

CITY OF LA VISTA
MAYOR AND CITY COUNCIL REPORT
AUGUST 20, 2013 AGENDA

Subject:	Type:	Submitted By:
APPROVAL - THOMPSON CREEK PHASE VI, PART 2 GRANT APPLICATION SUBMITTAL	◆ RESOLUTION ORDINANCE RECEIVE/FILE	JOHN KOTTMANN CITY ENGINEER/ASSISTANT PUBLIC WORKS DIRECTOR

SYNOPSIS

A resolution has been prepared authorizing the submittal of a grant applications for work associated with Part 2, Phase VI of the Thompson Creek project. These applications pertain to the second year of the project.

FISCAL IMPACT

Funding has been requested in the FY 13/14 Capital Improvement Program (CIP) for the proposed project.

RECOMMENDATION

Approval

BACKGROUND

The City is proposing to submit grant applications to the Nebraska Department of Environmental Quality (NDEQ) and the Nebraska Environmental Trust (NET) for year 2 of the second phase of the Thompson Creek project, which will include stream channel improvements and watershed management activities. The applications are due by September 3, 2013. These applications are a pre-requisite to applying to the Papio-Missouri River NRD for funds from their Urban Drainageway Program at the 60% level. The application to the NRD is due in February of 2014.

The City's consultants (TD2, RDG, and AES) have prepared the grant application forms for the NET and NDEQ including 30% plans and updated cost estimates for the channel improvements. Activities in year 2 will include finalization of the channel improvement plans and construction of channel improvements. Other year 2 activities will include methods to improve watershed management and water quality. This will include public education, citizen engagement, water quality monitoring, demonstration projects, and programs that may promote the use of rain barrels, downspout redirection, rain gardens or other methods to reduce runoff volume and improve water quality reaching Thompson Creek.

Determinations by these agencies as to the success of these applications will not be known until the first half of 2014.

RESOLUTION NO. _____

A RESOLUTION OF THE MAYOR AND CITY COUNCIL OF THE CITY OF LA VISTA, NEBRASKA AUTHORIZING THE SUBMITTAL OF A GRANT APPLICATION TO THE NEBRASKA DEPARTMENT OF ENVIRONMENTAL QUALITY (NDEQ) AND THE NEBRASKA ENVIRONMENTAL TRUST (NET) AND THE APPLICATION REQUESTING FUNDS FROM THE PAPIO-MISSOURI RIVER NRD FOR PHASE VI, PART 2, YEAR 2 OF THE THOMPSON CREEK PROJECT IN LA VISTA NEBRASKA.

WHEREAS, the City Council of the City of La Vista has determined that said Thompson Creek improvements are necessary; and

WHEREAS, the requested FY 13/14 Capital Improvement Program budget contains funding for preparation of grant applications; and

WHEREAS, submittal of a grant application to the Nebraska Department of Environmental Quality (NDEQ) and the Nebraska Environmental Trust Fund is necessary; and

WHEREAS, submittal of an application requesting funds from the Papio-Missouri River NRD is necessary; and

WHEREAS, the City's consulting firms on this project, RDG, TD2, and AES have completed the grant applications for the Nebraska Environmental Trust Fund and the NDEQ grant and will prepare the application for the Papio-Missouri River NRD request for funds; and

WHEREAS, the City will authorize submittal of three applications for funding, based on the City Council's understanding of the fiscal commitments involved in the applications and a general outline of the scope of work that will be involved if the grants are approved;

NOW, THEREFORE BE IT RESOLVED, by the Mayor and City Council of La Vista, Nebraska, authorizing the City Administrator to sign the grant applications to the Nebraska Department of Environmental Quality (NDEQ) and the Nebraska Environmental Trust Fund and the application requesting funds from the Papio-Missouri River NRD for Phase VI, Part 2, Year 2 of the Thompson Creek Project in La Vista, Nebraska.

PASSED AND APPROVED THIS 20TH DAY OF AUGUST, 2013.

CITY OF LA VISTA

Douglas Kindig, Mayor

ATTEST:

Pamela A. Buethe, CMC
City Clerk

THOMPSON CREEK WATERSHED RESTORATION
CITY OF LA VISTA
THREE YEAR PROJECT COSTS & ALLOCATION SUMMARY-PREPARED AUGUST 20, 2013
COST ALLOCATION BASED ON NDEQ/319 AND NET GRANT AWARDS FOR YEAR 1

PROJECT ACTIVITY	TOTAL COST	% OF FUNDING	YEAR 1 COST	% OF FUNDING	YEAR 2 COST	% OF FUNDING	YEAR 3 COST	% OF FUNDING
Education & Outreach	\$95,000		\$50,000		\$15,000		\$30,000	
Cost Shared Demonstration Projects	\$515,000		\$35,000		\$150,000		\$330,000	
Reconst. Thompson Cr.-Pre Con Monitoring	\$50,000		\$50,000					
Reconst. Thompson Cr.-Design & Construction								
Phase Engineering *	\$384,100		\$179,000		\$185,100		\$20,000	
Reconst. Thompson Cr.-Construction Costs*	\$2,287,552		\$461,000		\$1,786,552		\$40,000	
Thompson Cr. Post Const. Monitoring *	\$40,000						\$40,000	
TOTALS	\$3,371,652		\$775,000		\$2,136,652		\$460,000	
Funding from NDEQ-EPA 319 Funds	\$780,000	23.1%	\$150,000	19.4%	\$430,000	20.1%	\$200,000	43.5%
Funding from Nebraska Env. Trust	\$1,250,000	37.1%	\$525,000	67.7%	\$625,000	29.3%	\$100,000	21.7%
Funding from Local Sources	\$1,341,652	39.8%	\$100,000	12.9%	\$1,081,652	50.6%	\$160,000	34.8%
TOTALS	\$3,371,652	100.0%	\$775,000	100.0%	\$2,136,652	100.0%	\$460,000	100.0%
Funding from Papio-Mo. River NRD, 60% of Local Share	\$804,991.2		\$60,000.0		\$648,991.2		\$96,000.0	
Funding from City of La Vista	\$536,660.8		\$40,000.0		\$432,660.8		\$64,000.0	

NOTES:

1. Funding proposed from NRD pertains only to engineering services and construction work for Thompson Creek stabilization.
It does not include public education and outreach or demonstration projects.
2. The allocation amongst agencies and years is based on best available information as of this date and Year 1 grant awards.
3. The Year 1 total of La Vista and NRD funds represents required local share match for NDEQ/319 Grant.
4. All costs shown are in 2014 dollars.

* Items with asterisk are eligible for PMRNRD Urban Drainageway Funding

Nebraska Department of Environmental Quality

**Nonpoint Source Pollution Management Project
2013 Proposal Application**

Specific Instructions and Application Forms

The following information and formatting is required for all proposals. Failure to use the following forms in the prescribed formats and to furnish the information requested may disqualify the proposal. If these requirements cannot be addressed with existing information, a plan and schedule describing how the requirements will be met in the early phases of the project must be included.

- The proposal application **MUST** be submitted on these forms. If necessary, additional forms are available online at <http://deq.ne.gov>
- Item #6, Budget Summary, is an estimated range and will be finalized at a later time.
- Item # 9, the *brief* project overview, should not be longer than the space provided.
- The *Guidelines and Procedures for Completing the NPS Proposal Application* may offer additional information for completing these forms.
- Complete the Proposal Application Forms in their entirety including a DUNS number.
- Submit **One Hard Copy** of the required materials to:

Nonpoint Source Program
Nebraska Department of Environmental Quality
1200 N. Street, Suite 400
P.O. Box 98922
Lincoln, NE. 68502

- Submissions must be received in the NDEQ office by the RFP deadline:

4:00 pm on Tuesday September 3rd, 2013.

- A confirmation e-mail will be sent after NDEQ receives the proposal. Please contact Linda Rohn at (402) 471-3098 if you do not receive a confirmation e-mail after submitting a proposal.

2013 NPS PROPOSAL APPLICATION FORMS

1. Project Title: Thompson Creek Watershed Restoration

2. Sponsor Contact Information		
Organization	City of La Vista	
DUNS #	05 456 1071	
Street Address	9900 Portal	
City	La Vista	
State Zip	Nebraska 68128	
Primary Contact	John Kottmann, City Engineer/ Assistant Public Works Director	
Phone Number	402.331.8927	
E-mail Address	jkottman@cityoflavista.org	
3. Partners		
Organization	Contact Name	Phone Number
Papio-Missouri Natural Resources District	Gerry Bowen	(402) 444-6222
4. Project Location (closest city): La Vista, Nebraska		
5. Project Period (month/year) : Start Date: April 2014 End Date: June 2015		

6. Budget Summary	
Source	Dollar Amount
319 Funds	\$780,000
Non-Federal Funds	\$2,591,652
Other Federal Funds	\$0
Total	\$3,371,652
7. Project Type (Check One)	
<input checked="" type="checkbox"/> Watershed <input type="checkbox"/> Local Outreach	
<input type="checkbox"/> Waterbody <input type="checkbox"/> Statewide Outreach	
<input type="checkbox"/> Groundwater Area	

8. Has the sponsor received any previous Section 319 Grants? YES NO

9. In the space below provide a brief overview of the project for which you seek funding. Fit this overview within the box below. If you are asking for 319 Funds for only a portion of the overall project, indicate the components for which you seek funding.

The City of La Vista has completed Phase I, the design/initiation phase, for the restoration of the urbanized 1,250-acre Thompson Creek Watershed to an ecologically functional stream and riparian area and a valued community asset. Like many urban streams, Thompson Creek suffers from poor water quality, eroding banks, and diminished aquatic habitat and diversity. With Phase II we focus on improving water quality and aquatic habitat by extensive stream reconstruction and bioengineering — re-meandering the channel, stabilizing stream banks, constructing pools and riffles, reconstructing a floodplain bench, and restoring deep-rooted native vegetation to riparian areas. Phase II watershed restoration will also include continued implementation of BMPs in residential, public, and commercial settings including rain gardens, downspout reorientation, street planters, stormwater treatment trains, and retrofitting of storm sewers with hydrodynamic separators and an end-of-pipe treatment wetland. Outreach and education is integrated throughout the project spatially and temporally with interpretive materials, public meetings and updates, and involvement of teachers and students in monitoring of water quality, stream conditions, and aquatic macroinvertebrates. The project also is anticipated to significantly improve water quality and aquatic and riparian habitat functions in the watershed by reducing peak flows (by 25% for 2-year, 24-hour event), minimizing erosion, treating the first flush of stormwater for a significant portion of the watershed using cost-share BMPs and end-of-pipe BMPs (e.g., hydrodynamic separators paired with treatment wetland).

10. Budget

BUDGET CATEGORY	SOURCE of FUNDS – YEAR TWO ONLY			
	Section 319 Funds	Other Federal Funds ¹	Non-Federal Funds ²	TOTAL
Personnel				\$0
Material & Supplies				\$0
Travel				\$0
Equipment				\$0
Contractual – Construction				\$1,454,750
Contractual – Outreach				\$15,000
Contractual – Cost-Share				\$150,000
Contractual - Monitoring				\$0
Contractual – Construction Management				\$130,000
Contractual- Design Services				\$55,100
TOTALS	\$430,000	\$0	\$1,706,652	\$2,136,652

1. Sources of Other Federal Funding

Name	Amount \$
None	\$0

2. Sources of Non-Federal Funding

Name	Amount \$
Nebraska Environmental Trust Fund	\$625,000
Papio-Missouri River NRD	\$648,991
City of La Vista	\$432,661
Total	\$1,706,652

11. Project Description (Use either Format 1 or 2 depending on your project type)**(Please attach your description to the Proposal Application Forms)**

In five pages or less, provide a discussion of your project. Be sure to cover the points specified in the instructions.

1. Background. The 1,250-acre Thompson Creek Watershed Restoration in the City of La Vista (Sarpy County), Nebraska, is a significant natural resource for the City with its associated signature parks and its proximity to city hall. It is an urban watershed, largely residential but also including several large, more urbanized areas. Thompson Creek flows east for about 2 miles to a channelized section of Big Papillion Creek (HUC 12 Big Elk Creek-Big Papillion Creek 102300060205).

In 2009, the Papillion Creek Watershed Partnership completed a plan to address watershed nonpoint pollution and volume control issues. The plan combines Low Impact Development practices for new construction with structural volume control measures. Additionally, a 2006 study of the channel was completed, a FEMA grant enabled acquisition of 24 flood-prone residences to provide room for stream improvements, and the Papio-Missouri River Natural Resources District (NRD) has conducted a variety of studies on the creek. The Thompson Creek Watershed Restoration Project complements the watershed plan and studies by directly addressing Nebraska Department of Environmental Quality (NDEQ) nonpoint source issues that include streambank erosion and stream-channel degradation, and the provision of nonpoint source information and education through restoration activities, interpretation, and outreach.

The Thompson Creek Watershed extends from the western headwaters to 66th Street near Papillion Creek (Map, Section 12) and encompasses three classes of land use: (a) residential neighborhoods, (b) commercial/institutional areas and (c) open space. Although the overall goal of the project is to improve the ecological functioning and health of the entire watershed, restoration activities in the proposed Phase II of this three phase project will focus on areas depicted on the map (Section 12) as 2, 3 and 4 — the most severely channelized and urbanized portion of the stream. This is the area where opportunities to maximize benefit per dollar spent are greatest.

Phase I of this project, described in an approved Project Implementation Plan (PIP), focused on initial education/outreach, cost-share/demonstration projects (including a variety of BMPs), and site preparation and design of creek reconstruction in preparation for the proposed Phase II. With completion of Phase I the following were accomplished: (a) production of design and construction documents for the proposed Phase II creek and outlet restoration work (b) completion of Phase I cost-share demo projects, (c) relocation of utilities outside riparian corridor, (d) pre-construction monitoring, and (e) execution of Phase I education and information activities.

Items (a), (d) and (e) are underway. Design and construction documents, including an opinion of probable cost, are at 30% completion, with 100% completion and bidding scheduled for winter 2013-2014. The first round of pre-construction monitoring has been completed under and approved QAPP, with another round scheduled before Phase II begins. Monthly notices about the project are delivered to residents and a public open house about the project was held in August 2013. The timing of implementation activities necessitated that items (b) and (c) occur in late 2013 and the first half of 2014. At the time of this submission, awarded 319 funds for Phase I had not yet been released, pending final revisions requested by the EPA. It is assumed that funds awarded under Phase 1, but delayed in release, will be available during Phase I and Phase II.

The majority of work proposed in Phase II consists of construction actions that effect stream channel restoration, construct associated green infrastructure, and install hydrodynamic sediment separators (e.g., SAFL Baffles). With Phase II we also continue community education/outreach, cost-share demonstration projects, and two years of post-construction monitoring.

2. Objectives. Implementing the Thompson Creek Watershed Restoration Project will create a highly-visible community asset that will improve quality of life for La Vista residents as well as serve as a replicable model for other urban streams in the region. The Thompson Creek Watershed Restoration has the following goals and objectives:

- **Improve water quality in Thompson Creek and downstream receiving waters by:**
 - Improving stormwater management throughout the watershed by reducing volume and pollutant-loading, and by improving rate control.
 - Reducing erosion of the creek channel by reducing input and transport of nutrient-laden sediment.
- **Improve in-stream and riparian habitat by:**
 - Improving water quality.
 - Re-meandering the channel.
 - Stabilizing stream banks.
 - Constructing pools and riffles.
 - Reconstructing a floodplain bench.
 - Restoring native, deep-rooted vegetation to riparian areas.
- **Reduce flooding and damage to infrastructure and public and private property by:**
 - Improving stormwater management throughout the watershed by retrofitted storm sewers and associated BMPs.
 - Reconstructing the creek and floodplain.
- **Create public support for the project and its goals by:**
 - Increasing appreciation of a healthy stream for a community's quality of life.
 - Increasing awareness of individual property contributions to non-point source pollution.
 - Increasing understanding of linkages between non-point source pollution, water quality, and stream health.
 - Implementing cooperative projects to demonstrate cost-effective means of improving stream health.

The following measurable objectives are proposed for the project:

- Following construction, incrementally improve aquatic habitat conditions, as measured by methods adapted from the USEPA's Rapid Bioassessment Protocol (RBP). There is no ecoregional standard for urban streams, so a provisional metric needs to be found. For example, a provisional metric may be to observe an increase in intolerant and a decrease in tolerant taxa over time.
- By 2023, capture and treat the first ½ inch of net runoff for all storms, thus addressing approximately 90% of pollutant loadings.

- Achieve a 25% reduction in peak flows for the 2-year, 24-hr storm (3 inch) compared to the existing baseline. This provides rate control for larger storms and reduces pollutant transport, erosion, flooding, and habitat degradation.
- Achieve an 80% reduction in erodible banks.
- Engage residents, students, other citizens, and businesses in implementing BMPs at all scales. This will approximately be measured by the degree of participation in the BMP program within subwatersheds.

3 & 4. Pollutant Sources and Pollutant Loads. Pollutants in the project watershed, typical of urban watersheds, include nutrients (phosphorus, nitrogen species, etc.), suspended solids and sediment, hydrocarbons, metals, and bacteria (e.g., *E. coli*). The sources are likewise typical of urban watershed issues such as (a) erosion of the stream channel itself, (b) diffuse and acute soil erosion, (c) street and parking lot runoff, (d) runoff from residential and commercial lawns, (e) runoff from golf courses and manicured park lands, and (f) pet and wildlife waste. The downstream receiving water, Papillion Creek, is listed as impaired for *E. coli* where Thompson Creek discharges although Thompson Creek itself is not so listed.

Excess stormwater volume and runoff rates also contribute to poor water quality through acceleration of erosion and augmentation of flooding. Runoff volume and velocity are exacerbated by increased areas of impervious surfaces and further compounded by engineered collections of conveyance devices whose purpose is to move water out of urban areas as quickly as possible. On Thompson Creek, an additional 50% in the watershed area below Central Park/Edgewood Boulevard increases flow at 72nd Street by nearly 100% (1347 cfs to 2541 cfs for the 100-year event).

All these runoff factors combined, moreover, create beneficial use impairments (BUIs) within the watershed. They degrade instream habitat by burying or eroding spawning and feeding habitat for fish and macroinvertebrates and also by creating extreme hydrological conditions (frequent flooding and drying cycles) that inhibit colonization by aquatic animals and plants. In addition, the resultant scouring causes bank erosion and eliminates functional, diverse vegetated riparian habitat.

Thompson Creek Watershed exhibits multiple effects of this poorly managed stormwater runoff. In many places the stream channel is deeply-incised (7 to 15 feet) with severe bed and bank erosion from volatile flows. There is a lack of dense-rooting herbaceous vegetation on steep (2:1 horizontal:vertical) stream banks. In addition, there is a lack of floodplain storage below the detention basin in La Vista Falls Golf Course. In addition, flooding in the golf course occurs with 5-year storms and larger, reducing the area's usability. (The gold course, in subwatershed 1, is not a focus of this project; rather, flooding will be addressed with its future reconstruction as a park.) There is, nevertheless, documented damage and threat to infrastructure and public and private property throughout the watershed as a result of the stream's unstable flow regime.

Currently deployed BMPs in the watershed do not filter out fine sediments, orthophosphates, and other dissolved pollutants. High phosphorus loading in the watershed is due to direct input of unfiltered stormwater, producing eutrophication in still waters, as evidenced by algal blooms in the creek which degrade aquatic habitat and impair aesthetics. For this reason, BMPs intended to remove the dissolved pollutants are being installed to treat runoff into Thompson Creek from subwatersheds 2, 3 and 4.

Preparatory to Phase I, we estimated pre-restoration nonpoint pollutant loads for Thompson Creek Watershed using the WinSLAMM model (PV & Associates, LLC). This is an urban stormwater quality model which evaluates runoff volume and pollution loading for each source area within each land use for each rainfall event. Using WinSLAMM modeling, the watershed's 1,250-acre land surface is estimated to contribute about 0.5 ton of total suspended solids (TSS) per acre per year. This equals a pollutant loading from the entire water of 650 tons of TSS per year.

5. Management Practices. Phase II will execute the designs formulated in Phase I to: (a) reconstruct, largely using bioengineering, approximately 4,050 linear feet of eroding Thompson Creek with the BMPs or the restored reach extending from the detention basin east of 84th Street to 72nd Street (Map, Section 12), (b) retrofit storm sewers with hydrodynamic separators and paired with treatment wetlands, and (c) continue cost-share projects.

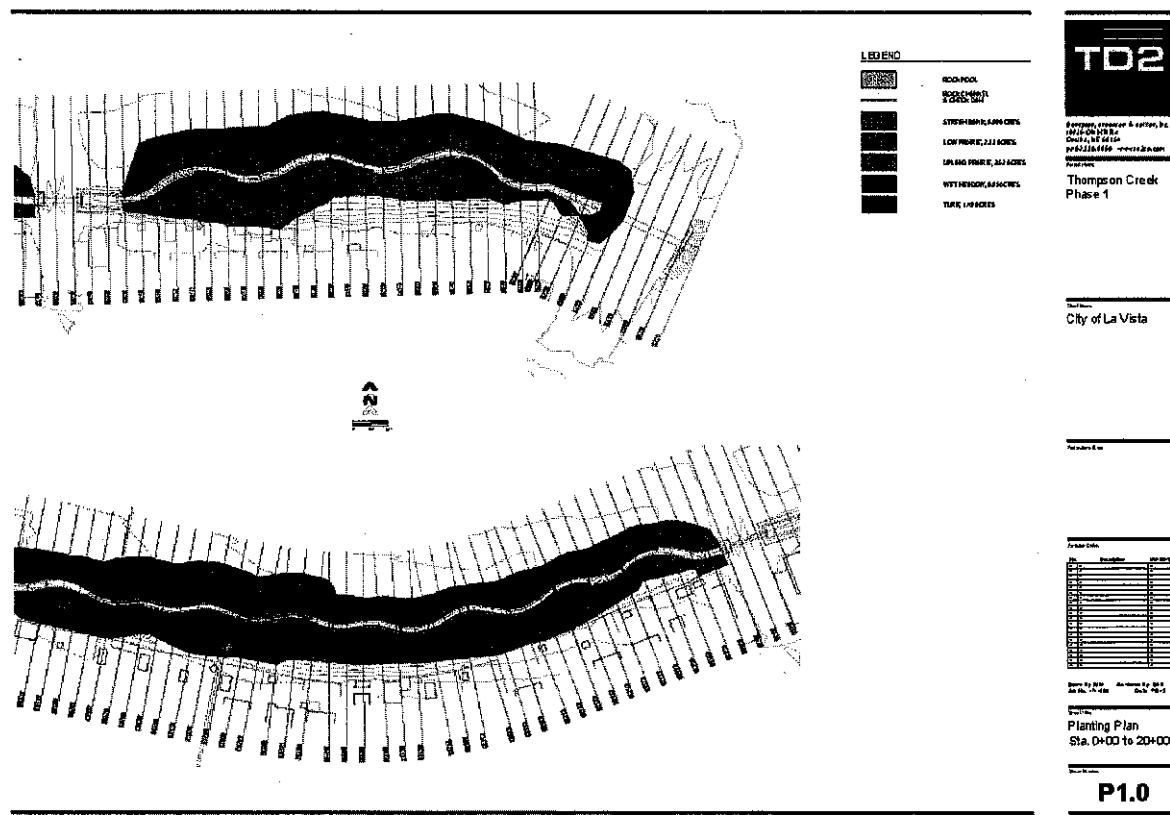
(a) *Stream reconstruction* design focuses on cost-effective enhancements that use proven techniques to provide multiple benefits. Bioengineering (use of natural materials and vegetation) is favored wherever possible. The reconstruction is designed to reduce the stream's longitudinal slope to a target of 0.5% and promote optimal stream and floodplain geometry. These actions will, in turn, diffuse runoff energy and balance sediment transport resulting in reduced erosion, improved water quality, enhanced aquatic and riparian habitat, and protection of public and private property and infrastructure.

Stream reconstruction will be accomplished via the following tasks, following designs from Phase I:

1. Re-meander the channel to provide a channel that is dynamically stable over time.
2. Raise the streambed where feasible.
3. Stabilize banks using bioengineering techniques (soil lifts, approximately 770 l.f.).
4. Install approximately 13 low-head grade controls (cross vanes).
5. Construct pools and riffles.
6. Reconstruct floodplain bench.
7. Restore native vegetation on banks — particularly deep-rooted native, herbaceous species.

Canopy cover, with the exception of preserving some choice specimen trees, will be eliminated to facilitate restoration of native herbaceous ground cover in the riparian zone.

Figure 1. Planting plan in the lower 40% of Thompson Creek illustrates the intended reconstruction. Meanders and grade control structures (low-head cross vanes) are shown.



(b) To manage watershed runoff entering Thompson Creek, 8 *stormwater outlets* in the reconstructed reach will be retrofitted with hydrodynamic separators paired with a treatment wetland. We propose to install SAFL Baffles (St. Anthony Falls Laboratory, <http://stormwater.safl.umn.edu/updates-december-2011>), which have been tested and found to remove 45-55% of TSS, while allowing easy access for cleaning and maintenance.

Treatment wetlands, integrated within the creek's reconstructed meanders, will receive discharge from each retrofitted outlet. The treatment wetland will produce a hydraulic head sufficient to push water through an engineered filter at the wetland outlet. This will remove additional TSS and phosphorus before water discharges to the creek. The wetland also will recharge local groundwater and help maintain a baseflow of cool water to the creek during dry or hot periods.

(c) *Cost-share BMP demonstration projects* from Phase I will be continued. This includes on residential properties, apartments and public property: a) 50 downspout redirections via modified gutters, downspouts and directive grading, b) 50 rain barrels, and c) 10 rain gardens. It also includes d) 4 street planters on public rights-of-way. These BMPS will prevent direct runoff to storm sewers from impervious surfaces, reduce runoff volume, and capture the most polluted first flush.

Runoff from two areas of extensive impervious cover, such as a public facility or commercial mall, will be treated with retrofitted BMPs or as part of a redevelopment project. Since the locations have not been identified, specifics are not available. In general, a stormwater treatment train approach will be used: a series of engineered and naturalized surface elements that provide water quality treatment, flood storage, and peak flow reduction. Alternately, BMPs may be installed during the redevelopment of Civic Center Park (currently La Vista Falls Golf Course) to manage runoff from subwatershed 1.

All BMPs constructed in Phase I and Phase II will be maintained to ensure ongoing effectiveness. Adaptive management will be practiced, taking into account any changing circumstances and allowing changes to be made to dynamically changing circumstances. This will ensure that project goals and objectives are achieved in a cost effective and timely manner.

6. Stakeholder Participation. The City of La Vista has continually solicited input on the Thompson Creek Watershed Restoration. Even prior to the current project, the City worked with landowners to identify their flood-prone or damage-prone properties adjacent to the stream with the intent of purchase and removal. Subsequent removals have established the needed space for restoration of Thompson Creek and also allowed creation of a new riparian park. These actions all fostered stakeholder participation. Detailed input on the stream restoration has been and will be sought through the City's park master planning process for the Civic Center Park (currently La Vista Falls Golf Course). In addition, education and outreach and citizen-assisted monitoring will continue to build stakeholder equity.

7. Education and Outreach. Outreach activities in Phase 2 will continue those started in Phase I. These included web and print-based communications, open houses, and volunteer activities with a focus on teachers and students in the Papillion-La Vista School District. A partnership with the University of Nebraska Omaha has begun to assist with water quality monitoring and macroinvertebrate monitoring. Phase II will add rain garden education, interpretive signage along the creek, participation by schools and volunteers in monitoring the stream corridor, and learning and teaching of residents and students about watersheds, streams and water quality. A *BioBlitz* is scheduled under Phase I and will be repeated in Phase II. This a one-day, intensive documentation of all life forms in the creek's stream, riparian zone and adjacent parks. This activity will be repeated in future years so that comparisons can be made comparative between life forms in a damaged urban stream versus a restored urban stream.

8. Monitoring. In Phase I, pre-construction baseline data have been and will be collected by professionals and UNO students. To facilitate comparison with pre-construction data, post-construction monitoring will use the same methods and parameters as the baseline. Specific standard operating procedures for

achieving the desired precision and accuracy in each category of data are detailed in a QAPP prepared for Phase I. As the project unfolds, teachers and students in the school district will be engaged to help with monitoring. Types of data to be measured are:

- a. Stream habitat condition and composition of macroinvertebrate communities.
- b. Water chemistry.
- c. GIS analysis of participation in runoff management in the subwatersheds.
- d. Peak flow (i.e., stage of creek following runoff event).
- e. Bank stability.

Stream habitat, macroinvertebrate communities, and bank stability are measured with an adaptation of the USEPA's Rapid Bioassessment Protocols¹ (RBP). This protocol assesses stream habitat condition and characterizes the macroinvertebrate community using standardized RBP data forms. Data forms include a semi-quantitative ranking system to score stream bed, bank, morphology, and riparian corridor conditions, and also document the appropriate taxa and abundance of macroinvertebrates, with the goal of assessing the integrity and functioning of the biotic community. A summer, fall and spring sample are being completed under Phase I. Phase II will continue the sampling.

Water chemistry is assessed in-situ with field measurements and surface water samples submitted to a qualified laboratory. In-situ measurements of temperature, pH, conductivity, dissolved oxygen, and turbidity are being made using a calibrated multi-meter. Surface water samples are being collected three time pre-construction, following standard protocols (including replicates) and analytical procedures for quantification of total suspended solids (TSS), soluble reactive phosphorus (SRP) and nitrate-nitrogen. This will continue in Phase II.

A GIS analysis of participation in runoff management is being developed. This simple approach identifies parcels which have in place BMPs that are known to reduce runoff or interrupt connected impervious surface flow. Lots will be scored as participating or not participating on the basis of the level of runoff control. The level of participation will be aggregated for subwatersheds in order to track the effectiveness of outreach efforts and adoption of BMPs.

Peak flow will be measured using a stage gauge installed in Thompson Creek near the South 72nd Street road crossing culvert. The City of La Vista has purchase automated stage gauge equipment with its own funds and is in discussions with the US Geological Survey in order to ensure an accurate stage-flow relationship is developed for modeling.

9. Evaluation Criteria. Evaluation criteria will be assessed in an adaptive management framework, encouraging modifications where circumstances dictate. Evaluation will include GIS mapping of participation in BMPs and comparison of other monitoring data with objectives set forth in Section 11.2. The City Engineer at La Vista will be responsible for monitoring project progress and taking corrective action should problems arise.

Specific measures of project success include, but are not limited to:

- Documentation of problems with BMPs and stream stabilization work, with corrective actions taken.
- Number of residents and students participating in open houses, monitoring, and special events.
- Citizen feedback from the Bioblitz and other focused activities.
- Achievement of target number of downspout redirections completed and rainbarrels installed.

¹ Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition*. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

- Achievement of target number of rain gardens and street planters installed.
- Achievement of demonstration projects for area of extensive impervious cover.
- Linear feet of Thompson Creek restored with meanders, floodplain bench, and riparian vegetation.
- List of future needed improvements in the watershed.

12. Project Map

One page, single-sided, map of project area (if applicable).

