATION	$ 10,000.00	LS	1	0	1.00	$ 10,000
MX033292		STABILIZED CONSTRUCTION ENTRANCE	$ 2,000.00	EA	2	0	2.00	$ 4,000
	SP-8	EARTH EXCAVATION	$ 50.00	CY	690	0	690.00	$ 34,500
	SP-12	TOPSOIL FURNISH AND PLACE, 6 INCH	$ 30.00	SY	92	0	92.00	$ 2,760
	SP-13	MESIC PRAIRIE SEEDING	$ 4,000.00	LS	1	0	1.00	$ 4,000
	SP-14	IRRIGATION	$ 3,000.00	LS	1	0	1.00	$ 3,000
	SP-15	VINE (1 GAL)	$ 30.00	EA	50	0	50.00	$ 1,500
	SP-15	SHRUB (5 GAL)	$ 60.00	EA	36	0	36.00	$ 2,160
	SP-15	TREE (5 GAL)	$ 60.00	EA	10	0	10.00	$ 600
	SP-16	MANAGEMENT, MONITORING & REPORTING	$ 4,000.00	EA	1	(1)	0.00	$ -
	SP-18	CLEARING AND GRUBBING	$ 9,000.00	LS	1	0	1.00	$ 9,000
	SP-19	TREE REMOVAL (6-15 UNITS DIA)	$ 70.00	UNIT	27	10	37.00	$ 2,590
	SP-19	TREE REMOVAL (OVER 15 UNITS DIA)	$ 90.00	UNIT	114	57	171.00	$ 15,390
	SP-20	TREE PROTECTION	$ 100.00	EA	5	0	5.00	$ 500
	SP-21	LIVE STAKES	$ 10.00	EA	150	0	150.00	$ 1,500
	SP-22	STONE TOE (WITH BANK REGRADING)	$ 30.00	LF	430	0	430.00	$ 12,900
	SP-22	STONE TOE (WITHOUT BANK REGRADING)	$ 25.00	LF	150	0	150.00	$ 3,750
	SP-23	ROCK VANE	$ 120.00	LF	25	0	25.00	$ 3,000
	SP-23	CROSS VANE	$ 100.00	LF	80	0	80.00	$ 8,000
	SP-24	ROCK GRADE CONTROL	$ 100.00	LF	27	0	27.00	$ 2,700
		FES WITH GRATE, 12 INCH	$ 996.00	EA	1	0	1.00	$ 996
MX033290		SILT FENCE	$ 4.00	LF	1,100	0	1100.00	$ 4,400
	SP-27	EROSION CONTROL BLANKET	$ 3.00	SY	1,145	0	1145.00	$ 3,435
		EROSION CONTROL FOR FES	$ 500.00	EA	3	0	3.00	$ 1,500
	SP-29	STRUCTURAL STREAMBANK STABILIZATION GABIONS, 2 BASKETS HIGH W/O MAT	$ 180.00	LF	156	0	156.00	$ 28,080
	SP-30	CONTAMINATED WASTE DISPOSAL	$ 50.00	TON	13	(13)	0.00	$ -
							Total	$ 170,261

Total Project Contractor Bid Costs: $170,261.00

Table 7a: Project Cost Summary.
Crabtree Creek Corridor Stabilization - Upstream Project Area.
IEPA FAA 3191509.

Project Cost Summary	Total Cost to Date	Local Match Share	Grant Assistance Amount
Clerical	$0.00	$0.00	$0.00
Supervisor	$0.00	$0.00	$0.00
DIRECT LABOR	$0.00	$0.00	$0.00
Fringe Benefits	$0.00	$0.00	$0.00
Overhead Costs	$0.00	$0.00	$0.00
INDIRECT COSTS	$0.00	$0.00	$0.00
EQUIPMENT, MATERIALS, SUPPLIES	$0.00	$0.00	$0.00
Engineering	$27,250.00	$10,900.00	$16,350.00
Contractor	$81,991.50	$32,796.60	$49,194.90
Other (Permit fees, signage)	$3,137.69	$1,255.08	$1,882.61
SUBCONTRACTS	$112,379.19	$44,951.68	$67,427.51
Totals	$112,379.19	$44,951.68	$67,427.51
		IEPA Grant Award (Upstream Project Area per IGA):	$70,242.00
		Balance of Award:	**$2,814.49**

Table 7b: Project Cost Summary.
Crabtree Creek Corridor Stabilization - Downstream Project Area.
IEPA FAA 3191509.

Project Cost Summary	Total Cost to Date	Local Match Share	Grant Assistance Amount
Clerical	$0.00	$0.00	$0.00
Supervisor	$0.00	$0.00	$0.00
DIRECT LABOR	$0.00	$0.00	$0.00
Fringe Benefits	$0.00	$0.00	$0.00
Overhead Costs	$0.00	$0.00	$0.00
INDIRECT COSTS	$0.00	$0.00	$0.00
EQUIPMENT, MATERIALS, SUPPLIES	$0.00	$0.00	$0.00
Engineering	$0.00	$0.00	$0.00
Contractor	$170,261.00	$73,260.64	$97,000.36
Other (Permit fees, signage)	$0.00	$0.00	$0.00
SUBCONTRACTS	$0.00	$0.00	$0.00
Totals	$170,261.00	$73,260.64	$97,000.36
IEPA Grant Award (Downstream Project Area Per IGA):			$97,000.36

Operation and Maintenance Plan – Upstream Project Area

The Operation and Maintenance Plan is provided at the end of this Final Report as Attachment 2. Conditions will be monitored and maintenance will be performed as described in Attachment 2.

Maintenance Costs – Upstream Project Area

The annual site maintenance cost for each of the first three years has been determined to be $3,560.00. Expenditures are likely higher during the first three years for native plant maintenance and nuisance weed control as the native plantings become established. Thereafter, it is likely that annual maintenance costs will be lower. Native plant maintenance is required to prevent undesirable vegetation from taking over the newly establishing native plants. Costs for Operations and Maintenance shall be paid by the Owner, the Woodridge Park District.

Table 8a. Site Maintenance Schedule – Upstream Project Area.

Post-Construction through 2026 (Ongoing)

Personnel:

Woodridge Park District = "WPD"
Village of Woodridge = "VW"
Living Waters Consultants = "LWC"
Landscape Contractor = "LC"
Volunteers = "VL"

2017 - 2026 (ongoing)

Coordinator	Patricipants	Activity	mid-April	late-May	late-June	mid-July	mid-August
WPD, VW & LWC	LWC, WPD, VW, LC	Weed-whip and Cut Natives (see Notes)	X				
WPD, VW & LWC	LWC, WPD, VW, LC	Spot Herbicide / Remove Weeds	X	X	X	X	X
WPD, VW & LWC	LWC, WPD, VW, LC	Bioengineering Materials Inspection	X				
WPD, VW & LWC	LWC, WPD, VW	Vegetation Monitoring		X		X	

Notes:
Herbicides shall be applied by a USDA-licensed applicator.
Cutting and Mowing of Native Plants should include removal of clippings from the site.

Responsibilities

The Woodridge Park District Board and their designated Representative shall be responsible for project site maintenance. Participating parties will include the Owner's Representative, professional Contractor services support, or possibly staff of the Woodridge Park District.

Operation and Maintenance Plan – Downstream Project Area

The Operation and Maintenance Plan is provided at the end of this Final Report as Attachment 2. Conditions will be monitored and maintenance will be performed as described in Attachment 2.

Maintenance Costs

The annual site maintenance cost for each of the first three years has been determined to be $4,000.00. Expenditures are likely higher during the first three years for native plant maintenance and nuisance weed control as the native plantings become established. Thereafter, it is likely that annual maintenance costs will be lower. Native plant maintenance is required to prevent undesirable vegetation from taking over the newly establishing native plants. Costs for Operations and Maintenance shall be paid by the Owner, the Woodridge Park District.

Table 8b. Site Maintenance Schedule – Downstream Project Area.

Post-Construction through 2026 (Ongoing)

	Personnel:	Village of Woodridge = Village					
		V3 Companies = V3					
		Landscape Contractor = LC					
		Volunteers = VL					
2016							
Coordinator	Participants	Activity		mid-May	mid-June	mid-July	mid-August
Village & V3	V3, LC	Native Plant Installation	X	X	X	X	X
Village & V3	V3, Village, and/or LC	Spot Herbicide / Weeding			X		
Village & V3	V3, Village, LC	Bioengineering Materials Inspection			X		
Village & V3	V3, Village	Vegetation Monitoring	X	X	X	X	X
2016 – 2025 (ongoing)							
Coordinator	Participants	Activity	mid-April	late-May	late-June	mid-July	mid-August
Village	LC	Weed-whip and Cut Natives	X				
Village	Village	Spot Herbicide / Weeding	X	X	X	X	X
Village	Village	Bioengineering Materials Inspection	X				
Village	Village	Vegetation Monitoring	X				
	Notes:						
	Herbicides shall include Poast, Roundup, or Rodeo (near water) as conditions allow, applied by a USDA-licensed applicator						
	Cutting and Mowing of Native Plants should include removal of clippings from the site						

Responsibilities

The Village of Woodridge and their designated Representative shall be responsible for project site maintenance. Participating parties will include the Owner's Representative, professional Contractor services support, or possibly staff from the Village's Public Works.

Discussion – Project Benefits

Pollutant Reduction

The Upstream Project Area substantial completion of streambank stabilization was completed by August 19, 2016. Final planting installations were installed August 29, 2016. Temporary cover crop became established within one month following slope stabilization. We have not had large flood events since installation. But observations suggest that the banks remained protected and erosion has been greatly reduced. Selected vegetation replacement of invasive trees and shrubs with native species in the 0.24-acre riparian area will also substantially reduce the loss of bank soils and promote bank soil stability. Native riparian plantings will reduce sheet erosion within the flood zone. Rock riffle structures will prevent channel downcutting which in the past caused site degradation. These measures will significantly reduce non-point source pollutant loadings to the downstream East Branch DuPage River. Based on site observations, there is minimal sediment delivered to the stream from the restoration site.

Implementation of the Crabtree Creek Corridor Stabilization - Upstream Project Area Project has been estimated to have reduced pollutant loading into Crabtree Creek and the East Branch DuPage River.

Pollutant Reduction from Upstream Project Area Streambank Stabilization & Riffle Structures:

- Sediment Load Reduction = 72.1 tons / year.
- Total Phosphorus Reduction = 72.9 lb / year.
- Total Nitrogen Reduction = 147.9 lb / year.

In addition, Native Plant Buffer / Urban Filter Strip (0.24-acre) pollutant load reductions based on a 3-acre tributary area of runoff (Jonquil Lane and Crabtree Avenue backyard areas) include:

- BOD Reduction = 17 lb / year
- COD Reduction = 85 lb / year

	Load before BMP (lbs/yr)		Load after BMP (lbs/yr)		Load Reduction (lbs/yr)
BOD	33		16		17
COD	213		128		85
TSS	462		125		337
LEAD	0		0		0
COPPER	0		U		U
ZINC	1		1		1
TDS	654		U		U
TN	9		6		4
TKN	5		U		U
DP	0		U		U
TP	1		1		1
CADMIUM	0		U		U

U = Removal Efficiency for the particular BMP and constituent unavailable.

The Downstream Project Area substantial completion of streambank stabilization was completed by November 11, 2016. Final planting installations were installed January 2, 2017. Implementation of the Crabtree Creek Corridor Stabilization - Upstream Project Area Project has been estimated to have reduced pollutant loading into Crabtree Creek and the East Branch DuPage River as follows:

Pollutant Reduction from Downstream Project Area Streambank Stabilization & Riffle Structures:

- Sediment Load Reduction =111 tons / year.
- Total Phosphorus Reduction =111 lb / year.
- Total Nitrogen Reduction = 223 lb / year.

Due to the installation of the Crabtree Creek Corridor Stabilization Project, pollutant loading rates to Crabtree Creek have been reduced at the project site. The benefits of BMPs will include reduced soil loss and reduced TSS, BOD, TP, and TN pollution transport to downstream waterways including the East Branch DuPage River and directly increased DO levels. BMPs will establish a permanent pollutant filtration buffer along the project corridor.

Appendix B-2 Causes of impairment for IL_GBL-02 to be addressed by the proposed Crabtree Creek Corridor Stabilization Project include:

- other flow regime alterations (319)
- dissolved oxygen (322)
- total phosphorus (462)

Appendix B-2 Sources of Impairment to be addressed by the proposed Crabtree Creek Corridor Stabilization Project include:

- channelization (20)
- impacts from hydrostructure flow regulation / modification (58)
- urban runoff / storm sewers (177)

<u>Habitat and Riparian Benefits</u>

- Selected vegetation replacement of non-native species with native trees shrubs, grasses, and forbs will protect and diversity wildlife habitat corridor along Crabtree Creek, as well as diversity the native plant understory which is an indicator of a healthy ecosystem. The proposed plant species will also increase the diversity of foraging opportunities for wildlife.

- Selected vegetation replacement will allow more desirable and beneficial species to flourish. There were numerous impacts to ecological integrity caused by the previously existing invasive plant species in the riparian zone. Dense stands of invasive shrubs such as common buckthorn and Tartarian honeysuckle previously shaded and out-competed growth of seedlings of bur oak (Quercus

macrocarpa) and black walnut (Juglans nigra) which occur in limited number in the riparian area. Riparian restoration will increase sunlight penetration and increase the density of native species.

- The riparian planting restoration will enhance the function of interception of rainfall and the deep-rooted trees and plants have increased absorption properties over the existing riparian species. The establishment of natural plantings and their functions in the riparian area will assist in water quality improvements and NPS reductions.

- The density of native forbs and grasses will enhance pollutant filtration and assimilation of nutrients as well as contaminated runoff discharged from surrounding upland areas, or through the project site. Native groundcover such as grasses and forbs are particularly efficient at trapping sediment in the uptake of phosphorus and nitrogen nutrients which otherwise cause pollution within the waterway. The proposed planting plan will significantly increase the abundance of groundcover species. Deep-rooted trees will increase the uptake of nitrogen from shallow groundwater, improving water quality of the stream.

- The planting plan will help restore in-stream vegetative cover by encouraging partial sunlight penetration into the water column to enhance growth of shoreline forbs and grasses. This will enhance the function of in-stream habitat conditions.

Public Outreach / Education

Project Signage (per project plans) placed on Jonquil Lane along the pedestrian sidewalk in open space is being utilized to notify pedestrians, bikers, and visitors regarding the project, funding sources, and proposed improvements and activities. The Project Site likely receives thousands of passersby annually. Many residents and visitors use the sidewalks along the Crabtree Creek stream corridor which will further enhance community educational outreach from the project site.

The Woodridge Park District (WPD) has been active with outreach and educational efforts over the last few years in:

- Conducting public meetings for residents along the project site,
- Educating homeowners and acquiring landowner signoffs for the proposed work in the common area,
- Contacting landowners along the project site and the community to notify them of the Project's goals and objectives and the work conducted.
- Conducting additional outreach / educational efforts presented in WPD Board meetings, and provided in WPD newsletter updates.
- Meeting with the Village of Woodridge Public Works Department officials to review project restoration efforts and related benefits and to coordinate the Downstream Project Area.
- Installation of a project description on the WPD website is being undertaken.

The Village of Woodridge has been active with outreach and educational efforts over the last few years in:

- The Village of Woodridge mailed notifications to property owners along the project site before and during construction.
- Discussion of the project at public meetings and one Board meeting,
- Educating homeowners and acquiring landowner signoffs for the proposed work in the common area,
- Installation of a project description on the Village website is being undertaken.

Conclusions

Public perspectives for the Crabtree Creek Corridor Stabilization Project Area include the following. Due to the experience of receiving favorable bid costs, additional streambank stabilization areas were added to the original proposed project. Therefore, one lesson learned is to be prepared to implement an expanded project area along a stream reach if conditions allow, rather than excluding small streambank areas that are located in between larger streambank areas proposed to be stabilized. Other lessons learned include that where conditions allow, using the same contractor that may be working on a nearby stabilization project areas can help to improve cost efficiencies. Site visit follow up after scheduled contractor maintenance may be essential, especially early on, to determine whether required work has been completed. One of the challenges in working with two agencies owning two different project areas has been in facilitating agency inter-correspondence and consistency of methods regarding completion of the project submittal requirements. It is recommended for the future that the same person be designated by both agencies to both develop and to finalize all related reports, forms, and administrative submittals. This may also facilitate completion of a consolidated Final Report.

Positive feedback was received from some of the adjacent residents in both the Upstream and Downstream Project Areas. Some negative feedback received from some of the adjacent residents in the Upstream Project Area included concern over the loss of the vegetative visual screening in the riparian buffer along Crabtree Creek. The loss of vegetative screening occurred during the vegetative management phase with the removal of undesirable vegetation such as buckthorn and honeysuckle shrub species. The Woodridge Park District has an ongoing education program with the residents to inform them why the removal of the undesirable vegetation was necessary in part to allow sunlight to occur on the banks of the creek in order to support the native plantings which were installed. Other educational reasons for the vegetation management include that the installed native plantings that replaced the undesirable vegetation will provide a vegetative buffer to not only reduce pollutant loadings into Crabtree Creek via pollutant filtration buffer but also to help to stabilize the previously eroding banks that have now been stabilized. The Village of Woodridge has received limited feedback during site visits, and most of the feedback was positive regarding completion of the project.

Based on the stabilization efforts observed to date, including the growth of temporary cover crop along with native plant species (see Attachment 1 Photos), the public perception of the Crabtree Creek Corridor Stabilization Project appears to be that the stream stabilization effort has been successful. The Woodridge Park District is aware that ongoing native plant maintenance will be a critical component

to project success. As a result, the contractor is under contract to provide three (3) years of native plant maintenance at the Project site. The Village of Woodridge has indicated that now that construction is complete, they are turning their attention to making sure the plantings are established and maintained.

ATTACHMENT 1A: PROJECT PHOTOS – UPSTREAM PROJECT AREA

Photo 1 (before, facing upstream): Significant channel migration was occurring at Crabtree Creek (Cross Section # 2, facing upstream). The stream channel is undercutting the tree rootball depicted (yellow arrow). Areas adjacent to the tree have experienced several feet of additional erosion (white arrow).

Photo 2 (after, facing upstream): Rock toe and re-shaped sloped with vegetation management.

Photo 3 (before, facing downstream): Crabtree Creek near Cross Section # 2 facing downstream. Erosion is undercutting adjacent tree rootballs. Vertical channel downcutting has transported out of the project reach fine gravel and small cobble, leaving behind only larger cobble and boulder materials. Some boulders are 3 feet in diameter.

Photo 4: (after, facing downstream): Rock riffle structure in center of photo for grade control and to divert erosive flows away from the right bank. Re-shaped right bank and left bank also depicted.

Photo 5 (before, facing upstream): The Crabtree Creek channel has shifted several feet to the north at this location. Eroded sediment contributes to downstream BOD, TP loading, TN loading, TS, and impaired instream aquatic habitat. Each of these concerns have been identified in the Upper DuPage River Watershed Plan.

Photo 6: (after, facing upstream): Tree removal was necessary to re-shape the recessed and steeply eroded slopes.

Photo 7: The central riffle, facing upstream.

Photo 8: Native vegetation seeding and native plant plugs in newly restored riparian habitat. Native vegetation will enhance pollutant filtration throughout the project site.

Photo 9 (before, facing upstream): Crabtree Creek streambank erosion was undermining tree rootballs. Erosion along both banks indicates the stream channel is enlarging to accommodate watershed flows.

Photo 10 (after, facing downstream): With newly constructed riffle in the foreground, the left bank depicted received tree removal and a newly re-shaped slope. Over time as the native vegetation becomes established, pollutant loadings will be reduced by being filtered through a restored riparian area.

Photo 11: At the far downstream project area near Stn. 1+00, Native plant seeding with erosion blanket and native plant plugs were installed in areas where trees were preserved.

Photo 12: Erosion blanket was fastened along tree roots in areas where trees were preserved.

ATTACHMENT 1A: PROJECT PHOTOS – DOWNSTREAM PROJECT AREA

Area 4 "Before" Photo (facing upstream):

The stream channel was undercutting the bank after exiting the upstream gabion section. Poor vegetation coverage contributed to bank destabilization.

Area 4 "After" Photo
(facing upstream):

Bank re-shaping with native vegetation installation.

Area 3 "Before" Photo
(facing downstream):

Outside bend bank erosion resulting in a destabilized flared end outfall structure and working towards the potential loss of several large diameter trees.

Area 3 "After" Photo
(facing downstream):

Bank re-shaping with stone toe and native vegetation installation. Rock vane installation and improvements to the outfall structure.

Area 2 “Before” Photo
(facing upstream):

Moderately incised banks with very little vegetation

Area 2 “After” Photo
(facing upstream):

Bank re-shaping with native vegetation installation.

Area 1 "Before" Photo
(facing downstream):

Severely eroded banks encroaching into utility easements (jeopardizing utility pole stability) and resident's back yards (jeopardizing existing fences).

Area 1 "After" Photo

Gabion basket installation with bank reshaping and native vegetation installation on the far bank and stone toe installation with bank reshaping and native vegetation installation on the near bank.

ATTACHMENT 2: OPERATION & MAINTENANCE PLAN

ATTACHMENT 3: SECTION 319 FINANCIAL ASSISTANCE AGREEMENT # 3191509

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

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2600 Center Drive
Woodridge, Illinois 605017-0887

Re: Financial Assistance Agreement No. 3191509

Dear Sir or Madam:

I am pleased to inform you that the Woodridge Park District's Section 319 application has been approved.

The enclosed Financial Assistance Agreement (Agreement) is being sent to you for signature and processing. Your organization's duly authorized representative must sign and date both copies of the Agreement along with the Taxpayer Identification Number form, Federal Funding Accountability and Transparency Act Required Reporting form, and Organization Certifications and Grant Conditions.

Return, with original signature, both copies of the Agreement along with a single copy of the Taxpayer Identification Number form, Federal Funding Accountability and Transparency Act Required Reporting form, and the Organization Certifications and Grant Conditions to:

Illinois Environmental Protection Agency
Bureau of Water – Watershed Management Section
1021 North Grand Avenue East, P.O. Box 19276
Springfield, Illinois 62794-9276
Attention: Scott Ristau

Receipt of a written refusal or failure to return a properly executed Agreement within thirty (30) days from the date of this letter may subject the Agreement to cancellation consideration.

4302 N. Main St., Rockford, IL 61103 (815) 987-7760
595 S. State, Elgin, IL 60123 (847) 608-3131
2125 S. First St., Champaign, IL 61820 (217) 278-5800
2009 Mall St., Collinsville, IL 62234 (618) 346-5120

9511 Harrison St., Des Plaines, IL 60016 (847) 294-4000
412 SW Washington St., Suite D, Peoria, IL 61602 (309) 671-3022
2309 W. Main St., Suite 116, Marion, IL 62959 (618) 993-7200
100 W. Randolph, Suite 10-300, Chicago, IL 60601 (312) 814-6026

PLEASE PRINT ON RECYCLED PAPER

A copy of the Agreement will be returned to you once the Agreement is fully executed by Illinois EPA and filed with the State of Illinois Comptroller. The start of the performance period covered by this Agreement shall be from the date of execution identified on the signature page of the Agreement. This date corresponds to the date the Agreement becomes fully executed. No services will be paid which are performed prior to the execution date.

Should you have any questions regarding the enclosed, please contact Scott Tomkins with the Bureau of Water at (217) 782-3362.

Sincerely,

Marcia Willhite

Marcia Willhite
Chief
Bureau of Water

ST:3191509

Attachments

Financial Assistance Agreement

State of Illinois
Illinois Environmental Protection Agency
Bureau of Water

AGREEMENT PERIOD:
The period of performance covered by this agreement shall be from **The Date of Execution** through July 15, 2017. No services will be paid which are performed prior to or subsequent to this performance period.

Assistance Amount	$167,242.00	CFDA Number	66.460
Agreement Type	319	Agreement Number	3191509

Recipient	Woodridge Park District		
Address	2600 Center Drive Woodridge, Illinois 60517-0887	Telephone FAX	(630) 353-3300 (630) 353-3310

Project Description/Scope of Work

CRABTREE CREEK CORRIDOR STABILIZATION PROJECT

Under this Agreement, the Recipient shall complete the following tasks.

DESIGN SPECIFICATIONS

1. The Recipient shall prepare design specifications (Design) for the stabilization of approximately 1,223 feet of eroding streambank and 120 feet of eroding streambed and the establishment of a native vegetative buffer (0.45 acres) over two segments of Crabtree Creek, a tributary to the East Branch of the DuPage River (IL_GBL-02), in the Village of Woodridge. The Design for the two segments will consist of:

   a. At the upstream site, approximately 443 feet of streambank stabilization using stone toe protection, bank re-grading, nine rock points, native riparian vegetation and other measures; 80 feet of stream channel stabilization using three rock riffle grade control structures; and 0.18 acres of native vegetative plant buffer; and

   b. At the downstream site, approximately 780 feet of streambank stabilization using stone toe protection, bank re-grading, rock points, native riparian vegetation, 150 feet of gabion basket along with other supporting stabilization measures; 40 feet of stream channel stabilization using four rock riffle grade control structures; and 0.27 acres of native vegetative plant buffer.

sediment transport. Two (2) copies of the draft report shall be completed and submitted by the Recipient to the Illinois EPA by May 31, 2017. The final report shall be completed and one (1) electronic copy and five (5) paper copies submitted by the Recipient to the Illinois EPA by July 15, 2017.

OTHER DIRECTED ACTIVITIES

5. The Recipient shall be available for coordination and progress briefings. The dates and locations of these briefings will be specified by the Illinois EPA in consultation with the Recipient during the course of the project.

6. The Recipient shall submit a written progress report by the fifteenth (15th) of July, October, January, and April occurring during the Agreement Period summarizing the activities and accomplishments of the Recipient. Whenever practical reports should be submitted printed two sided.

7. All products produced and all work performed by the Recipient under this Agreement shall be subject to review and approval by the Illinois EPA to determine eligibility and acceptability in meeting the terms and intent of this Agreement.

8. All products and materials produced under this Agreement shall include a statement identifying the Illinois EPA, U.S. EPA, and Section 319 of the Clean Water Act as a source of financial assistance.

9. At each site where best management practices (BMPs) are installed under this Agreement, the Recipient shall design and erect a temporary sign which acknowledges the participating agencies and identifies Section 319 of the Clean Water Act as the funding source of this project. Sign design must be approved by, and consistent with the specifications of, the Illinois EPA prior to their installation at any site. Designs for all signs shall be completed and submitted by the Recipient to the Illinois EPA by August 31, 2015. The Recipient shall erect the sign approved by the Illinois EPA prior to the installation of the BMP(s) at its particular site. The signs shall remain in place throughout the installation of the BMP(s) and for a period thereafter as mutually agreed upon by the Recipient and the Illinois EPA.

10. The Recipient shall develop an Operation and Maintenance Plan (O & M Plan) for the BMPs implemented under this Agreement to ensure their long-term viability (at least ten years). The O & M Plan shall identify regular inspection needs and appropriate management activities such as sediment and debris removal, replacement of vegetation and hardware, chemical treatment, etc. The O & M Plan shall identify both coordinating (i.e. local governments) and participating (i.e. citizen groups, landowners) parties to carry out inspection and management needs and the financial resources necessary for implementation of the O & M Plan. A draft of the O & M Plan shall be completed and submitted by the Recipient to the Illinois EPA by August 1, 2015. The final O & M Plan shall be completed and submitted by the Recipient to the Illinois EPA by September 1, 2015.

11. The Recipient shall submit a draft of all publications, press releases, newsletter articles, video productions, and other public information materials relating to water quality issues to the Illinois EPA for review and comment prior to their distribution. The Recipient shall allow the Illinois EPA twenty-one (21) days from the date of submittal to provide comment on the proposed information material.

Project Schedule

Description	Completion Date
DESIGN SPECIFICATION	
1. Draft Design Specification	August 1, 2015
Final Design Specification	September 1, 2015
PERMITS AND LANDOWNER AGREEMENTS	
2. Draft Agreements	November 1, 2015
Final Agreements	December 1, 2015
CONSTRUCTION AND IMPLEMENTATION	
3. Design Implementation	May 31, 2017
Photographic Documentation of Construction	July 15, 2017
FINAL REPORT AND PROJECT EVALUATION	
4. Draft Report	May 31, 2017
Final Report	July 15, 2017
OTHER DIRECTED ACTIVITIES	
6. Progress Report	Quarterly as stipulated
SIGN DESIGN	
9. Sign Design	July 31, 2015
Sign Installation	August 31, 2015
OPERATION AND MAINTENANCE PLAN	
10. Draft O&M Plan	August 1, 2015
Final O&M Plan	September 1, 2015

Estimated Allowable Project Costs

Project Cost Summary	Totals
1. Direct Labor	$0.00
	0.00
2. Indirect Costs	$0.00
	0.00
3. Other Direct Costs	$0.00
Travel	0.00
4. Equipment, Materials, Supplies	$0.00
	0.00
5. Subcontracts	$282,736.00
Construction Contractor(s)	258,736.00
Project Consultant(s)	24,000.00
TOTAL	**$ 282,736.00**

Assistance Amount at	59%	$ 167,242.00
Recipient Share at	41%	$ 115,494.00

Offer and Acceptance

This Financial Assistance Agreement is subject to all applicable State and Federal statutory provisions, State and Federal Grant Regulations, the Organization Certifications and Grant Conditions attached hereto, and certifications provided as part of the Recipients Application for Assistance.

For the State of Illinois Environmental Protection Agency:

The Director (herein called the "Director") of the Illinois Environmental Protection Agency, in accordance with the authority given in the Environmental Protection Act, and in appropriation by the General Assembly made pursuant thereby, hereby offers financial assistance to the Recipient, up to and not exceeding the specified amount, for the support of the efforts contained in the Project Description.

Director_____
(Lisa Bonnett, Director)

By_____

Printed Name Carol Radwine

Title Chief Financial Officer

Date _____

On behalf of the Recipient:

I the undersigned, being duly authorized to take such actions, do hereby accept this offer and agree to all terms and conditions including the Organization Certifications and Grant Conditions attached hereto. I certify under oath that all information in this Agreement is true and correct to the best of my knowledge, information, and belief; that the funds shall be used only for the purposes described in this Agreement; and that the award of grant funds is conditioned upon such certification

Recipient_____

Signature _____

By _____

Printed Name _____

Title _____

Date _____

For the State of Illinois Environmental Protection Agency:

Therefore, the State of Illinois executes this Agreement this ___ day of _____, 2015.