Exhibit B

31st Street Improvements

MITIGATION PLAN FOR OFF-SITE, PERMITTEE-RESPONSIBLE MITIGATION

MAY 2013

PREPARED FOR: THE US ARMY CORPS OF ENGINEERS,
KANSAS CITY DISTRICT

PREPARED BY:

Vireo
Patti Banks Associates + Community ReDesigned

PREPARED ON BEHALF OF:

City of Lawrence
KANSAS

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Section 1 – Project Description and Background

The proposed 31st Street project site is located in Township 13 S., Range 20 E., Section 17 in the City of Lawrence, in Douglas County, Kansas. The proposed project would consist of construction of approximately 1 mile of a divided, 2-lane roadway with stormwater curb and gutter on the interior sides of the roadway and a 16-foot wide grassed median. The exterior shoulder of both roadways will consist of a 46-foot graded and vegetated shoulder with sidewalks constructed along both sides of the roadway. See Attachments for a map of the proposed project location where impacts are expected to occur and the proposed location for mitigation of these impacts.

Section 2 - Mitigation Objectives

The primary objective of mitigation is to replace wetland and stream functions impacted by the proposed project. This section discusses the existing resource impacts; the types and quantities of resources that will be created and enhanced; and how these resources address the needs of the watershed.

Summary of Existing Resource Impacts

The proposed project will involve the placement of fill materials within wetlands and tributaries to the Wakarusa River, determined by the US Army Corps of Engineers (USACE) to be jurisdictional. The roadway will be constructed on top of an embankment constructed from excavated local soils, measuring approximately 290 feet wide at the base and approximately 50 feet wide at the roadway crest. Fill material for the elevated roadway will consist of grading mostly on-site soils totaling approximately 82,000 cubic yards of material. An estimated 37, 500 cubic yards of additional material will also be imported to the project site for roadway fill and grading purposes. Roadway construction will impact approximately 3.46 acres of forested/scrub-shrub wetland.

Two new box culverts will be installed through the placed fill to convey flows from two existing streams under the new road embankment. The western-most culvert is designed as a 10 ft x 10 ft x 173 ft long, reinforced concrete box culvert. A concrete apron will extend an additional 16.5 feet at the inlet and outlet of this culvert for a total structure length of 206 feet. Rock will be placed at the downstream end of the culvert for erosion protection, impacting an additional 30 feet of wetland. The eastern-most culvert is designed as an 8 ft x 5 ft x 185 ft long, reinforced concrete box culvert. The total structural length for this culvert installation is estimated at 270 linear feet. Construction of the box culverts will impact approximately 476 linear feet of ephemeral/intermittent streams.

Proposed Resource Types, Quantities, and Functions

Mitigation for wetland and stream impacts is proposed to include creation of 4 acres of wet meadow and emergent wetland, and enhancement of 2,400 linear feet of riparian corridor along the Wakarusa River (see map in Attachments for project locations).

The Lower Wakarusa River is a sub-watershed within the Lower Kansas River watershed, which includes parts of Atchison, Douglas, Jefferson, Johnson, Leavenworth, and Wyandotte Counties. A Watershed Restoration and Protection Strategy (WRAPS) 9 Critical Elements Plan has been developed to provide a blueprint of protection and restoration strategies and activities to protect and restore surface waters in the Lower Kansas Watershed. The WRAPS project area includes the Lower Wakarusa River with the exception of the drainage that feeds Clinton Reservoir. The primary pollutant of concern within this watershed's streams and rivers is bacteria. Approximately 77 percent of the impaired streams and rivers within the Lower Kansas WRAPS do not meet their designated uses. The Lower Wakarusa is listed under Section 303(d) of the Clean Water Act due to fecal coliform bacteria. However, the priority for achieving the Total Maximum Daily Load (TMDL) for this river is medium as proposed by this plan, and will be addressed in the future (see Attachments for the WRAPS Plan Overview and Executive Summary).

Mitigation of impacts to wetlands and streams within the same watershed will benefit the Wakarusa sub-watershed and the overall goals and objectives of the WRAPS plan for the Lower Kansas Watershed.

Section 3 - Site Selection

On-site mitigation was considered in an effort to meet the City's mitigation requirements. However, given the relatively poor quality and diversity of vegetation within the existing wetlands and streams, and the overwhelming presence of exotic invasives like shrub and Japanese honeysuckle, this did not appear to be a logical choice for restoration or enhancement.

The proposed mitigation site is less than one mile southwest of the proposed project location where the impacts will occur (see Attachments for a map of the impact and proposed mitigation sites). While it is the USACE's preference to mitigate impacts using a wetland bank or in-lieu fee, the closest mitigation bank is located in the Stranger Creek sub-watershed. The City of Lawrence would prefer to provide mitigation for impacts to wetlands and streams within the same watershed in which they will occur. Specific site locations for the wetland and stream mitigation are based on suitable site characteristics necessary to provide a successful mitigation project and that are in close proximity to the existing Baker Wetland complex. The Kansas Department of Transportation (KDOT) will also be using property within this area to meet the mitigation requirements of the South Lawrence Trafficway (SLT) project.

By locating the mitigation within the Wakarusa sub-watershed, the City will achieve its goal of adding valuable wetland and stream resources within the sub-watershed and will meet its mitigation obligations; while assisting with achieving the goals of the Lower Kansas WRAPS plan.

As with mitigation banking, the primary project goal is to create larger blocks of contiguous wetlands that can sustain ecological function. Therefore, from an ecological perspective, the primary reasons for implementing mitigation in these locations are that it will mitigate for impacts within the same watershed they occur in, and it will add to the ecological function of the existing Baker Wetland complex, which will in turn help insure its long-term viability.

Section 4 - Mitigation Site Protection

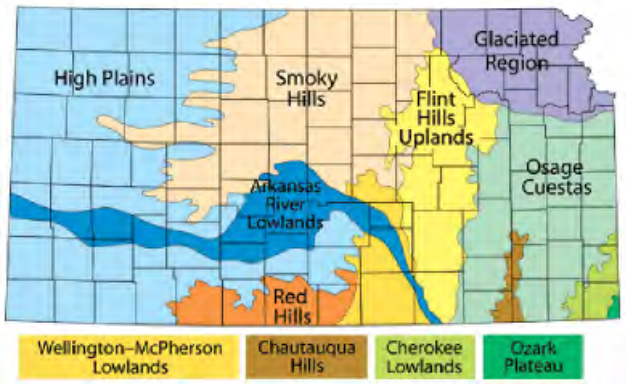
The proposed sites for wetland and riparian corridor mitigation will be purchased by the City and be deeded to Baker University, which will be responsible for the construction, management, monitoring, and long-term protection of the mitigation sites. Contact information is:

Dr. Patricia Long, President
Baker University
Office of the President
618 Eighth Street
Baldwin City, Kansas
(785) 594-8311

Section 5 - Baseline Project Information

Baseline information on the 31st Street (impact) site and the proposed mitigation sites includes ecological characteristics; existing resources, soils, and hydrology; and a wetland delineation.

Ecological Characteristics



Both sites lie within the eastern ecoregion of Kansas called the Osage Cuestas, which occupies most of southeastern Kansas. This ecoregion is characterized by east facing ridges with steep, cliff like faces on one side and gentle slopes on the other (cuestas), gently undulating plains, and perennial streams. The ridge of each cuesta is topped with resistant limestone, while thick layers of shale underlie the gentle slopes. In presettlement times, this ecoregion was a tallgrass prairie on the western side and a mix of tallgrass prairie and oak-hickory forest along the eastern side (map courtesy of Kansas Geological Survey).

Existing Resources

The impact site is markedly affected by adjoining land uses. The dam for Mary's Lake and accumulated disposal in the construction demolition landfill area to the west has effectively created a bowl out of the area. There are steep (20-foot or higher) banks along the entire western edge of the landfill site. Existing vegetation is generally of two types on the site, with deciduous woodland on the northern and eastern portions of the site and bottomland grassland with scattered trees on the southern and western side. Most of the site is dominated by shrub honeysuckle in the understory and Japanese honeysuckle in the canopy, which is negatively impacting plant diversity throughout the site.

Photos of existing conditions within the impact site illustrate the blanket of shrub honeysuckle and the general condition of the forested/shrub-scrub wetland.

The proposed wetland mitigation site is currently in agricultural crop production. It is bounded on the north by a road and on the east, west, and south by agricultural land that is slated to become a wetland mitigation site for the SLT project.

Photos of existing conditions within the proposed wetland mitigation site.

The proposed stream mitigation site is located adjacent to the Wakarusa River, south of the wetland mitigation site. A reference site along the Wakarusa River west of East 1500 Rd was surveyed in June 2012 to determine typical

diversity and density of trees and shrubs within the existing riparian corridor. The diameter at breast height as well as species of all trees equal to or greater than three inches in diameter was recorded. Three linear transects 3 ft x 100 ft were used to determine diversity and density of shrubs. The survey revealed 17 species of trees at an average density of 183 trees per acre. The diversity of shrubs was only 4 species at a density of 1,000 per acre. Most of the shrubs surveyed, however, were invasive shrub honeysuckle. The tree species and number of specimens from this reference survey is below.

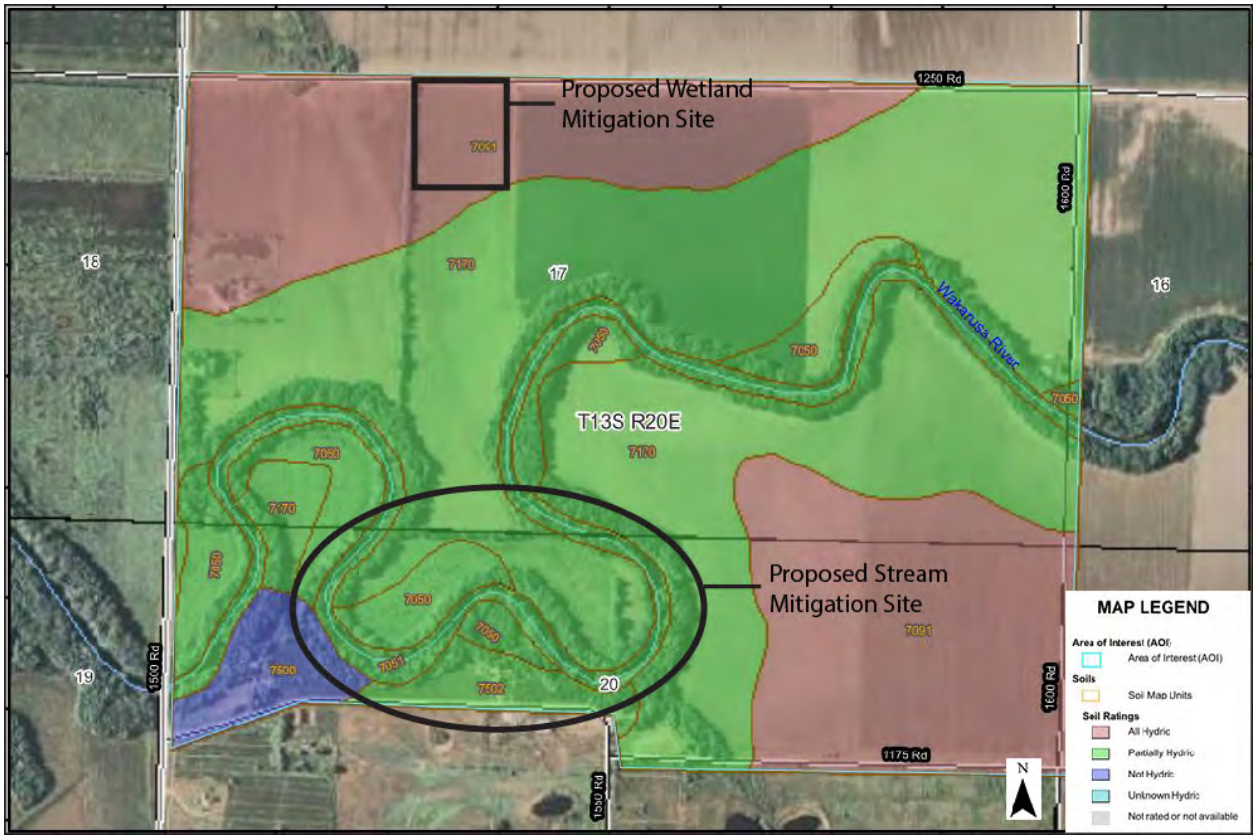
Trees		# Present
Hackberry	*Celtis occidentalis*	294
Black Walnut	*Juglans nigra*	64
Red Elm	*Ulmus rubra*	51
Boxelder	*Acer negundo*	36
Silver Maple	*Acer saccharinum*	35
Green Ash	*Fraxinus pennsylvanica*	29
Pawpaw	*Asimina triloba*	25
American Sycamore	*Platanus occidentalis*	21
Red Mulberry	*Morus rubra*	20
Unknown Elm	*Ulmus sp.*	18
Cottonwood	*Populus deltoides*	12
Bur Oak	*Quercus macrocarpa*	10
American Elm	*Ulmus americana*	8
Kentucky Coffeetree	*Gymnocladus dioicus*	6
Honey Locust	*Gleditsia triacanthos*	6
Bitternut Hickory	*Carya cordiformis*	3
Shagbark Hickory	*C. ovata*	3
	Total	641
641/3.5 acres = 183 trees per acre		

Table to the left lists the tree species noted from the 2012 survey. Photo on right is existing conditions within the riparian corridor of the proposed stream mitigation site.

The buffer area adjacent to the riparian corridor consists of a standard Conservation Reserve Program (CRP) mix of native warm season grasses (see photo below).

Existing Soils

Soils within the impact and proposed mitigation sites are in the Wabash-Kennebec-Reading association. They are deep, nearly level, well drained to very poorly drained soils, on bottom lands (Natural Resource Conservation Service, 2012). Most of the soils within the impact site are Wabash (see Attachments for the Wetland Delineation Report). Soils within the proposed wetland mitigation site are Wabash silty clays that are occasionally flooded; poorly drained; and all hydric. Soils present within the proposed stream mitigation site are Reading and Kennebec silt loams that are rarely to occasionally flooded; well-drained and moderately well-drained; and partially hydric.



Map of hydric soils within the proposed mitigation sites.

Existing Hydrology

The primary water sources for the wetland and riparian corridor within the impact site are two tributaries of the Wakarusa River. The primary hydrological source for the mitigation site is the Wakarusa River.

Wetland Delineation

Review of the U.S. Fish and Wildlife Service Wetland Mapper website for the potential presence of wetlands did not indicate the presence of wetlands on either the impact or the mitigation site. A wetland delineation conducted by Vireo (formerly Patti Banks Associates) in 2010 identified an 11.09-acre wetland within the impact site, as well as

two ephemeral or intermittent streams (see Attachments for Wetland Delineation Report). The Wakarusa River is the only wetland present at the proposed mitigation sites.

Section 6 - Determination of Credits

The proposed 31st Street project will result in impacts to 3.46 acres of wetlands and 476 linear feet of ephemeral/intermittent streams. Credits for impacts were determined by USACE staff and through use of the USACE's *Kansas Stream Mitigation Guidance (SMG) – February 15, 2008*.

Wetland Credits

The wetland delineation conducted in October 2010, identified the presence of 11.09 acres of wetlands. Impacts to wetlands by the proposed project were determined to be 3.46 acres of the total wetland area. Wetland impacts will be mitigated on a 1:1 acre-per-acre basis, per USACE guidance.

Stream Credits

The proposed project will impact 476 linear feet of two ephemeral/intermittent streams. The SMG was used to calculate stream credits required and generated. The number of stream credits required for the proposed impacts is 1,482. The City of Lawrence is proposing to use off-site permitee-responsible mitigation within the same watershed as the impacts will occur. The number of stream credits that is generated using the SMG is 1,512. The generated credits are based on enhancement of a 100-foot by 2,400-foot riparian corridor along the Lower Wakarusa (see Attachment for credit worksheets).

Section 7 - Mitigation Work Plan

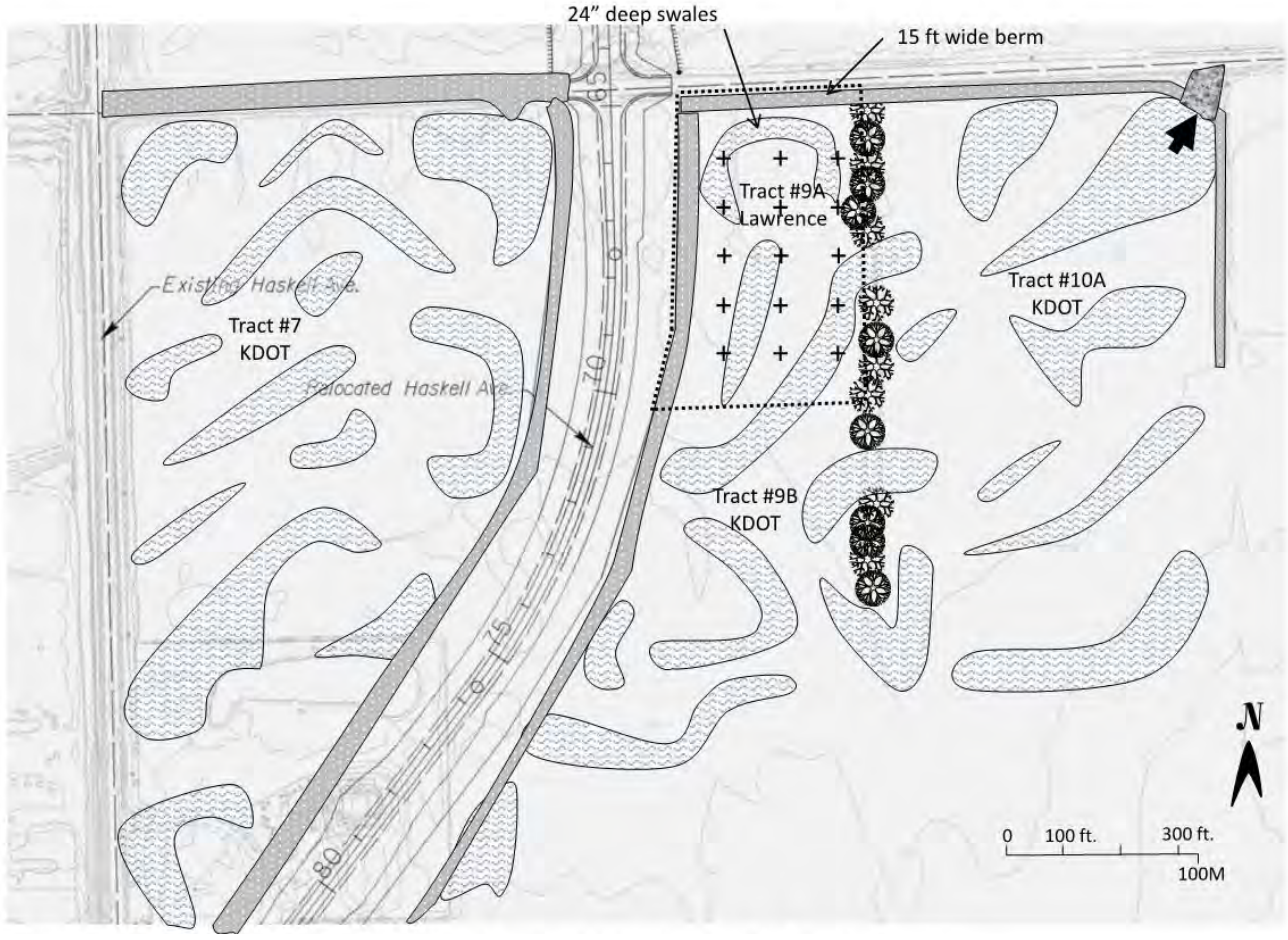
A mitigation work plan has been developed for the proposed mitigation sites. The wetland mitigation will focus on creation of wet meadow and emergent wetland habitats within the 4-acre site. The focus of the stream mitigation will be enhancement of the riparian corridor along the northern side of the Wakarusa River.

Wetland Mitigation

When the proposed wetland mitigation site (Tract 9A) becomes available in the fall of 2013, a temporary 3 ft x 5 ft 15-point grid will be established in order to conduct a pre-construction plant survey. The percent coverage of each plant species within a meter square grid located 2 meters east and west of the stake at each point will be recorded. This survey will determine what plants are present prior to construction. After the plant survey has been completed, the location of future berms and emergent wetland swales will be determined. The swales will be constructed with variable depths to a maximum of 24 inches with 1:25 slopes on the edge (see plan below). The variation in water depths will in turn lead to a variation in plant species present. As soon as earth moving has been concluded, no later than spring 2014, the 60 species of seeds that

have been collected from the nearby Baker Wetlands will be dispersed by hand and lightly harrowed. The list of seed species on page 9 is what Baker Wetland staff anticipates collecting. Seeding rates will be appropriate to insure a successful planting. Additional seed will be added as necessary to meet the performance criteria. Early successional invasives, e.g. thistles and Purple loosestrife, will be eliminated as soon as they are identified.

Sediment excavated from the emergent wetland swales will be re-utilized on site to create the berms.



Plan view shows creation of wet meadow and emergent wetlands within the proposed wetland mitigation site (Tract 9A). The areas adjacent to Tract 9A will be used by KDOT to meet the mitigation requirements of the SLT project.

Species	Common Name	Indicator Status	Species	Common Name	Indicator Status
Alisima subcordata	Water Plantain	OBL	Juncus torreyi	Torrey's Rush	FACW
Ammannia coccinea	Tooth-Cup	OBL	Justicia americana	Water Willow	OBL
Amorpha fruiticosa	False Indigo	FACW	Leersia oryzoides	Rice Cutgrass	OBL
Asclepias incarnata	Marsh Milkweed	FACW	Leptochloa fusca	Bearded Sprangletop	FACW
Asclepias sullivantii	Milkweed	FACW	Leptochloa panicea	Mucronate Sprangletop	FACW
Bidens aristosa	Tickseed Sunflower	FACW	Ludwigia alterniflora	Bushy Seedbox	OBL
Boltonia asteroides	White Boltonia	FACW	Ludwigia peploides	Floating Seedbox	OBL
Carex bicknelli	Bicknell's Sedge	FACW	Lycopus americanus	American Bugleweed	OBL
Carex bushii	Bush's Sedge	OBL	Lythrum alatum	Winged Loosestrife	OBL
Carex crus-corvi	Raven-Foot Sedge	OBL	Penthorum sedoides	Ditch Stonecrop	OBL
Carex frankii	Frank's Sedge	OBL	Phyla lanceolata	Lanceleaf Frog Fruit	OBL
Carex hyalenoplepis	Shoreline Sedge	OBL	Polygonum amphibium	Water Smartweed	OBL
Carex pellita	Woolly Sedge	OBL	Polygonum lapathifolium	Willow Weed	OBL
Carex tribuloides	Blunt Broom Sedge	OBL	Polygonum pensylvanicum	Pennsylvania Smartweed	FACW
Carex vulpinoidea	Fox Sedge	FACW	Ranunculus sceleratus	Celeryleaf Buttercup	OBL
Cephalanthus occidentalis	Buttonbush	OBL	Rumex altissimus	Pale Dock	FACW
Cyperus acuminatus	Awned Flatsedge	OBL	Rumex crispus	Curly Dock	FAC
Cyperus erythrorhisos	Red Root Flatsedge	OBL	Sagittaria brevirostris	Short-Beak Arrowhead	OBL
Cyperus esculentus	Chufa	FACW	Sagittaria latifolia	Broadleaf Arrowhead	OBL
Cyperus strigosus	Straw-Color Flatsedge	FACW	Schoenoplectus tabernaemontani	Soft -Stem Bulrush	OBL
Echinochloa crus-galli	Barnyard Grass	FAC	Scirpus atrovirens	Green Bulrush	OBL
Eleocharis compressa	Flat-Stem Spikerush	FACW	Scirpus georgianus	Dark-Green Bulrush	OBL
Eleocharis erythropoda	Bald Spikerush	OBL	Scirpus pendulus	Drooping Bulrush	OBL
Eleocharis macrostachya	Creeping Spikerush	OBL	Senna marilandica	Maryland Senna	FAC
Eleocharis wolfii	Wolf's Spikerush	OBL	Sparganium eurycarpum	Giant Burreed	OBL
Elymus virginicus	Virginia Wild Rye	FACW	Spartina pectinata	Prairie Cordgrass	FACW
Hibiscus laevis	Halberd-Leaf Rosemallow	OBL	Symphyotrichum praealtum	Willowleaf Aster	FACW
Hibiscus moscheutos	Swamp Rosemallow	OBL	Teucrium canadense	American Germander	FACW
Iva annua	Annual Sumpweed	FAC	Vernonia fasciculata	Prairie Ironweed	FAC
Juncus dudleyi	Dudley's Rush	FACW	Veronicastrum virginicum	Culver's Root	FAC

Table showing representative plant seeds to be collected from the Baker Wetland and used for the wetland mitigation planting.

Stream Mitigation

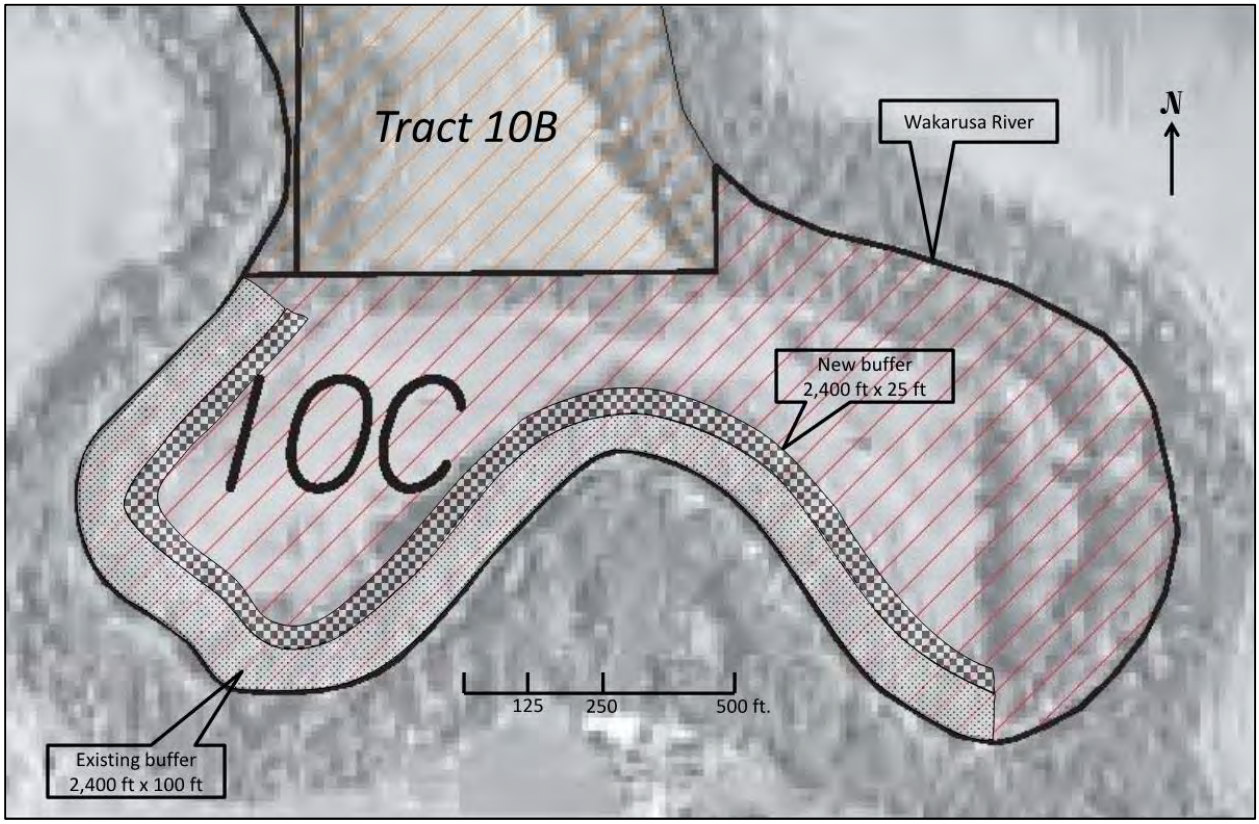
Stream mitigation will be provided through enhancement of the riparian corridor along the Wakarusa River. Due to the presence of many lesser quality trees within the riparian corridor located in the proposed stream mitigation site (Tract 10C), there will be an effort to plant additional tree species that will improve wildlife value. The density of the tree plantings will be 250 trees per acre in the new buffer and 50 trees per acre in the existing buffer. Placement of trees will be random rather than linear, generally averaging 13 ft x 13 ft on center. The density of shrubs will be 500 per acre in the new buffer only. The spacing of the shrubs will also be random rather than linear and average 9 ft x 9 ft on center. The species and number of trees and shrubs that will be planted in the restoration area is also shown in the table below.

Canopy Trees		# Trees
Black Walnut	*Juglans nigra*	70
Bur Oak	*Quercus macrocarpa*	70
Pin Oak	*Q. palustris*	70
Northern Red Oak	*Q. rubra*	70
Black Oak	*Q. velutina*	40
Shagbark Hickory	*Carya ovata*	40
Bitternut Hickory	*C. cordiformis*	40
Pecan	*C. illinoensis*	40
Understory Trees		**# Trees**
Pawpaw	*Asimina triloba*	40
Cockspur Hawthorn	*Crataegus crusgalli*	40
Persimmon	*Diospyros virginiana*	30
Eastern Hophornbeam	*Ostrya virginiana*	25
Downy Serviceberry	*Ameliancher arborea*	25
[1.4 ac x 250 trees] + [5.5 ac x 50 trees] = 625 trees		

Shrubs		# Shrubs
Spice Bush	*Lindera benzoin*	110
Elderberry	*Sambucus canadensis*	110
Black Chokeberry	*Aronia melanocarpa*	110
Blackhaw Viburnum	*Vibrunum prunifolium*	110
Nannyberry Viburnum	*Vibrunum lentago*	110
Red Buckeye	*Aesculus pavia*	50
Eastern Wahoo	*Euonymus atropurpurea*	50
Coralberry	*Symphoricarpos orbiculatus*	50
	Total	700
1.4 acres x 500 shrubs per acre = 700 shrubs		

Tables showing the species and number of trees and shrubs for planting to enhance the riparian corridor.

The location of the stream mitigation site is shown in the following figure. The additional buffer area was previously planted to a standard Conservation Reserve Program mix of native warm season grasses. This will be burned in spring 2014 in order to facilitate planting of the trees and shrubs. The newly planted trees will be protected with a spiral plastic tree wrap and competitive vegetation within 12 inches of the trunk will be controlled with Oust XP Herbicide, specially designed for forestry application.



Plan above shows the area delineated for riparian corridor enhancement.

Section 8 - Operation and Maintenance Plan

Maintenance of the mitigation sites will be critical to the continued viability of the plantings and the ability of the project to meet the performance criteria.

Wetland Mitigation

The main objective of long-term operation and maintenance will be to determine if site conditions are continuing to meet project goals and criteria. In the first 3 years after implementation of this plan, monitoring will be more intensive in order to detect potential problems with site design, water conditions, and establishment of vegetation. Conditions should stabilize during this early period, and the scope and frequency of monitoring activities for the purpose of this project will decrease. Maintenance and monitoring activities that will be conducted on a periodic basis are listed below:

1. Check sites after heavy rains to determine if berms and waterways are functioning properly, if erosion problems exist, and if water holding capacities continue to meet design criteria. Repairs will be made as necessary.

2. Monitor water levels in the various swales of the project periodically during spring and summer to determine if the pools are holding water as designed. Take corrective action as required.

3. Inspect vegetation along the unit perimeters on a regular basis to ensure that it remains intact to prevent erosion or damage to berms. Replant as necessary each season.

4. Check outflow points seasonally and clean or unclog as necessary. It is important that they continue to function appropriately so that spring inundation occurs followed by mid- to late-summer draw-downs. This will maintain appropriate vegetation and invertebrate biodiversity.

5. Assess the area during the growing season for invasive and unwanted species. These will be treated early to prevent establishment.

6. Mow berms periodically to maintain herbaceous vegetation and control woody species. Roots of woody vegetation tend to cause damage to berms and are therefore undesirable.

Stream Mitigation

Newly planted trees and shrubs shall be inspected at least once per month for the first 3 months then seasonally (spring and fall), and needed maintenance performed promptly. The goal of the riparian buffer enhancement is to achieve a natural state that does not depend upon regular maintenance. The enhancement is designed to be naturally sustaining with little to no human input once it has become established. The area will be monitored into the future to insure that no problems arise.

Section 9 - Performance Standards

The mitigation site will be considered successful when it attains a density of plants that sufficiently 'self-manages' itself. The plants should achieve mature height relative to their species. There will be some deviation from the original planting plan as some plants are more aggressive than others, but overall, the plant composition found in the mitigation area should adequately relate to the proposed planting plan. Opportunistic or volunteer plants will be assessed for their potential benefit or threat to the mitigation site and dealt with accordingly.

Wetland Mitigation

The success criteria will be a stabilized vegetative buffer adjacent to the enhanced habitat and percent plant coverage of greater than 50% Facultative (FAC) or wetter. The US Department of Agriculture (USDA) Wetland Indicator Status will be used to determine current hydric plant classification for Region 5. Voucher specimens will be made of all new or difficult to identify plant species found. Identifications will be verified using specimens at the Baker University Herbarium.

Stream Mitigation

The success criteria will be 400 live shrubs per acre and 180 live trees per acre in the new buffer (25 feet adjacent to the existing riparian corridor) and at least 40 live trees per acre planted in the existing riparian corridor. The goal of 14 new tree species and 8 new species of shrubs will also be part of the success criteria. The surviving trees and shrubs will be surveyed each June.

Section 10 - Monitoring Requirements

Wetland Mitigation

The same 3 ft x 5 ft 15-point grid used in the pre-construction survey will be re-established within Tract 9A as soon as earthwork has been completed. A quantitative assessment of vegetation will be made by conducting a 1-square meter sample 2 meters to the east and a replicate sample two meters to the west of each grid stake. In each 1-meter sample plot a visual estimate of percent cover of each plant species will be made. This is an estimate of spatial coverage of each species. Due to the potential of multiple layers of overlap, the total percent coverage for any one plot could total to more than 100 percent. The percent of bare ground and/or standing water will also be quantified. This assessment will be made for a minimum of 3 years in early June. The start date is undetermined as it is dependent upon when the earthwork is concluded.

Baseline photographs will be taken from each corner of the tract as well as follow-up photos during mid-June of the following three years. Photos will include buffer areas as well as the wetland swales. A Wetland Delineation Survey will be conducted at the four corner grid points during the June plant survey for each of the three years of the survey. The collected data will be digitized, analyzed, and summarized in a report to Lawrence Public Works each October for 3 years after earthwork has been completed.

Stream Mitigation

The trees and shrubs that are planted will be flagged by species so they can be more easily monitored. The first report on success rates will be provided to Lawrence Public Works in the Fall of 2014. The buffer will be monitored for a minimum of 3 years to determine success. Photos of the site will be taken prior to planting as well as during the June survey for the first 3 years.

Annual monitoring reports will be submitted by the City to the USACE within the first two months of each calendar year. Reports will be submitted to:

Department of the Army
Kansas City District, Corps of Engineers
Regulatory Branch
601 East 12th Street
Kansas City, MO 64106

Section 11 - Long-term Management Plan

Long term management will be handled by Baker University. The wetland and riparian corridor mitigation areas will be managed in accordance with the maintenance plan described in Section 8.

Section 12 – Adaptive Management Plan

If adverse conditions are observed at any time during the mitigation monitoring, measures will be taken to correct these conditions. Adverse conditions that could develop include excessive sediment, erosion, structural damage, and colonization of the restoration area by exotic, invasive species.

Control of invasive species will be conducted in the method best suited for controlling that species, while maintaining overall system health.

Section 13 - Financial Assurances

The City of Lawrence will be responsible for all financial assurances related to successful completion of this project:

Public Works Department
City of Lawrence
PO Box 708
Lawrence, KS 66044
(785) 832-3123

Section 14 - Completion of Mitigation

Notification of Completion

A final monitoring report will be submitted within one month of completion of the third year of monitoring. The final report will summarize the development, monitoring, and success of the mitigation area. Upon submittal of this report, the City will request a site visit with the USACE to determine the status of the mitigation site.

Agency Confirmation

Once the mitigation site has met the success criteria within the third year, the City of Lawrence Public Works will request a written "Notice of Completion" from the USACE.

Section 15 - References

Kansas Department of Health and Environment. Lower Kansas WRAPS 9 Element Plan. Available online at: www.kdheks.gov/nps/wraps/LowerKansas_plan&summary.pdf.

Kansas Geological Survey, University of Kansas. Physiographic regions of Kansas. Available online at: www.kgs.ku.edu.

US Army Corps of Engineers. 2008. Kansas Stream Mitigation Guidance (SMG) – February 15, 2008.

US Department of Agriculture, Natural Resource Conservation Service. Web Soil Survey. Available online at: www.websoilsurvey.nrcs.usda.gov.

USDA NRCS. Wetland Indicator Status. Available online at: www.plants.usda.gov/wetland.html.

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ATTACHMENTS

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PROJECT AREA MAP with IMPACT and PROPOSED MITIGATION SITES

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SOUTH LAWRENCE TRAFFICWAY MITIGATION AREAS			
MITIGATION TYPE	LOCATION	CALCULATED AREA (ACRES)	MITIGATION REQUIREMENTS † (ACRES)
WETLANDS	1	17.99	—
WETLANDS	2	29.30	—
WETLANDS	3	115.10	—
WETLANDS	4	8.29	—
WETLANDS	5	5.39	—
WETLANDS	6	20.74 *	—
WETLANDS	7	18.62	—
WETLANDS	8	72.88	—
WETLANDS	9B	6.40	—
WETLANDS	10A	16.01	—
BASE WETLANDS		304.72	304
WETLANDS	11	22.36 **	—
ADDITIONAL WETLANDS		22.36	13
TOTAL WETLANDS		327.08	317
UPLAND PRAIRIE	10B	23.62	—
UPLAND PRAIRIE	12A	2.34	—
UPLAND PRAIRIE	12B	9.26	—
UPLAND PRAIRIE	12C	7.20	—
UPLAND PRAIRIE	13	7.14	—
UPLAND PRAIRIE	14	24.22	—
TOTAL UPLAND PRAIRIE		73.78	37
RIPARIAN	10C	27.47	—
TOTAL RIPARIAN		27.47	16
GRAND TOTAL		428.33	370

† Based on the FHWA RGO (May 2008) Section IV.A
* Santa Fe Site
** Optional Potential Mitigation to be coordinated with Haskell Indian Nations upon vacation of Existing 31st St.
ø 9A includes 4.0 acres of wetland mitigation for Project 23 U-2117-01.

31st Street
Impacted Wetlands

South Lawrence Trafficway

Proposed Wetland
Mitigation Site

Proposed Stream
Mitigation Site

Exist. 23rd St.
E. 1750 Rd.
Relocated E. 31st St.
N. Louisiana St.
Reloc. 31st St.
Proposed K-10
Iowa St./U.S. 59
Reloc. Haskell Ave.
Reloc. Louisiana St.

LEGEND
- Wetlands
- Optional Additional Wetlands
- Upland Prairie
- Riparian Habitat
- Wetlands – Project 23 U-2117-01

SCALE 0 500' 1000'

April, 2013
MITIGATION AREAS
SOUTH LAWRENCE TRAFFICWAY
KDOT PROJECT NO. 10-23 K-8392-04

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LOWER KANSAS WRAPS 9 ELEMENT PLAN OVERVIEW AND EXECUTIVE SUMMARY

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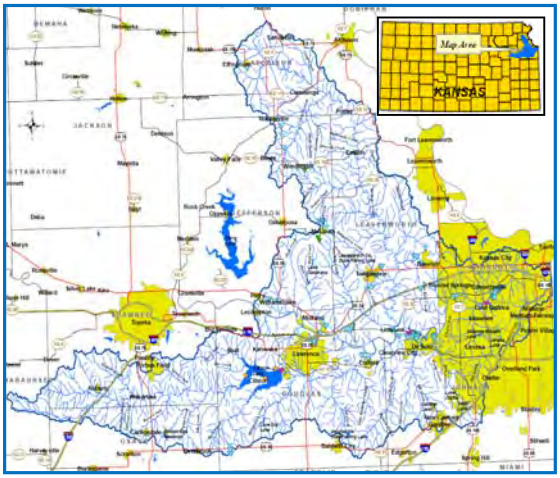
Lower Kansas WRAPS 9 Element Plan Overview

The overall goal of the Lower Kansas WRAPS 9 Element Plan is to provide a blueprint of protection and restoration strategies and activities to protect and restore surface waters in the Lower Kansas WRAPS Project Area.

The **Lower Kansas Watershed** includes parts of six counties including Atchison, Douglas, Jefferson, Johnson, Leavenworth,

The **Lower Kansas WRAPS Project Area** covers the Lower Kansas HUC 8 watershed with the exception of the Wakarusa River drainage which feeds Clinton Lake.



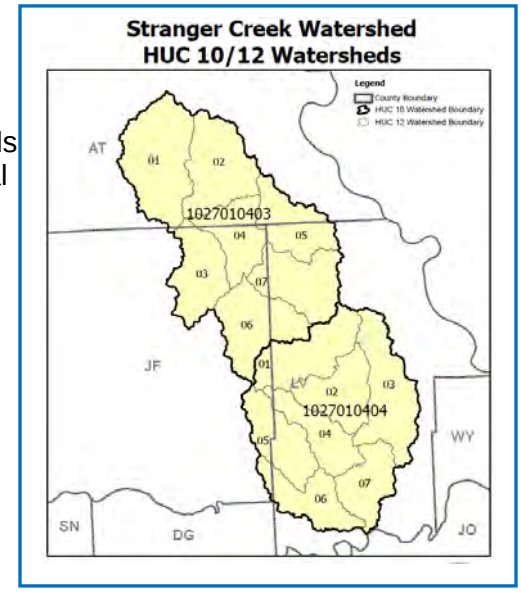
Lower Kansas Watershed

The primary pollutant concern of this watershed's streams and rivers is bacteria, which is present in human and animal waste. Approximately 77% of the impaired stream/river segments within the Lower Kansas WRAPS do not meet their designated uses.

Lower Kansas WRAPS Project Area

Bacteria are naturally occurring single celled microorganisms. There are numerous types of bacteria; some are good, while others are bad. Water supplies contaminated with manure contain (E-coli) and may have other disease–causing microorganisms such as *Crytosporidium* and *Giardia*.

The Stranger Creek priority area includes HUC 10s 1027010403 and 1027010404. The watershed is 22% cropland and 52% pasture/hay/grassland with 18% in woodland. Grazing density of livestock is high, with a number of subwatersheds with more than 50 animal units per square mile.



Stream TMDLs within Lower Kansas WRAPS Project Area		
Water Segment	**TMDL Pollutant**	**Priority**
Cedar Creek	Fecal Coliform Bacteria	High
Cedar Creek	Nitrates	High
Crooked Creek	Biology	Low
Stranger Creek near Linwood	Fecal Coliform Bacteria	High
Stranger Creek near Easton	Fecal Coliform Bacteria	High
Washington Creek	Dissolve Oxygen	High
Kansas River near Lawrence	Biology	Medium
Nine Mile Creek near Linwood	***E. coli* bacteria**	**High**
Kill Creek	Fecal Coliform Bacteria	High
Lower Kansas River	Biology	Medium
Lower Kansas River	Nutrients and oxygen demand on aquatic life	Medium
Lower Kansas River	*E. coli* bacteria	High
Lower Wakarusa River	Fecal coliform bacteria	Medium
Mill Creek	Chloride	Low
Mill Creek	Fecal coliform bacteria	High
Mill Creek JO. CO.	Biology	High

Impairments to be Addressed

- Bacteria on Nine Mile Creek

Priority Areas for Stranger Creek

- The priority area for the Stranger Creek Watershed is Nine Mile Creek

Best Management Practices and Load Reduction Goals

Best Management Practices (BMPs) to address bacteria in the watershed was chosen by the Lower Kansas Stakeholder Leadership Team (SLT) based on local acceptance/adoption rate and amount of load reduction gained per dollar spent.

<u>Bacteria /Phosphorus Reducing BMPs for the Nine Mile Creek Watershed</u>:

- Vegetative filter strip

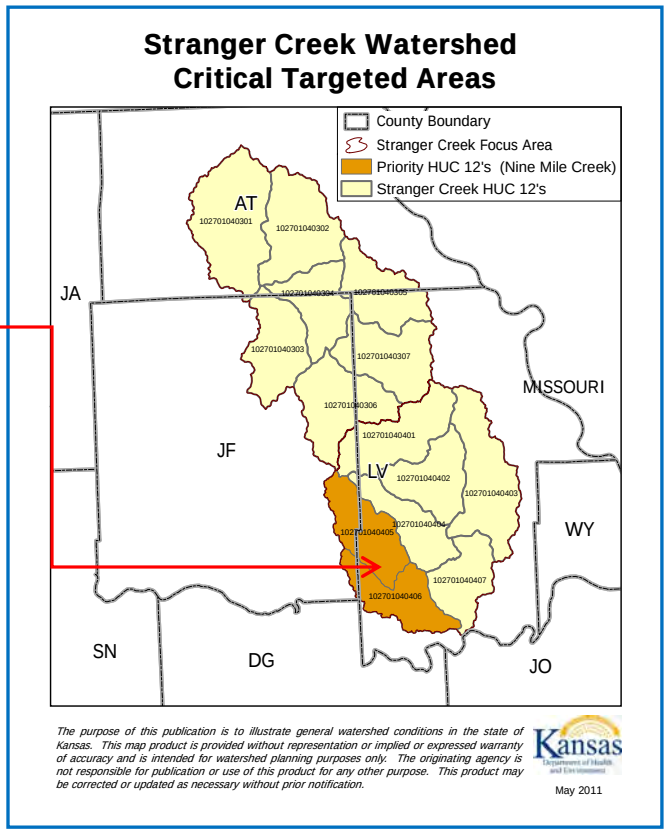
- Relocate feeding sites

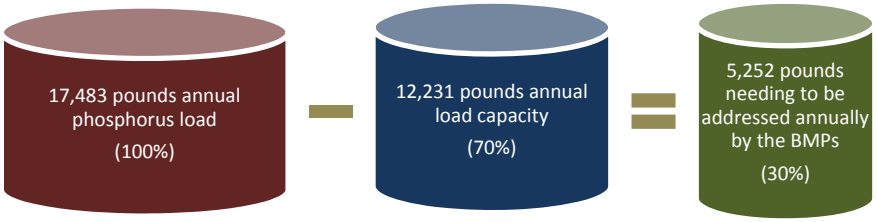
- Alternative (Off-Stream) watering system

- Relocate pasture feeding site

- Current Targeted HUC 12 Watershed:
  Nine Mile Creek Watershed

There is no bacteria load reduction calculation at this time. The SLT decided to use phosphorous load reduction instead. The assumption is that if you are reducing phosphorous, lowered bacteria counts should be evident in water quality samples. The annual reduction goal for phosphorous is 5, 2527 lbs. and will be implemented over a five year time frame.





The current estimated phosphorus load from nonpoint sources in the Nine Mile Creek watershed is 17,483 pounds per year according to the TMDL section of KDHE. This has been determined by KDHE as a result of sampling data obtained in the watershed. After subtracting the annual load capacity, the total annual load reduction allocated to the Lower Kansas Watershed needed to meet the phosphorus reduction goal of 30 percent with implemented BMPs is 5,252 pounds of phosphorus. This is the amount of phosphorus that needs to be removed from the watershed and is the target of the BMP installations that will be placed in the watershed.

The SLT has laid out specific BMPs that they have determined will be acceptable to watershed residents as listed below. These BMPs will be implemented in the Livestock Targeted Area (Stranger Creek Watershed). All these BMPs will simultaneously have a positive effect on reduction of phosphorus and nitrogen (nutrient) impairments.

1.0 Executive Summary

Watershed restoration and protection efforts are needed to address a variety of water resource concerns statewide in Kansas. These concerns include issues such as water quality, public water supply protection, flooding, wetland and riparian habitat protection, unplanned urban development, and others. The State of Kansas committed to implementing a collaborative strategy to address watershed restoration and protection issues when the Governor's Natural Resources Sub-cabinet adopted the Kansas Watershed Restoration and Protection Strategy (KS-WRAPS) in May, 2004. The KS-WRAPS effort established a new way of approaching watershed issues for Kansas. The effort places emphasis on engaging watershed stakeholders in implementing a stakeholder developed action plan that achieves watershed goals established by the stakeholders themselves. This allows for an individualized approach to watershed issues across the state, with input, guidance, and action to achieve watershed improvements coming from the people who live and work in the watershed. Funding for the development of Watershed Restoration and Protection Strategy (WRAPS) plans for individual watersheds is made available to sponsoring groups, using Kansas Water Plan funds and EPA Section 319 Nonpoint Source Pollution Control Grant funds through the Kansas Department of Health & Environment (KDHE).

The Lower Kansas WRAPS Project Area is composed of the Lower Kansas watershed. The goal of the Lower Kansas Watershed Restoration and Protection Strategy is to provide a plan of restoration and protection goals and actions for the surface waters of the Kansas River and its tributaries. Watershed goals are characterized as "restoration" or "protection". Watershed restoration is for surface waters that do not meet water quality standards, and for areas of the watershed that need improvement in habitat, land management, or other attributes. Watershed protection is needed for surface waters that currently meet water quality standards, but are in need of protection from future degradation.

The Lower Kansas WRAPS project began when the Kansas Alliance for Wetlands and Streams (KAWS) was awarded a grant from the KDHE in 2007. A Coordinator for the Lower Kansas WRAPS project was hired in August of 2007 to guide the development of the WRAPS planning effort in the basin, and to work with stakeholders. Individuals with an interest in water resources in the Lower Kansas watershed met and began the process of identifying water-related issues in the basin in October, 2007. A diverse group of stakeholders became involved in the Lower Kansas WRAPS planning process. Farmers, landowners, representatives of natural resource agencies and organizations, city and county government representatives, public water suppliers and others participated. The Lower Kansas WRAPS Stakeholder Leadership Team (SLT) evolved from a core group of meeting attendees. Stakeholders discussed methods for devising a leadership team that would encompass the broad constituent base of the watershed, given the rural and urban components. The function of the team, how

it is governed, what its make-up should be and why it was needed were discussed. The SLT serves as a board to make decisions and provide guidance to the WRAPS Coordinator. They will also determine priorities and provide direction to the project. The SLT is comprised of ten members, including the following representatives: public water supply, watershed district, conservation district, outreach/education, tribal, environmental at large/local health, (fish, forestry, wildlife,) local government, livestock production, crop production.

The Lower Kansas WRAPS has completed three of the four basic stages in the WRAPS process. The Development Stage included stakeholder recruitment, affirming an interest in continuing the project, and documenting stakeholder decisions. The Assessment Stage reviewed watershed conditions and identified watershed restoration and protection needs. The Planning Phase established goals, actions needed to achieve goals, develop cost estimates, and identify stakeholder implementation strategies. The Lower Kansas WRAPS is ready to begin the Implementation Stage, which includes securing the resources needed to execute the plan, monitor and document progress, and revise the plan as needed.

In consultation with the KDHE – Watershed Management Section and the KDHE – TMDL Planning Section, the High Priority fecal coliform bacteria (FCB) TMDL for Stranger Creek and Nine Mile Creek, as well as the High Priority Phosphorous 303d impairment on Nine Mile Creek will be the focus of this plan. Elevated Phosphorous and FCB are associated with livestock manure deposited adjacent or directly into streams.

Additional existing stream and lake TMDLs in the watershed are recognized and will be addressed in the future in the following watersheds.

1. Lower Wakarusa including Washington Creek
2. Urban area including Mill Cr., Kill Cr. , Cedar Cr., Gardner City Lake and Lake Olathe
3. Lower Kansas River

The overall goal of the Lower Kansas WRAPS 9 Element Plan is to provide a blueprint of protection and restoration strategies and activities to protect and restore surface waters in the Lower Kansas WRAPS project area. An additional goal is to address watershed issues identified by the Lower Kansas Stakeholder Leadership Team as resources allow. These issues, by priority, include: bacteria, sediment and biology, nutrient management, pesticides, source water protection, identify/preserve green space, water conservation, groundwater protection/water wells, and flooding.

STREAM MITIGATION CALCULATION WORKSHEETS

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Project Name: City of Lawrence,KS NWK-2011-124 **Date:** 23-Apr-13

Adverse Impact Factors for Riverine Systems Worksheet										
Factor	Impact 1	Impact 2	Impact 3	Impact 4	Impact 5	Impact 6	Impact 7	Impact 8	Impact 9	Impact 10
Stream Type Impacted	0.4	0.4								
Stream Status	0.1	0.1								
Exisiting Condition Value	*0.1*	*0.1*								
Formula total	0.04	0.04	0	0	0	0	0	0	0	0
Duration	0.3	0.3								
Activity	2.2	2.2								
Cumulative impact	0.0618	0.081	0	0	0	0	0	0	0	0
Sum of Factors = **M**	3.1018	3.121	0	0	0	0	0	0	0	0
Linear Feet of Stream Impacted = **LF**	206	270								
M x LF	638.9708	842.67	0	0	0	0	0	0	0	0

Total Mitigation Credits Required = 1481.6408 Impact 1 is west drainage and Impact 2 is east drainage

Adverse Impact Factors Table										
Stream Type	Ephemeral/Intermittent w/o Pools 0.4			Intermittent w/ Pools 0.6			Perennial 0.8			
Stream Status	Tertiary 0.1			Secondary 0.4			Primary 0.8			
Existing Condition	Functionaly Impaired Stream Type x 0.1			Moderately Functional Stream Type x 0.8			Highly Functional Stream Type x 5.0			
Duration	Temporary (<1 yr.) 0.05			Short Term (1-2 yr.) 0.1			Permanent (>2 yr.) 0.3			
Impact Activity	Shade/ Clear 0.05	Utility Crossing 0.15	Below Grade Culvert 0.3	Temporary Inundation Zone 0.4	Armor 0.5	Diversion/ Weir 0.75	Morphologic 1.5	Impound 2	Pipe 2.2	Fill 2.5
Cumulative Impact	0.0003 x total linear feet of stream impacted per reach									

Project Name: City of Lawrence,KS **Date:** 23-Apr-13

Riparian Buffer Creation, Enhancement, Restoration and Preservation Worksheet										
Factors	Benefit 1	Benefit 2	Benefit 3	Benefit 4	Benefit 5	Benefit 6	Benefit 7	Benefit 8	Benefit 9	Benefit 10
Stream Type	0.4	0.05								
Priortiy Status	0.05	0.05								
Net Benefit (stream side A)	0.18	0.4								
Net Benefit (stream side B)	0	0								
Supplemental Buffer Credit		0.2	0	0	0	0	0	0	0	0
Control / Site Protection	0.2	0.2								
Mit. Construction Timing (side A)	0	0								
Mit. Construction Timing (side B)	0	0								
Temporal Lag (years)	-0.2	-0.2								
Sum Factors (**M**) =	0.63	0.7	0	0	0	0	0	0	0	0
Linear Feet of Stream buffer (**LF**)	2400	0								
Credits (**C**) = **M** x **LF**	1512	0	0	0	0	0	0	0	0	0
Site Factor (**SF**) pg.19	1	1								
Total Credits Generated **C** x (**SF**)	1512	0	0	0	0	0	0	0	0	0

Total Riparian Restoration Credits generated = 1512

Stream Type	Ephemeral/ Intermittent w/o Pools 0.05	Intermittent w/ Permanent Pools 0.2	Perennial 0.4	
Priority Status	Tertiary 0.05	Secondary 0.2	Primary 0.4	
Net Benefit (for each side of stream)	Riparian Creation, Enhancement, Restoration, and Preservation Factors (select values from Table 1) (MBW = Minimum Buffer Width = 50' + 2' / 1 % slope)			
Supplemental Buffer Credit	Condition: MBW restored or protected on both streambanks To calculate:(Net Benefit Stream Side A + Net Benefit Stream Side B) / 2			
Control / Site Protection	Corps approved site protection without third party grantee 0.05	Corps approved site protection recorded with third party grantee or transfer of title to a conservancy 0.2		
Mitigation Construction Timing (each side of stream)	Schedule 1 0.15	Schedule 2 0.05	Schedule 3 0	
Temporal Lag (Years)	Over 20 -0.3	10 to 20 -0.2	5 to 10 -0.1	0 to 5 0

31ST STREET WETLAND DELINEATION REPORT

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MEMORANDUM

Date: October 08, 2010

To: Ric Johnson, Wilson & Company

From: Laurie Brown, Patti Banks Associates

Re: 31st Street Wetland Delineation – Lawrence, Kansas

Patti Banks Associates (PBA) was retained by Wilson & Company (Wilson) to provide a wetland inventory and delineation. The following sections summarize the completed inventory and delineation.

PROJECT AREA DESCRIPTION and HISTORY

The project site is located in Township 13 S., Range 20 E., Section 17 in the City of Lawrence, in Douglas County, Kansas. The site is bounded by residential development and Mary's Lake/Prairie Park to the north, light industrial to the west, and crop fields to the south and east (Figure 1).

This wetland delineation will inform the development of concept plans for improvements to the 31st Street corridor between Haskell Avenue and O'Connell Road. The street is currently designated as a principal arterial roadway according to the City's Transportation 2030 Plan and a minor arterial on the Kansas Department of Transportation (KDOT) Functional Classification map.

This portion of 31st Street is a unique corridor. Only a small portion of the corridor east of Haskell Avenue is paved to access existing commercial and light industrial properties. The properties adjoining the study area are zoned agricultural, single-family, commercial and light industrial. Presently, the single-family homes and residential subdivisions do not have direct access onto 31st Street, only the commercial and light industrial properties have direct access. Other unique City owned features include Mary's Lake, Prairie Park, and an active construction demolition landfill located adjacent to the section line.

The proposed improvements are for approximately 1mile of arterial roadway within a yet to be determined alignment footprint. The proposed improvements include sidewalks, multi-use path, box culvert, storm drainage, stormwater quality elements, landscaping, animal crossing opportunities, auxiliary lanes where needed, extension of the existing water distribution main, coordination with the proposed sanitary sewer improvements, and utility coordination.

929 Walnut Street, Suite 200
Kansas City, Missouri 64106
Tel 816-756-5690
Fax 816-756-1606

EXISTING DATA REVIEW

PBA reviewed existing information for the project site prior to conducting a site visit. Information included aerial photography (Google Earth 2010), topography (base mapping supplied by the Kansas Department of Transportation and supplemented with ground survey by Peridian Group, Inc.), National Wetland Inventory (NWI) map (U.S. Fish and Wildlife Service - FWS Mapper), and the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey. Project location, topography, soils, and wetlands are illustrated in Figures 1through 4, respectively.

The NRCS Web Soil Survey (Figure 3) was reviewed to determine the potential for hydric soils to exist on the project site. Soils within the project area are in the Wabash-Kennebec-Reading association. Approximately two-thirds of the project area consists of Wabash soils, which are listed as hydric.

The NWI map of the project site (Figure 4) indicates the presence of a lake (PABh-palustrine, aquatic bed, semi-permanently flooded, diked/impounded wetland) at the northwestern corner of the project area.

WETLAND INVENTORY and DELINEATION

On September 7, 2010 Patti Banks Associates personnel performed a field delineation of Waters of the United States, including jurisdictional wetlands identified by NWI mapping, within the project limits. Wetland extents were determined in accordance with methods set forth in the "*Corps of Engineers Wetlands Delineation Manual (1987)*". To meet the US Army Corps of Engineers definition, a wetland must exhibit three environmental parameters: hydrology, soil, and vegetation. Positive indicators of all three parameters must be present for the site to be classified as a wetland.

The overall site is markedly impacted by the adjoining land uses. The dam for Mary's Lake and accumulated disposal in the landfill has effectively created a bowl out of most of the area. There are steep (20-foot or higher) banks along the entire western edge of the landfill site.

Vegetation

Existing vegetation is generally of two types on the site, with deciduous woodland on the northern and eastern portions of the site and grassland bottomland with scattered trees on the southern and western side. A total of four sample plots were evaluated to determine the presence or absence of wetland habitat within the project site. The delineation data sheets are included in the report attachment.

Vegetation within the woodland portion (sample plots 1 and 4 on Figure 5) consists of black walnut (Juglans nigra), hickory (*Carya ovata*), Osage orange (*Maclura pomifera*), sycamore (*Platanus occidentalis*), mulberry (*Morus rubra*), hackberry (*Celtis occidentalis*), Eastern red cedar (*Juniperus virginiana*), chokeberry (*Prunus virginiana*), autumn olive (*Elaeagnus umbellata*), shrub honeysuckle (*Lonicera morrowii*), Japanese honeysuckle (*Lonicera japonica*), raccoon grape (*Ampelosis*

cordata), giant foxtail (*Setaria faberi*), wild rye (*Elymus canadensis*), giant ragweed (*Ambrosia trifida*), Johnson grass (*Sorghum halapense*), and poison ivy (*Toxicodendron rydbergii*). Shrub and Japanese honeysuckle, which are invasive, dominate the site. Japanese honeysuckle has formed a blanket over much of the vegetation, especially below the lake to the northeast (Figure 6).

Vegetation within the grassland bottomland area (sample plots 2 and 3 on Figure 5) consists of lacustrine sedge (*Carex lacustris*), reed canary grass (Phalaris arundinacea), water smartweed (*Polygonum amphibium*), bur marigold (*Bidens aristosa*), marsh skullcap (*Scutellaria galericulata*), boneset (*Eupatorium perfoliatum*), fog fruit (*Phyla lanceolata*), water hemlock (*Cicuta maculata*), black willow (*Salix nigra*), silver maple (*Acer saccharinum*), American elm (*Ulmus americana*), cottonwood (*Populus deltoides*), Boxelder (*Acer negundo*), and rough-leaved dogwood (*Cornus asperifolia*) (Figure 7).

An earthen berm between the southern end of the grassland area and the irrigation channel is elevated enough to support more upland species including honey locust (*Gleditsia triacanthos*), Eastern red cedar (*Juniperus virginiana*), shingle oak (*Quercus imbricaria*), wild rye (*Elymus canadensis*), poison ivy (*Toxicodendron rydbergii*), and shrub honeysuckle (*Lonicera morrowii*). There is abundant arrowhead (*Sagittaria latifolia*) within the irrigation channel.

Soils

Field observations of soils within the northern and eastern portions of the site indicate non-hydric conditions as evidenced by the soil type (Sibleyville) and the high matrix chroma (see data sheets 1 and 4). Field observations of soils within the southern and central portions of the site indicate hydric conditions as evidenced by the soil type (Wabash) and the low matrix chroma (data sheets 2 and 3), indicating that these latter soils are likely saturated for significant periods of time during the vegetative growing season.

Hydrology

Past topographic surveys (Figure 2) indicate a stream channel on the eastern side of the site that now appears adjacent to the western side of the landfill (Figure 8). Field observations did not reveal the reason for the change in location of the stream channel. Stream flow is coming from the primary spillway for Mary's Lake. The stream eventually empties into an irrigation channel that runs east-to-west along the southern boundary of the project area.

No site areas were inundated during the site visit; although soils in the southern and central portions were wet, but not saturated. Depth to saturation could not be determined at the time of the delineation. Evidence of wetland hydrology was present in the form of water marks on the trees and herbaceous vegetation within the southern and central portion of the site. It is likely that this area becomes inundated seasonally, consistent with rainfall patterns in the area. Observations made in the northern and eastern portions of the site provided no evidence of water marks, drift lines, or sediment deposits.

RESULTS

Based on published information and field observations, PBA determined that all three wetland characteristics are present within the southern and central portions of the site. The area delineated as a wetland is 11.09 acres in size (Figure 5). The wetland delineation boundary was surveyed by Wilson on September 8-9, 2010.

It is possible that the wetland would have originally extended into the construction demolition landfill area located on the western edge prior to the addition of fill materials. Field observations indicate that the banks formed by the landfill are impounding additional water within the delineated wetland area.

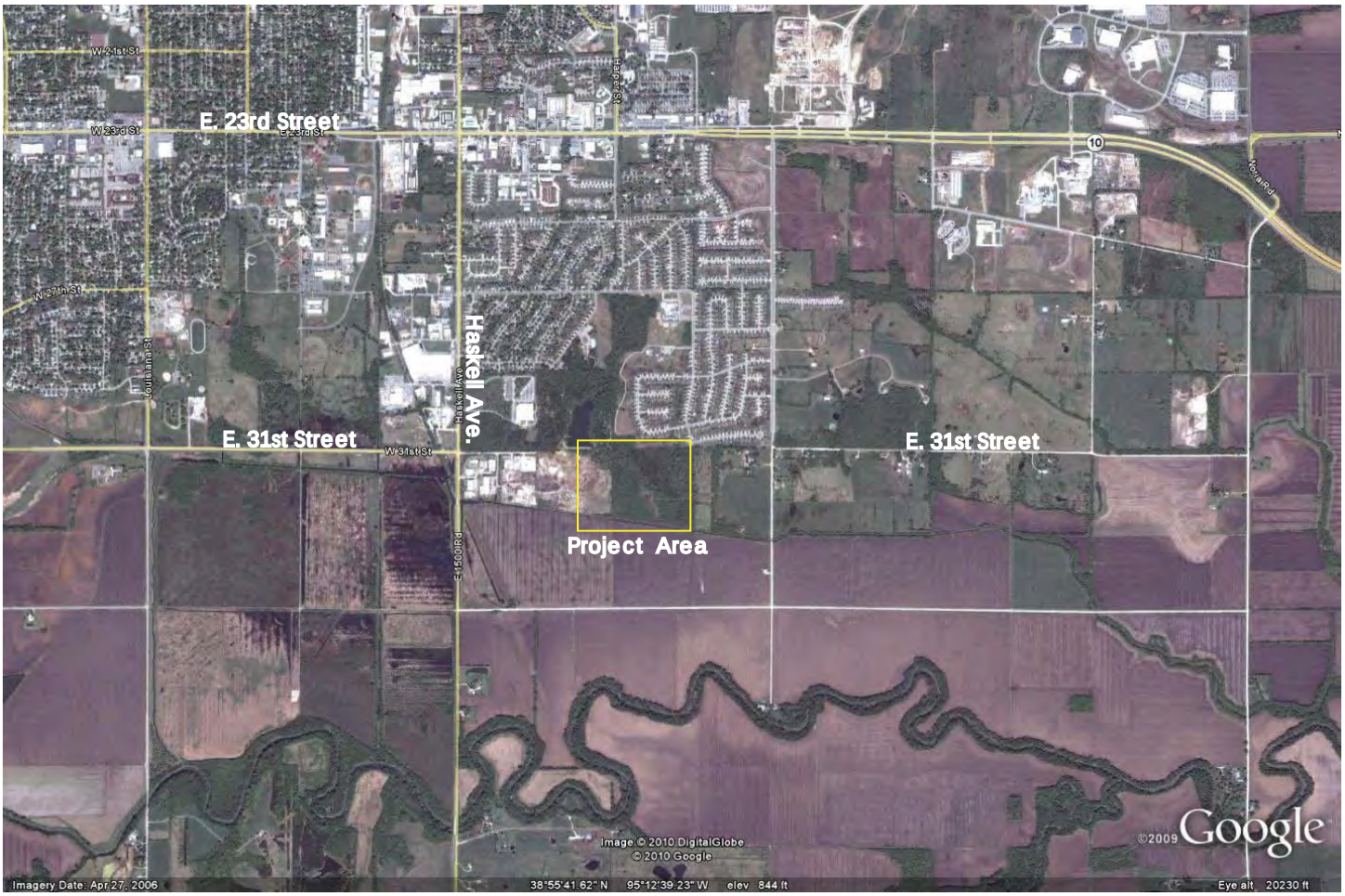
The northern and eastern woodland areas including the northern portion of the stream channel were determined by PBA not be a wetland due to the non-hydric soils and upland vegetation present, which precludes the area from meeting the required three parameters. This is likely due to the changes in topography and the dominant presence of invasive vegetation (honeysuckle) indicating major disturbances within this portion of the site. However, this does not preclude classification of the entire stream as Waters of the U.S. by the U.S. Army Corps of Engineers. This determination should be made during the project permitting process.

The irrigation channel adjoining the southern boundary of the site was not included within the wetland delineation as it is outside of the project area.

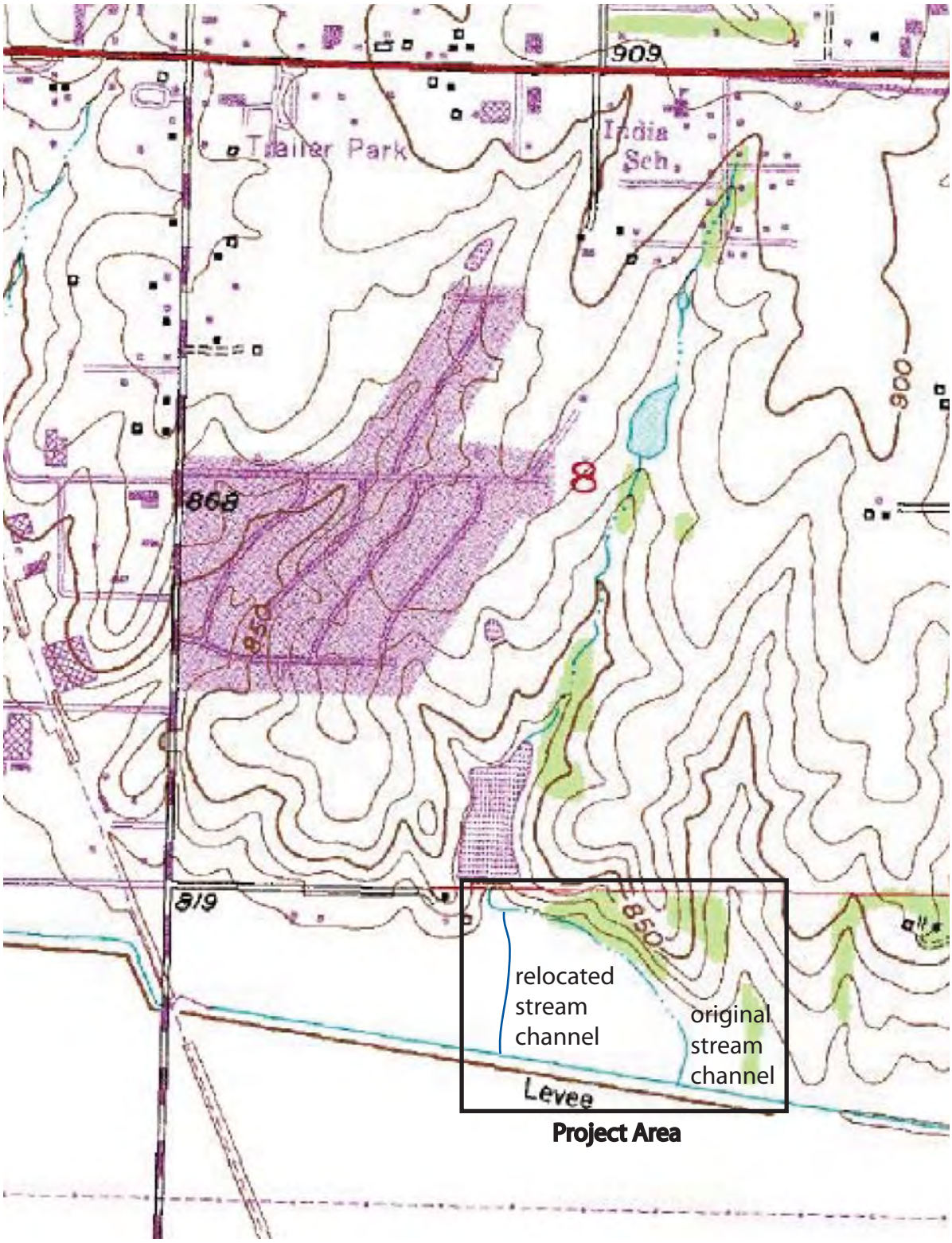
If you have any questions about the content of this report or would like to schedule a field visit, please contact me at (816) 756-5690 ext. 3006 or llbrown@pbassociates.com.

ATTACHMENTS

FIGURES AND DATA SHEETS

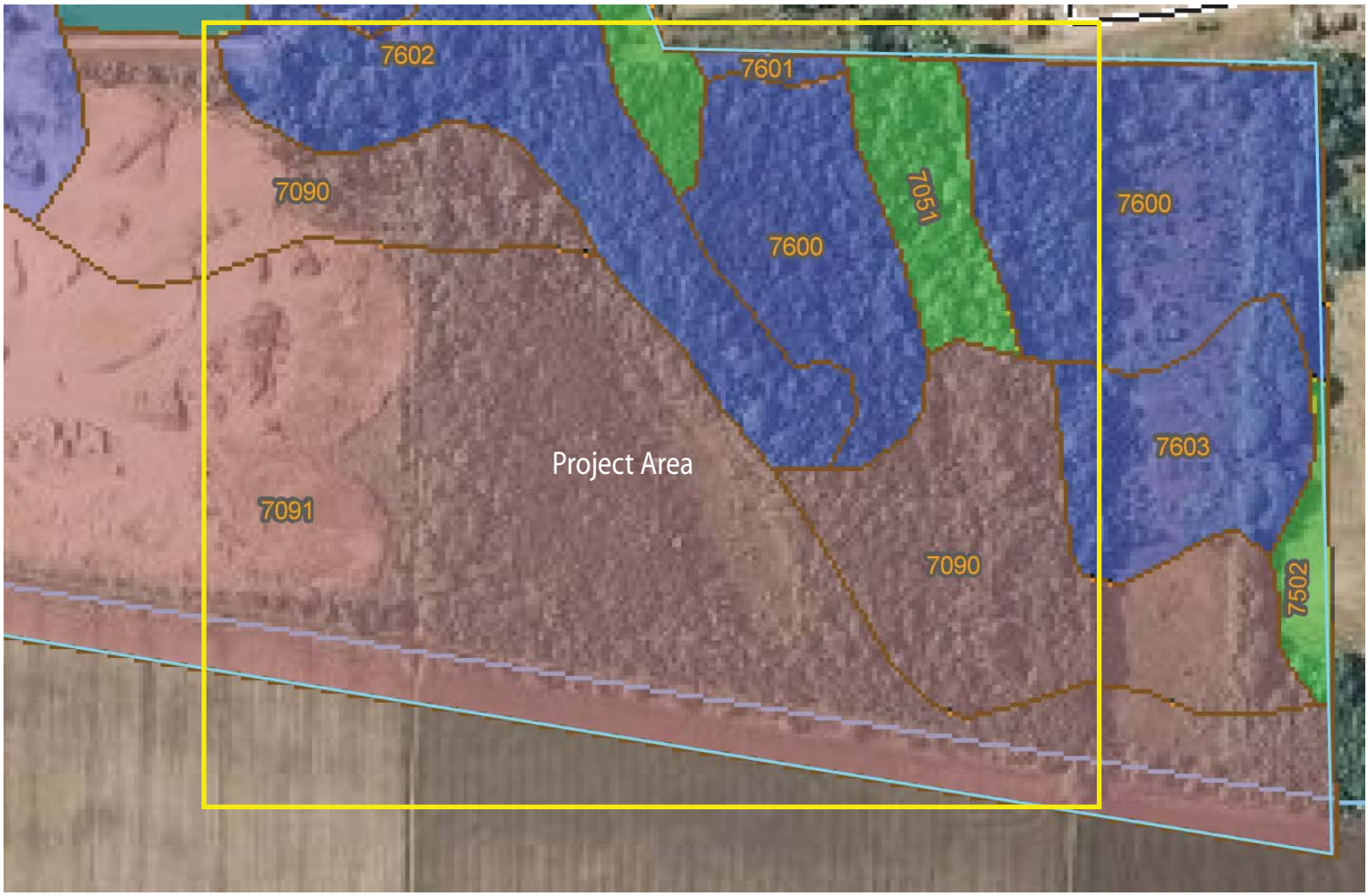


31st Street Corridor	Figure 1: Location Map Lawrence, Kansas	PBA PATTI BANKS ASSOCIATES
Source: Google Earth	Scale: Not To Scale	Date: September 30, 2010



31st Street Corridor	Figure 2: Topographic Map	PBA PATTI BANKS ASSOCIATES

Source: MSR Maps accessed 9/03/2010	Scale: Not To Scale	Date: September 30, 2010	N



Soil Ratings

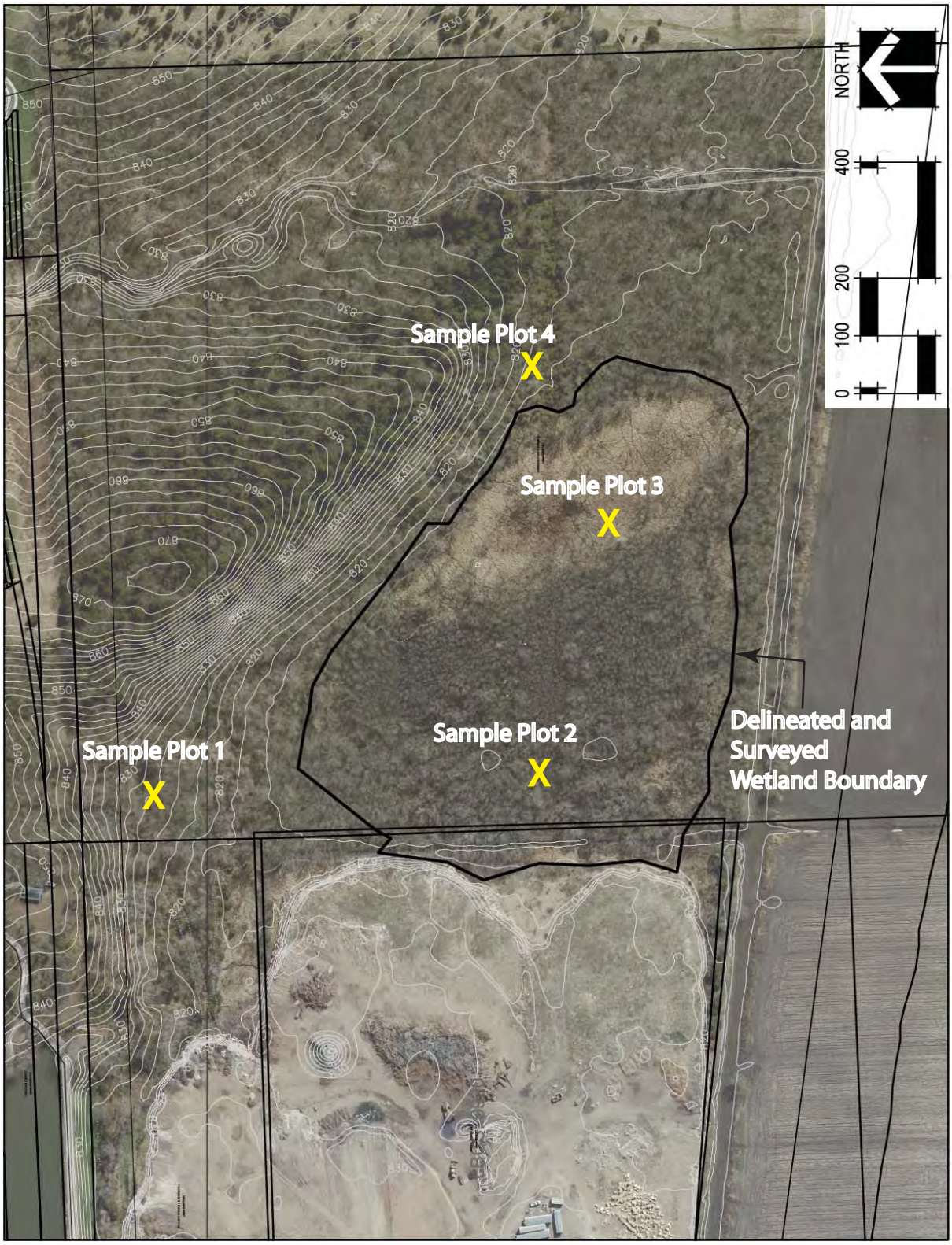
- All Hydric
- Partially Hydric
- Not Hydric
- Unknown Hydric
- Not rated or not available

31st Street Corridor	Figure 3: Soil Survey of Douglas County, Kansas	PBA PATTI BANKS ASSOCIATES
Source: NRCS Web Soil Survey accessed 9/03/2010	Scale: Not To Scale	Date: September 30, 2010

N

31st Street Corridor	Figure 4: National Wetlands Inventory	PBA PATTI BANKS ASSOCIATES

Source: FWS Wetlands Mapper accessed 9/03/2010	Scale: Not To Scale	Date: September 30, 2010	N



31st Street Corridor	Figure 5: Wetland Sample Plots and Survey Boundary	PBA PATTI BANKS ASSOCIATES

Source: Wilson & Company	Scale: Not To Scale	Date: September 30, 2010	N

Photo 1: Looking southeast across the construction demolition landfill area that borders the project area to the west.

Photo 2: Looking east at the woodland area located on the northern side of the wetland area. Japanese honeysuckle is blanketing the vegetation.

31st Street Corridor	Figure 6: Photo Documentation	PBA PATTI BANKS ASSOCIATES

Photographer: Laurie Brown	Date of Photograph: September 7, 2010	Date: September 30, 2010	

Photo 3: Looking northeast from the southwest. corner of the wetland area. Dominant vegetation is reed canary grass, smartweed, elm, and silver maple.

Photo 4: Looking north at the central wetland area. Dominant vegetation is lacustrine sedge, smartweed, and reed canary grass.

31st Street Corridor	Figure 7: Photo Documentation	PBA PATTI BANKS ASSOCIATES

Photographer: Laurie Brown	Date of Photograph: September 7, 2010	Date: September 30, 2010	

Photo 5: Looking north along the stream corridor that is located along the western side of the wetland area.

Photo 6: Looking south at the southern end of the stream as it flows into the irrigation channel that flows along the southern edge of the wetland area.

31st Street Corridor	Figure 8: Photo Documentation	PBA PATTI BANKS ASSOCIATES

Photographer: Laurie Brown	Date of Photograph: September 7, 2010	Date: September 30, 2010	