Antelope Creek Watershed Basin Management Plan

2012 Post-Construction Stormwater Workshop

Hardin Hall, East Campus- University of Nebraska - Lincoln
March 21, 2012
1:30 – 2:00 pm

Sponsored by

Presented by

Jon Trombino, PE – EA Engineering, Science, and Technology
Jonathan Mohr, AICP – EA Engineering, Science, and Technology

Project Sponsors

- **City of Lincoln**
  - Ed Kouma, PE – 402-441-7018
- **Lower Platte South NRD**
  - Paul Zillig – 402-476-2729

Lower Platte South Natural Resources District

CITY OF LINCOLN NEBRASKA MAYOR CHRIS BEUTLER

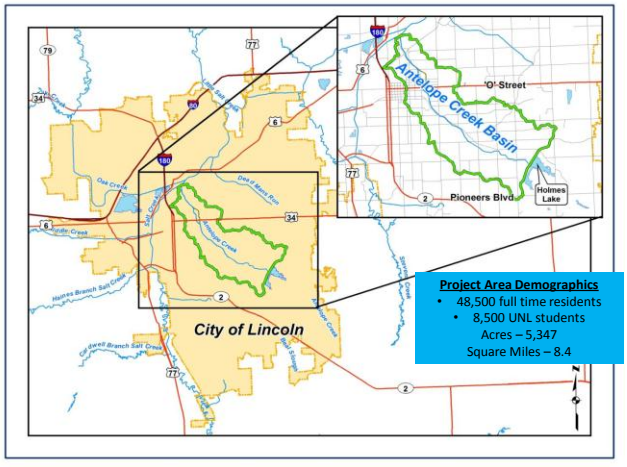
Project Team

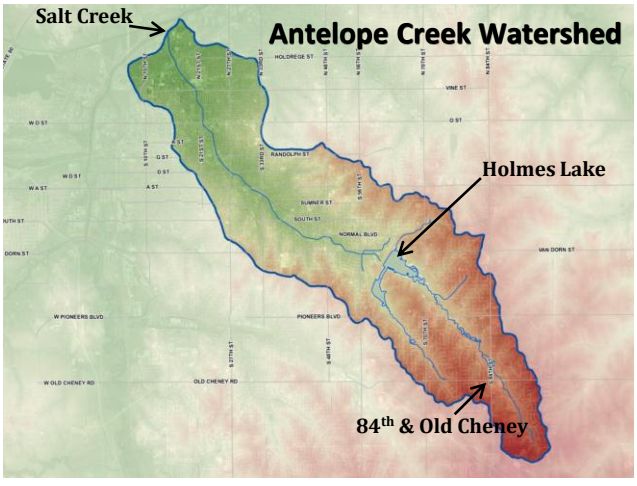
- **Project Team**
  - **EA Engineering, Science, and Technology, Inc.**
    - Lincoln, NE
  - **JEO Consulting Group, Inc.**
    - Lincoln, NE
  - **Wright Water Engineers**
    - Denver, CO
  - **Dr. Robert Pitt (Technical Expert)**
    - University of Alabama

Core Work Group

- **Core Work Group**
  - City of Lincoln Planning, Public Works, Parks & Recreation
  - NDEQ
  - Lower Platte South NRD
  - EA / JEO / WWE
- **Advisory Council**
  - Mayor appointed
  - Stakeholders from around the City

Project Location and Background





Water Quality Regulations

- **Regulatory Compliance – Total Maximum Daily Load (TMDL)**
  - Antelope Creek on 303(d) List of Impaired Waters
  - NDEQ developed TMDL in 2007
- **Achievement of Recreational Standards**
  - The diffuse nature of the pollutants makes it impractical to treat or remove all of the *E. coli* sources
- **Reaching the current water quality standards may not be feasible**
  - Incremental reductions may be possible

Intent of the Basin Plan

- **Determine the Source of Contaminants in Antelope Creek**
- **Determine what can be done to reduce levels of each contaminant**
  - **What does it take to remove Antelope Creek from the 303(d) list?**

Intent of the Basin Plan

- **Awareness and public education**
- **Apply lessons learned to other basins within the City and future growth areas**

Water Quality Summary

Water Quality Sampling Findings

- ***E. coli***
  - **Antelope Creek exceeds *E. coli* standards during dry and wet weather conditions**
  - ***E. coli* sources in the watershed are anticipated to be associated with diffuse, transient sources such as wildlife and pets**
  - **Concentrations are comparable to other urban streams in US**

Water Quality Sampling Findings

- **Ammonia**
  - Below detection limit during 2010/2011 sampling
- **Other Water Quality Factors**
  - Antelope Creek exceeds standards for Conductivity, Chloride, Selenium
  - Likely to be from natural sources and contributed by groundwater
  - No current TMDL for other factors

Groundwater boil in Antelope Creek below Vine Street bridge

Water Quality Sampling Findings

- **Sediments**
  - Sediments in Antelope Creek can incubate *E. coli*
- **Nutrients**
  - Nitrogen and phosphorus
  - Nutrients promote algae growth
  - Algae present is an aesthetic problem, not harmful

Water Quality Sampling Findings

Bird use under bridges

Wildlife/domestic pets

Groundwater Influence

Direct connections with impervious surfaces

Watershed Modeling using WinSLAMM

Water Quality Modeling (WinSLAMM)

- **Source Loading and Management Model for Windows (WinSLAMM)**
  - Dr. Robert Pitt – University of Alabama
  - Evaluates nonpoint source pollutant loadings for urban stormwater
  - Was performed for the entire Basin Plan area

Water Quality Modeling (WinSLAMM)

- **Modeling Inputs**
  - Actual 24-hour rainfall data from City
  - Past MS4 wet-weather monitoring results for *E. coli*, TSS, Total Phosphorus, Nitrogen, Copper, Zinc
  - Soils conditions
  - Land-use survey (use, number of disconnects, % impervious)

- **29 scenarios with 11 different BMPs**

Water Quality Modeling (WinSLAMM)

- **Provided extensive data on pollutant reduction**
  - Base conditions per land use
  - Reduction estimates
  - Flow volume reduction
- **Over 100 pages of tables**

Water Quality Modeling (WinSLAMM)

- **Use of WinSLAMM**
  - Estimate Pollutant Loading from different land uses
  - Develop estimates for pollutant removal of structural BMP Projects
  - Can be used as a tool to Evaluate Plan Effectiveness
- **Best BMPs according to WinSLAMM**
  - Volume Reduction BMPs
  - Infiltration/ Biofilters
  - Wet Ponds
  - Disconnects

Water Quality Modeling (WinSLAMM)

- **Example Pollutant Load Reduction table from draft Basin Plan**

Table 8-4. Annual Pollutant Load Reduction Estimates for AC-P01

Pollutant	Pollutant Load	Anticipated Load Reduction	Percent Reduction
TSS	10,990 lbs	2,500-3,000 lbs	23-27%
Phosphorus	25 lbs	0-4 lbs	0-16%
E. coli	2.5×10^{13}	1-5 x 10^{12} counts	4-20%

Direct Impervious Connection Areas

Curb-cut Bioswale

City of Lincoln Parks and Recreation Office Parking Lot

Provided by Dr. Robert Pitt

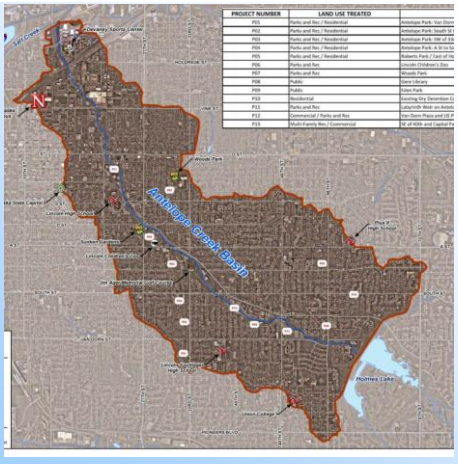
Kansas City curb-cut biofilters

Implementation Summary

- **Phased approach over 40-years**
- **Includes 8 sub-basins**
- **Prioritized sub-basin for Phase One**
  - Called Antelope Park sub-basin
  - 600-acres
  - Concentration of resources to priority area

Implementation Summary

- **13 structural demonstration projects**
  - 5 of 13 in priority sub-basin
  - Provide treatment of stormwater
- **Over 20 non-structural recommendations**
  - Retrofitting bridges/overpasses to limit roosting/nesting
  - Sanitary sewer line inspections
  - Dry weather screening
  - Pet waste ordinance enforcement
  - Rooftop/parking lot disconnection
  - Rain garden program



Closing Summary

- ***E. Coli* and Other Pollutants of Concern**
  - Problem throughout the urban streams in United States
  - Will require a new approach to Storm Water Management
  - Important to implement these practices into new development areas

Closing Summary

- **Stormwater control effectiveness for *E. coli***
  - **Source controls**
    - Source controls also called non-structural BMPs
  - **Surface Volume Reduction**
  - **Infiltration BMPs**

Public Information and Education

more information...
visit lincoln.ne.gov
(keyword: watershed) "click on Master Plans"
call Ed Kouma Lincoln Public Works and
Utilities Watershed Management
402-441-7018

ekouma@lincoln.ne.gov

Questions?

Thank You!