



MAYOR'S CLEAN WATER PROGRAM TASK FORCE

FINAL REPORT

NOVEMBER 2012

CITY OF
LINCOLN
NEBRASKA

Chapter 1 Background Information



Clean Water Task Force Charge Statement

The goal of the Mayor's Clean Water Task Force is to formulate recommendations for post-construction best management practices (BMPs) for new development and redevelopment projects by August 2012. These recommendations aim to address both the increased pollutant loads to local water ways as a result of urbanization as well as the increased quantity of water delivered to a water body during a storm event. It is important to also consider business, environmental and neighborhood interests, recognizing the need to sustain long-term economic and development opportunities in the City of Lincoln.

Post-construction BMPs are implemented to prevent flooding, reduce erosion and sedimentation, increase base flows in streams, filter impurities in stormwater runoff to decrease pollutant levels, reduce algae blooms in water bodies, support riparian and aquatic habitats, promote biodiversity, provide open space and areas for outdoor recreation, promote sustainability and increase aesthetics.

Federal and State Law require that the City of Lincoln:

1. Develop and implement strategies which include structural and non-structural best management practices
2. Have an ordinance or other regulatory mechanism requiring the implementation of post-construction runoff controls
3. Ensure adequate long term operation and maintenance of controls
4. Determine the appropriate best management practices and goals for a post-construction stormwater program

The objective of the Mayor's Clean Water Task Force is to formulate recommendations for a Post-Construction Program that meet the above requirements.

Facilitation and Process for Developing Recommendations

Most of Lincoln's creeks and lakes do not meet clean water standards for their state designated uses. In part, this is due to the urbanized nature of the areas draining to the City's waterways. As the City of Lincoln continues to grow and develop, the pollution from stormwater runoff continues to increase. As a result of the correlation between urbanization and stormwater pollution and similar to other Cities of similar size or greater, the City of Lincoln is required to maintain a stormwater discharge permit for the City's stormwater runoff. This is so that the City can be in compliance with the National Pollutant Discharge Elimination System program that is mandated and enforced by the Environmental Protection Agency and by the Nebraska State Department of Quality.

The Mayor's Clean Water Program Task Force was formed by Executive Order of the Mayor in December 2011 with the goal of formulating recommendations for water quality post-construction standards (i.e. clean water standards for stormwater) to assist the City for being in compliance with state and federal regulations. There were six monthly Task Force meetings starting in January 2012 and lasting through June 2012. The Task Force consisted of 18 individuals selected by the Mayor to represent a broad representation of the community. The Task Force were conducted by the Mediation Center, with David Hubbard and Lorrie Benson, with assistance from Sandy Wolf. It was supported by City support staff as well as with a professional outside facilitator. Task Force members, facilitator staff and support staff are listed in the appendices.

The process as well as the meetings were facilitated by the Mediation Center. At the initial meeting the Mayor welcomed the Task Force members and stressed the importance of the goals of the Clean Water Program Task Force. The Mediation Center then discussed the role of the facilitator and discussed Guidelines and Ground Rules for discussion. The Guidelines and Ground Rules for discussion were finalized at the second meeting. The Mediation Center and support staff from the City met for planning sessions prior to each meeting of the Task Force to create an agenda and discuss requests made by Task Force members during previous meetings. Meetings were designed to provide both presentations and opportunities for small group discussions. After each meeting the Mediation Center sent out a Group Memory of the meeting to Task Force members and support staff for review. The Group Memory was finalized and sent out prior to the subsequent meeting as well as handed out at the subsequent meeting. Prior to the initial meeting, phone calls were made by the Mediation Center to Task Force members as a reminder. The Task Force also received reminder emails for the remainder of the meetings.

During the initial meetings (January through March, 2012), Task Force members were provided with information regarding the federal requirements and examples of how other peer cities have met such requirements. Information was also provided about how water quality standards would improve water quality, reduce flood risks, promote aquatic and riparian areas, reduce stream bank erosion and promote a more healthier life style for Lincoln residents. A variety of guest speakers representing areas of technical expertise made presentations during the meetings. A list of those individuals and topics are included in the appendices. The first three meetings were mostly the presentation of material related to post-construction standards. Members of the Task Force voiced their questions and points of view regarding the presented information during and

at the end of each meeting. City staff provided additional information sought by the Task Force members at the meeting or at the next meeting. Some of this information was provided in the form of Technical Memorandums, Questions and Answers, and common Stormwater Definitions. All of these are included in the appendices.

The fourth meeting (April 17, 2012) of the Task Force consisted of preliminary straw polling based on the following categories: Agree, Agree If, Need More Information/Discussion, Disagree Because & Additional Options. Polling issues were based on:

- Preliminary recommendations related to criteria for treatment (i.e. treatment of what size of rain fall event);
- Criteria applicable to what size of development or redevelopment;
- Exceptions;
- Waivers;
- Effective date of recommendations; and
- Maintenance concerns.

After the polling there was an overall discussion of the issues where there didn't appear to be consensus, particularly related to the criteria and maintenance. Some of the Task Force members met outside of the regular task force meeting after the fourth meeting to discuss the application of the proposed standards. They then shared their concerns with some of the support staff and subsequently at the sixth meeting with the rest of the Task Force. The fifth meeting (May 15, 2012) was a bus tour to visit existing Best Management Practices sites.

The sixth meeting (June 19, 2012) consisted of brief discussions about the potential possibility for an additional meeting (there was a consensus to not have an additional meeting) and that the sixth meeting was the final meeting so there would be a final vote. Prior to the sixth meeting there appeared to be a lot of issues remaining, so following the initial discussions there was an initial poll. Following the initial polling there was significant discussion regarding the recommendations set forth in the initial poll. These recommendations were the issues in the straw poll from the April meeting with revisions made based on previous discussions with the Task Force. A final polling was done using Agree or Disagree categories, with both categories allowing for comments, with consensus being the overall goal. However where there was not a consensus opinion, the final decisions on recommendations were made based on a majority basis.

The final Task Force recommendations are shown in Chapter 2. The results of all of the polling exercises are included in the appendices. It should be noted that the procedure itself allowed for discussion and revisions of the recommendations as the Task Force group worked together. The discussions regarding specific recommendations proved very useful in working toward a consensus or majority on the recommendations, as well as clarifying positions not having a majority of opinion. Some Task Force members left early, abstained or were absent from the polling, so attendance and polling results may seem to be in conflict. However the polling results reflect the members actively polling during each polling event.

Chapter 2

Post-Construction Standards Recommendations



Introduction to Mayor's Clean

Water Program Recommendations

Clean Water Task Force recommendations reflect the majority opinion of those participating at the final polling during the June Task Force meeting. Overall, the attendance was exceptional with a great majority of the members present at each meeting. While significant efforts were made to schedule meetings in such a way as to include all Task Force members, attendance varied slightly from meeting to meeting. The final polling of the members for each recommendation was completed at the final meeting with 15 of the 18 members present. Final polling numbers ranged between 12 and 15 members participating depending upon the recommendation being polled. As described in the previous Chapter the polling results from each poll were recorded and are included in the appendices.

For context and understanding, Task Force recommendations presented in this Chapter are accompanied by information relating to issues raised and important facts considered by the group during the course of formulating each policy recommendation. Terms used in this Chapter such as majority, consensus (majority with over 80% in agreement) and unanimous (all in agreement) refer to those participating for each recommendation.

Recommendations for Post-Construction Best Management Practices (BMPs)

1. New Development Standard Criteria

Adopt a criteria for management of rainfall events of 1.25 inches or less for New Developments

For areas of New Development it is recommended to design, construct, and maintain Best Management Practices based on a rainfall event of 1.25 inches (equivalent to 90 percent of all local rainfall events)

This recommendation requires the management of rainfall volume from 90 percent of all local rainfall storm events in order to reduce the impacts of the increased volume of stormwater runoff and pollutants from new developments to local waterways. This 90th percentile rainfall depth (1.25 inches), when applied over an area, gives the Water Quality Control Volume to be controlled on site. For Best Management Practices the Water Quality Control Volume (from a 1.25 inch rainfall event) is to be temporarily held then released over a 40 hour period. For Best Management Practices that are designed with subsurface storage (e.g., pervious pavements, bioretention, rain gardens), it

is preferred that the subsurface storage hold the Water Quality Control Volume and infiltrate it into the underlying soil (as practical).

Currently there is not a required water quality criteria in the City ordinances to reduce the amount of pollutants that flow untreated from new developed areas into local waterways. Other peer cities in the region have established water quality standards that vary between treating 0.5 inch of runoff to 80th to 90th percentile rainfall depths.

There were discussions by the Task Force members regarding; the cost to implement recommendations, if standards should be done on a watershed basis, the use of a runoff volume versus rainfall volume, the advantages and disadvantages of using other rainfall percentiles, and if there was a need for keeping the recommendations similar for both developments and re-developments. During the sixth and final meeting there was much discussion on what percentile rainfall event to base the recommendations on (i.e. 80th, 85th or 90th percentiles). During the final poll the majority (9 to 6) of Task Force members selected the 90th percentile recommendation.

2. Re-Development Standard Criteria

This recommendation requires the management of rainfall volume from 80 percent of all local rainfall storm events in order to reduce the impacts of the increased volume of stormwater runoff and pollutants from new developments to local waterways.

This 80th percentile rainfall depth (0.83 inches), when applied over an area, gives the Water Quality Control Volume to be controlled on site. For Best Management Practices the Water Quality Control Volume (from a 0.83

inch rainfall event) is to be temporarily held then released over a 40 hour period. For Best Management Practices that are designed with subsurface storage (e.g., pervious pavements, bioretention, rain gardens), it is preferred that the subsurface storage hold the Water Quality Control Volume and infiltrate it into the underlying soil (as practical).

Adopt a criteria for management of rainfall events of 0.83 inches or less for Re-Developments

For areas of New Development it is recommended to design, construct, and maintain Best Management Practices based on a rainfall event of 0.83 inches (equivalent to 80 percent of all local rainfall events)

The Task Force had considerable discussion on areas of re-development meeting the same standards as new developments, or if they should be allowed to have a lower threshold than new developments. An issue of concern was the availability of space to build Best Management Practices in densely urbanized areas such as the downtown area. Treating runoff from these areas present challenging issues as space is at a premium. There was a consensus agreement (12 to 2) among the Task Force members on this recommendation.

3. Where Standard Criteria Will be Applicable

Areas One Acre or Greater

It is recommended that new standards apply to all developments and redevelopments that are one acre or greater in size

In a similar manner to the Erosion and Sediment Control ordinances this recommendation would apply to developments and re-developments that are one acre or more and for all areas that are a part of an overall common plan of development or sale that are one acre or more. It was noted that typically lots in a subdivision are considered to be part of a larger common plan of development.

There was not much discussion on this recommendation. There was a consensus (12 to 2) by the Task Force indicating that the new standards should apply to areas of one acre or greater.

4. Exceptions

This recommendation was to exempt single family dwellings (that are not part of a common plan of development or sale).

There was limited discussion that for the great majority of cases, these type of dwellings would not be required to meet the recommendations as they would fall into the one acre or less category. There was consensus (14 to 1) by the task Force on this recommendation.

Allow Exceptions

Single family dwellings not part of a subdivision are recommended to be exempt

5. Allow for Waivers

Waivers

It is recommended to provide a policy for waivers

Task Force members recommended that there be waivers allowed for the new standards. The waiver policy is planned to be at the Director of Public Works and Utility's discretion. Guidelines include allowing waivers for unplanned emergency work or repairs necessary to protect life or property. Also allowing for retro-fitted Best Management Practices on previously developed property

within the same watershed provided that the same level of stormwater quality or more is provided. Another option would be the consideration of waivers through a credit system.

There were discussions regarding circumstances where the project cost of implementing the proposed standards would be so disproportionate, that completing the project would be not be feasible. It was noted that there are other cities with waiver policies that consider unique circumstances where it may not be possible to meet the recommendations. Also there were discussions about having a credit system to allow for more flexibility (see Recommendation #10). There was a consensus (13 to 2) on this recommendation.

6. **Effective Date of Ordinance**

This recommendation was for the new standards to have a delayed effective date of one year after the ordinance adoption.

There were discussions regarding; projects currently in design, the engineering community needing education on Best Management Practices and for City staff to provide education and training on Best Management Practices prior to the implementation of the recommendations. Also due to the relative long time line typical for the planning of development and re-development projects a delay in the effective date was further warranted. There was unanimous agreement (12-0) regarding the effective date of implementing the new standards.

Effective Date of Ordinance

It is recommended that the date of implementing the new standards be one year after the ordinance is adopted

7. **Requirements for Inspection of Best Management Practices**

Inspections of Best Management Practices

It is recommended that the owners of the Best Management Practices conduct inspections annually

It was recommended by Task Force members that the respective owners of each Best Management Practice be responsible for annual inspections. It was also recommended that City staff provide training to Best Management Practice owners to properly conduct the inspections and to provide a list of applicable contractors in the community that could be hired to do these inspections. Task Force members also asked the City to provide a standard

check list so that owners/contractors know what they were looking for when doing inspections.

The Task Force discussed who should conduct the inspections of the Best Management Practice facilities and how often they should be inspected. Some Task Force members thought the City should do the inspections of the Best Management Practice facilities, whereas others thought that facilities should be inspected by the owners. During the Task Force meetings the City did make the Task Force members aware that the City does plan to inspect the Best Management Practices after installation, annually for a few years and then periodically after that (e.g. five year intervals). Currently the City inspects retention/ detention basins designed to detain major rainfall events (2, 10 and 100 year storm events) at a minimum of every five years. This process has worked successfully for the past several years with the vast majority of the basins passing City inspections. Those that do not pass City inspections were typically because of relatively minor maintenance issues.

There was a majority agreement (8 to 6) on this recommendation, with the majority of the Task Force recommending that the owner of the Best Management Practice facility do the annual inspections.

8. Requirements for Maintenance of Best Management Practices

Task Force members recommended that the owners of each Best Management Practice be responsible for maintenance. It was further recommended that a maintenance plan be provided by the designer at the time of the design.

Similar to inspections there was much discussion on who should maintain the Best Management Practices and who establishes a maintenance plan. Any maintenance and maintenance plan from a development or redevelopment could be conveyed to others such as a Homeowners Association, who would end up accepting inspection and maintenance responsibility for the Best Management Practices.

There were concerns from Task Force members on the ability of Homeowner Associations having the capacity to maintain Best Management Practices. There were also comments from Task Force members that if the City were responsible for major maintenance of the Best Management Practices that there would not be any buy-in from the Homeowner Associations to do any minor maintenance of the Best Management Practices. It was noted that while some Cities maintain Best Management Practices the vast majority of Cities require that they be maintained by the owner.

There was a majority of agreement (9 to 6) on this recommendation, with the majority recommending that the owner of the Best Management Practice facility do maintenance.

Maintenance of Best Management Practices

It is recommended that the owners of Best Management Practices be responsible for maintenance

9. Requirements for the Replacement of Best Management Practices

Replacement of Best Management Practices

If properly established, inspected and maintained it is recommended that the City replace Best Management Practices

There was a recommendation by the Task Force for the City to replace Best Management Practice facilities when they are no longer functional. Due to the flexible and maintainable nature of Best Management Practices they should typically have a significant life span if established, inspected and maintained properly. It is recommended that the City have a policy for replacing Best Management Practices that are shown to have been established, inspected and

maintained in a proper manner.

Task Force members felt that the City should provide replacement due to the limited ability of Homeowner Associations and similar organizations to plan and fund the major expense of replacing a failed Best Management Practice. As previously stated, for the City to replace Best Management Practices there would need to be adequate records that the failed Best Management Practice was adequately established, inspected annually, properly maintained and that any previous City inspection comments were adequately addressed.

There was majority recommendation (12 to 3) on this issue for the City to replace Best Management Practice facilities that have been properly established, inspected and maintained.

10. Create a Credit System

The Task Force recommended that a system be set up to allow for mitigating the location of Best Management Practices by providing a credit system. See Recommendation # 5 for additional information on where these situations might apply.

There was considerable discussion on this issue including where these credit sites could be located.

The City has federal requirements to address impaired waters. Each impaired creek or lake in Lincoln typically has different pollutants of concern unique to that waterbody. As such, it was necessary that any credits be located within the same watershed of the proposed development or re-development project seeking credits. There was unanimous support (12-0) for this recommendation.

Allow for Off Site Mitigation and Offer Credits

It is recommended that the City have a system to allow for credits

It is recommended that a credit policy be developed based on a volume (acre-feet) of stormwater being treated for developments/re-developments projects that obtain a waiver. In summary the treatment of stormwater above the 1.25 inch standard for developments or 0.83 inch standard for re-developments would obtain a credit for the extra volume of stormwater treated up to an amount of 1.65 inches (95th percentile rainfall event). The volume of credit would be the extra volume obtained by treating over the required amount, i.e. subtracting the volume of stormwater required to be treated from the actual volume of stormwater treated.

Also as an incentive, credits could be obtained by treatment of stormwater through alternative Best Management Practices that use subsurface storage such as porous pavements, bioswales, rain gardens, etc with infiltration practices and no drain down to the municipal storm drainage system. These credits would be based on a volume of 0.05 acre-feet per acre treated basis.

Examples of how this work are as follows:

1. A 20 acre development site would be required to treat 1.25 inches or 2.08 acre feet of stormwater (20 acres multiplied by 1.25 inches divided by 12 inches/foot). If the 20 acre development site was designed to treat 1.65 inches (95th percentile rainfall event) it would treat 2.75 acre-feet. This would provide a credit of 0.67 acre-feet (i.e. 2.75 acre-feet minus 2.08 acre-feet) of credits that could be used elsewhere in the watershed. This 0.67 acre-feet credit would be enough to satisfy the recommendations for a 6.4 acre development site or a 9.7 acre redevelopment site that obtained waivers. Alternatively the 0.67 acre-feet credit would be enough to have a Best Management Practice designed to treat 0.62 inches (70th percentile rainfall event) of stormwater from a 13 acre development site that obtained a waiver.

2. A 20 acre development site that uses applicable alternate Best Management Practices will obtain a credit of 1.0 acre feet (0.05 acre-feet/foot multiplied by 20 acres). Similar to the other type of credit this could be used elsewhere in the watershed for a project that obtained a waiver. As a comparison this would provide more credits than if the same area was treated to a 95th percentile rainfall event (e.g. 0.67 acre-feet of credits).

United States
Environmental Protection
Agency

Office of Water
(4203)

EPA 833-F-00-009
January 2000 (revised December 2005)
Fact Sheet 2.7



Stormwater Phase II Final Rule

Post-Construction Runoff Control Minimum Control Measure

Stormwater Phase II Final Rule Fact Sheet Series

Overview

1.0 – Stormwater Phase II Final
Rule: An Overview

Small MS4 Program

2.0 – Small MS4 Stormwater
Program Overview

2.1 – Who's Covered? Designation
and Waivers of Regulated Small
MS4s

2.2 – Urbanized Areas: Definition
and Description

This fact sheet profiles the Post-Construction Runoff Control minimum control measure, one of six measures that the operator of a Phase II regulated small municipal separate storm sewer system (MS4) is required to include in its stormwater management program in order to meet the conditions of its National Pollutant Discharge Elimination System (NPDES) permit. This fact sheet outlines the Phase II Final Rule requirements for post-construction runoff control and offers some general guidance on how to satisfy those requirements. It is important to keep in mind that the small MS4 operator has a great deal of flexibility in choosing exactly how to satisfy the minimum control measure requirements.

Why Is The Control of Post-Construction Runoff Necessary?

Post-construction stormwater management in areas undergoing new development or redevelopment is necessary because runoff from these areas has been shown to significantly affect receiving waterbodies. Many studies indicate that prior planning and design for the minimization of pollutants in post-construction stormwater discharges is the most cost-effective approach to stormwater quality management.



A. Clean Water Task Force Membership

Members:

Bud Dasenbrock	Mayor's Environmental Task Force
Dave Potter	Lower Platte South Natural Resources District Board
Bob Caldwell	Developer, Residential
Don Linscott	Developer, Commercial
Rick Onnen	Home Builders of Lincoln (HBAL)
Brock Peters	Contractor
Tom Franti	UNL Extension Stormwater & Greenspace Work Group
Carl Eskridge	City Council Representative
Tim Texel	Home Owners Association Representative
DaNay Kalkowski	Attorney
Milo Mumgaard	Lincoln Green by Design
Jim Wathen	American Council of Engineering Companies (ACEC)
Jeff Emanuel	Lawn Care Industry, Nemaha Nursery
Paul Johnson	Home Owner with Rain Garden
Reba Schafer	Business Owner with Best Management Practice
Dennis Scheer	Landscape Architect
Pam Dingman	Lincoln Independent Business Association (LIBA)
Peter Katt	Developer Attorney

B. Clean Water Task Force Staff

Staff:

Ed Kouma	City of Lincoln-Watershed Management
Ben Higgins	City of Lincoln-Watershed Management
Jared Nelson	City of Lincoln- Watershed Management
Rock Krzycki	City of Lincoln- Watershed Management
Ellen Wright	City of Lincoln- Watershed Management
Roger Tiedeman	City of Lincoln-Street Maintenance
Devin Biesecker	City of Lincoln-Engineering Services
Nicole Fleck-Tooze	City/County Planning Department
JJ Yost	City of Lincoln-Parks & Recreation Dept.
Wynn Hjermstad	City of Lincoln-Urban Development Dept.
Paul Zillig	Lower Platte South NRD
JB Dixon	Lower Platte South NRD
John Chess	City/County Health Department
Jocelyn Golden	Law Department

Facilitation:

David Hubbard	Mediation Center
Lorrie Benson	UNL Water Center
Sandy Wolf	Mediation Center

C. Task Force Membership Attendance

[illegible]

D. Meeting Summaries, Speakers, Topics, Information Received

January 17, 2012

Clean Water Task Force Meeting: 11:30a.m. - 1:30 p.m.

Location: Lower Platte South Natural Resources District

Mayor Beutler - Mayor City of Lincoln, Introductions

Dave Hubbard and Lorrie Benson - Mediation Center, Introductions and Ground Rules

Ben Higgins - Public Works and Utilities, Clean Water Program

Blayne Renner - NDEQ, NDEQ/EPA Requirements for Post Construction

J.B. Dixon - LPSNRD, Anticipated EPA Regulations for Post-Construction Stormwater

Information Received

Definitions (1 of 3)

Frequently Asked Questions

Midwest Cities with Phase I Permits

Stormwater Public Service Announcement Video

PowerPoint Presentations:

- Clean Water Program, Development of Recommended Ordinances for Water Quality
- Anticipated EPA Regulations for Post-Construction Stormwater

February 21, 2012

Clean Water Task Force Meeting: 11:30a.m. - 1:30 p.m.

Location: Lower Platte South Natural Resources District

Dave Hubbard and Lorrie Benson - Mediation Center, Review of Last Meeting

Jared Nelson - Public Works and Utilities, Technical Memo #1 - Rainfall Frequency Curve

Ben Higgins - Public Works and Utilities, Technical Memo #2 - Ordinance

Jared Nelson - Flood Control and Water Quality

Ted Hartzig & Carter Hubbard - OA Consulting, BMP Presentation

Information Received

Definitions (2 of 3)

Technical Memo #1 - Rainfall Frequency Curve

Technical Memo #2 - Ordinance

Increase in Stormwater Runoff with Urbanization graphic

Stormwater Phase II Final Rule (2005)

Public Works Memorandum on Post Construction Best Management Practices

PowerPoint Presentations:

- Flood Control and Water Quality
- The Application of Best Management Practices in Lincoln

March 20, 2012

Clean Water Task Force Meeting: 11:30a.m. - 1:30 p.m.

Location: Lower Platte South Natural Resources District

Dave Hubbard and Lorrie Benson - Mediation Center, Review of Last Meeting

Ben Higgins - Public Works and Utilities, Technical Memo #3 & #4 - Volume and Land Use Comparisons, Costs

JB Dixon - LPSNRD, How Stormwater Quality Requirements Would Work

Selma Kessler - City of Omaha Public Works, Post Construction Program Overview

Information Received

Definitions (3 of 3)

Technical Memo #3 - Volume and Land Use Comparisons

Technical Memo #4 - Costs

PowerPoint Presentations:

- How Stormwater Quality Requirements Would Work
- City of Omaha - Post Construction Program Overview

Discussion Questions for April Meeting

April 17, 2012

Clean Water Task Force Meeting: 11:30a.m. - 1:30 p.m.

Location: Lower Platte South Natural Resources District

Dave Hubbard and Lorrie Benson - Mediation Center, Review of Last Meeting

Ben Higgins - Public Works and Utilities, Technical Memo #5 - Water Quality Standards

Ben Higgins - Public Works and Utilities, Draft Recommendations for Post Construction Ordinances

Dave Hubbard and Lorrie Benson - Straw Poll

Information Received

Technical Memo #5 - Water Quality Standards

PowerPoint Presentations:

- Draft Recommendations for Post Construction Ordinances

May 15, 2012

Clean Water Task Force Meeting - Bus Tour: 11:30a.m. - 1:30 p.m.

Location: 570 Fallbrook Blvd. for start of Best Management Bus Tour

Dave Hubbard - Outline of Post Construction Best Management Practice Bus Tour

Jim Able, NEBCO - Fallbrook Summary

Phil Wenta, NEBCO - Fallbrook Summary

Brad Stritmatter, OA Consulting - Fallbrook Summary

Ted Hartzig, OA Consulting - Lewis Ballfield Summary

Ted Hartzig, OA Consulting - Lewis Ballfield Summary

Dennis Scheer, Clark Enerson - Assurity Summary

William Schmeeckle, Assurity - Assurity Summary

Information Received

Best Management Practice Bus Tour Map

Self Guided Best Management Practice Tour Map

Lincoln Best Management Practice Project Locations

June 19, 2012

Clean Water Task Force Meeting: 11:30a.m. - 1:30 p.m.

Location: Lower Platte South Natural Resources District

Dave Hubbard - Mediation Center, Review of Last Meeting and Outline of Polling Process

Dave Hubbard and Lorri Benson - Mediation Center, Compilation of "Post-it-Note" charts from April 17th Meeting , Straw Poll, Final Poll

Information Received

Compilation of "Post-it-Note" charts from April 17th Meeting

Questions and Concerns

Note: Group memories for each meeting were sent out via email after each meeting

Note: The above and other material including Resource materials are located on Watershed Management's website at lincoln.ne.gov, keyword 'clean water program'

E. Task Force Polling Summaries

April 17, 2012 Straw Poll

A preliminary straw polling process was developed for the April 17, 2012 meeting that allowed each Task Force member participating to indicate if they Agree, Agree if, Need more information/discussion, Disagree because....., or provide Other options on each draft criteria. Some Task Force members were absent, abstained, or marked more than one column for this exercise at the time of the polling, so attendance and polling results may not match. The comments related to the items below are included in the information handed out during the June 19, 2012 meeting and are also available on the web at lincoln.ne.gov, keyword 'clean water program'.

Preliminary Straw Poll Results

Criteria	Agree	Agree if..	Need more info	Disagree because ..	Other options
1. New Development Standard Criteria – 90%	5	5	3	4	7
2. Redevelopment Standard Criteria – 80%	5	6	0	4	3
3. Standards Applicable to Areas Equal to or Greater than 1 Acre	8	2	1	3	1
4. Exceptions – Single Family Dwellings Not Part of a Subdivision	8	2	1	3	0
5. Allow for Waivers	6	8	1	1	6
6. Effective Date of Ordinance – Ordinance not applicable to new developments and redevelopments that obtain planning commission approval within three months of ordinance adoption	1	9	0	6	2
7. Requirements for Annual Inspections of BMPs by owner	5	5	2	4	4

June 19, 2012 Initial Poll

An initial straw polling process was developed for the June 19, 2012 meeting that allowed each Task Force member participating to indicate if they Agree or Disagree and also provided for comments. Some Task Force members were absent or abstained from this exercise at the time of the polling, so attendance and polling results may not match. The comments related to the items below are included in the Group Memory for the June 19, 2012 meeting and are also available on the web at lincoln.ne.gov, keyword 'clean water program'.

Initial Poll Results

Recommendation	Agree	Disagree
1. New Development Standard Criteria – 90%	8	8
2. Redevelopment Standard Criteria – 80%	12	4
3. Standards Applicable to Areas Equal to or Greater than 1 Acre	15	1
4. Exceptions – Single Family Dwellings Not Part of a Subdivision	16	0
5. Allow for Waivers	16	0
6a. Effective Date of Ordinance – Ordinance not applicable to new developments and redevelopments that obtain planning commission approval within three months of ordinance adoption	2	14
6b. Effective Date of Ordinance – Ordinance not applicable to new developments and redevelopments that obtain planning commission approval within 12 months of ordinance adoption	14	2
7. Requirements for Annual Inspections and Inspection Reports of BMPs by owners	9	7

June 19, 2012 Final Poll

Based upon previous discussions, the initial polling for this meeting, and subsequent discussions, a final polling process was developed that allowed each member present to agree, disagree or offer comments on each recommendation. Recommendations were based on the results of previous polling and discussions. Some Task Force members left early, abstained or were absent from the room at the time of the final polling, so attendance and polling results may not match. The polling results reflect only those members participating during the June 19, 2012 meeting. The comments related to the items below are included in the Group Memory for the June 19, 2012 meeting and are also available on the web at lincoln.ne.gov, keyword 'clean water program'.

Final Poll Results

Recommendation	Agree	Disagree
1. New Development Standard Criteria – 90%	9	6
2. Redevelopment Standard Criteria – 80%	12	2
3. Standards Applicable to Areas Equal to or Greater than 1 Acre	12	2
4. Exceptions – Single Family Dwellings Not Part of a Subdivision	14	1
5. Allow for Waivers	13	2
6. Effective Date of Ordinance – Ordinance not applicable to new developments and redevelopments that obtain planning commission approval within 12 months of ordinance adoption	12	0
7. Requirements for Annual Inspections of BMPs by -	6 (City)	8 (Private)
8. Requirements for Maintenance of BMPs by -	6 (City)	9 (Private)
9. Requirements for Replacement of BMPs by -	12 (City)	3 (Private)
10. Create a “Banking/Credit” System	12	0

F. Clean Water Task Force Facilitator Information

Facilitation:

Mediation Center

David Hubbard, Lorrie Benson and Sandy Wolf

The Mediation Center was hired by the City of Lincoln as a neutral party to provide facilitation services for the Mayor's Clean Water Program Task Force meetings. City Staff provided the Mediation Center with the stormwater requirements as mandated by the Environmental Protection Agency (EPA) and the Nebraska Department of Environmental Quality (NDEQ). Mediation Center staff coordinating the Task Force meetings were David Hubbard and Sandy Wolf. The Mediation Center also asked Lorrie Benson, J.D. Assistant Director of University of Nebraska's Nebraska Water Center to provide her expertise in helping to facilitate the Task Force meetings.

G. Definitions

COMMON STORMWATER DEFINITIONS #1

Best Management Practice (BMP): Practices that reduce pollutants in stormwater. Post Construction BMPs (or permanent BMPs) may include structural or non-structural solutions that are used to prevent or control the discharge of pollutants and minimize runoff to streams and lakes. Examples of non-structural BMPs include a schedule of activities, prohibition of practices, maintenance procedures, and structural BMPs are permanent features of the landscape such as, ponds, wetlands, and bioretention areas.

Clean Water Act (CWA): Federal legislation enacted in 1972 with revisions in 1987 that provide the legal basis of the National Pollution Discharge Elimination System (NPDES) permit program. Goals of the Clean Water Act are to reduce the discharge of pollutants to streams and lakes.

Green Infrastructure: Is an approach to wet weather management that uses natural systems—or engineered systems that mimic natural processes—to capture, cleanse and reduce stormwater runoff. At the site scale, green infrastructure consists of site-specific management practices that are designed to maintain natural hydrologic functions by absorbing and infiltrating precipitation where it falls.

Low-Impact Development (LID): Is a stormwater management approach whose goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source. The core concept of Low Impact Development is preventing stormwater runoff by integrating small-scale landscape practices and planning techniques that preserve natural drainage features and patterns. The Low Impact Development approach is similar to Green Infrastructure.

Impaired Waters: The goal of the Clean Water Act is “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters”. Under section 303(d) of the Clean Water Act, “states,” are required to develop lists of impaired waters. The waters that fail to meet the water quality standards set by the states are added to the state’s list of “Impaired Waters.” The states are required by the Clean Water Act to create a clean up plan. The main tool for completing this is a process called the “Total Maximum Daily Load,” or TMDL.

Municipal Separate Storm Sewer System (MS4): Is a publicly owned system of drainage conveyances that discharges to streams and lake. This may include any pipe; ditch or gully; or system of pipes that is operated by a governmental entity and used for collecting and conveying stormwater that is not part of the sewage treatment system. Discharges from MS4s are regulated under the National Pollutant Discharge Elimination System municipal stormwater program (Phase I and Phase II).

National Pollutant Discharge Elimination System (NPDES): Is part of the Clean Water Act that provides a permit program for regulating and enforcing stormwater discharges from urban areas.

Post construction: Development alters landscapes by increasing impervious surfaces (i.e. roads, sidewalks, parking lots, and rooftops) which can have detrimental effects on aquatic systems. Stormwater runoff from these hard surface areas can contain sediment, nutrients, roads salts, heavy metals, bacteria, petroleum hydrocarbons, and other pollutants detrimental to water quality. Post-construction management’s goal is to limit surface runoff volumes and reduce water runoff pollutant to streams and lakes.

Total Maximum Daily Load (TMDL): A calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards. These standards are dependent on the intended use of the waterbody such as drinking, swimming, or fishing.

COMMON STORMWATER DEFINITIONS #2

2, 10, 100-year Storm: Refers to rainfall totals that have a 'x' percent probability of occurring at the location in that year. For instance the 10-year storm statistically would occur once every 10 years or have a 10% chance of occurring in any one year.

90 Percent Storm: (or 90th Percentile Rainfall Depth) represents the depth of rainfall which is not exceeded in 90 percent of all runoff producing rainfall storm events within the time period analyzed. In other words 90 percent of the storms that produce runoff will be less than or equal to this depth.

Curve Number (CN): A runoff coefficient used to predict direct runoff or infiltration from rainfall excess. The number is based on combining land use and one of four hydrologic soil types on a parcel of land. The *CN* has a range of 30-100; lower numbers indicate low runoff and more permeable soils, while higher numbers indicate increasing runoff potential and less permeable soils.

Detention Basin: Is a flood control stormwater management facility designed to hold runoff for a period of time and to eventually empty after rainwater runoff ends. It is built primarily to control water quantity and not necessarily water quality.

Environmental Protection Agency (EPA): An agency of the federal government whose mission is to protect human health and the environment. When congress writes an environmental law, the EPA implements it by writing regulations. Often they set national standards that states and tribes enforce through their own regulations.

Erosion Sediment Control: The capture or control of particles suspended in runoff from construction site activity which is otherwise carried into streets, storm sewer inlets, then through drainage ways into area waterways reducing the beneficial uses of water. *Erosion and Sediment Control* is required by City ordinances.

Extended Dry Detention Basin: A detention basin designed to temporarily capture the water quality volume of runoff from a storm and detain it for forty hours.

Extended Wet Detention Basin: A detention facility constructed with a permanent pool of water and additional storage space above the permanent pool, which fills during a storm event. It is designed to detain the water quality volume for forty hours. Pollutants are removed from stormwater through settling and biologic processes.

First Flush: The initial runoff during a storm or snowmelt event which carries more pollutants with it than runoff that occurs later in the storm. The *first flush* can be thought of as the first cleansing of the ground. Examples of contaminants include excess fertilizers, oil, soaps and pet waste.

Illicit Discharge: Any discharge to a Municipal Separate Sewer System (MS4) that is not entirely comprised of stormwater. *Illicit discharges* often include pathogens, nutrients, surfactants, and various toxic pollutants. The exceptions include water from fire fighting activities and discharges from facilities already under an NPDES permit.

Native Soil and Vegetation Preservation: The practice of preserving land areas containing soil profiles and vegetation that have adapted to the climate, hydrology, and ecology of the area to minimize the impacts of development.

Nebraska Department of Environmental Quality (NDEQ): Is a regulatory agency of the EPA whose goal is to protect Nebraska's air, land and water resources. They are also responsible for coordinating with local, state

and federal agencies such as: the U.S. EPA ; the U.S. Department of Defense and the Army Corps of Engineers to implement federally-delegated environmental programs.

Pervious Pavement: A type of pavement that allows water and air to infiltrate the surface layer into the underlying soil or sub-base layer. The captured water is stored in the sub-base layer until it either infiltrates the underlying soil or is routed through an underdrain system.

Retention (Wet) Ponds: Is a stormwater control structure designed with a permanent pool of water which allows suspended sediment particles and associated pollutants to settle out. Often retention ponds are designed to detain as well.

Riparian Corridor: Refers to the strips of herbaceous and woody vegetation that are parallel to streams and adjacent to open waterbodies such as, rivers, streams, wetlands, or lakes. Riparian Buffers capture sediment and other pollutants in surface runoff water before they enter the adjoining waterbody.

Smart Growth: Refers to coordinated urban planning to support economic, community and environmental goals. It is the big-picture way to manage the overall footprint of impervious surfaces at the neighborhood, watershed and community scales. It aims to prevent development in important rural and natural resources areas.

Swale: Is a sloped depression or ditch which conveys and infiltrates stormwater.

Bioswale: An open vegetated swale with an engineered soil mix and underdrain system designed to treat a specific water quality volume.

Native Vegetation Swale: Native grasses and forbes planted in a swale to reduce velocity of runoff and promote infiltration.

Wetland Swale: An open vegetated channel without underdrains or soil matrix designed to filter runoff and remain wet between rain events.

Watershed: All the land area that drains to a given point.

Water Quality: The chemical, physical, and biological characteristics of water. This term also refers to regulatory concerns about water's suitability for swimming, fishing, drinking, agriculture, industrial activity, and healthy aquatic ecosystems.

Water Quality Modeling: Is a tool, using mathematical techniques, to simulate and predict the position and movement of pollutants in a watershed.

Water Quality Control Volume (WQCV): The volume of stormwater that BMP's are designed to capture and treat in order to improve water quality in the stormwater runoff. The volume of water is retained and infiltrated or slowly released to remove pollutants and reduce erosion. It's generally described by either a specified runoff amount or rainfall volume.

Water Quality Criteria: Section 304(a)(1) of the Clean Water Act requires the EPA to develop criteria for water quality that accurately reflects the latest scientific knowledge. The criteria are developed for the protection of aquatic life and for human health.

COMMON STORMWATER DEFINITIONS #3

Engineered Soil: A mixture of sand, soils and organic materials that improves the infiltration and enhances the growing conditions for plants as well as to help with removal of runoff pollutants.

Eutrophication: The process by which a body of water acquires a high concentration of nutrients, especially phosphates and nitrates. These typically promote excessive growth of algae. As the algae die and decompose, high levels of organic matter and the decomposing organisms deplete the water of available oxygen, causing the death of other organisms, such as fish. Eutrophication is a natural, slow-aging process for a water body, but human activity typically speeds up the process.

Good Housekeeping: Common sense measures that help businesses and agencies manage site activities and operations to control pollution. They are employed to prevent materials and wastes from being exposed to stormwater, thereby preventing stormwater runoff pollution. It is a proactive approach to stormwater management and seeks to prevent problems before they occur.

Gray Infrastructure: Transportation, roads, bike trails, water, wastewater, stormdrains, electric, telecommunication and other essential community support systems.

Pollutant(s): A substance, that renders the air, soil, water, or other natural resource harmful or unsuitable for aquatic, riparian and human habitats.

Debris: A collection of loose material derived from rocks, or an accumulation of animal or vegetable matter.

E.coli (Escherichia coli): Bacteria that normally live the intestines of healthy people and animals. Most strains are harmless, but a few are nasty strains that produce powerful toxins that cause skin ailments or illness in humans. The presence of E. coli in water is a strong indication of sanitary sewage contamination or animal waste. Sources include but are not limited to pets and wildlife.

Heavy Metals: Metallic elements are harmful to living organisms in low concentrations and are therefore considered pollutants. Examples are mercury, cadmium, arsenic, and lead. Some metals such as copper, selenium and zinc are essential to maintain the metabolism of the human body however in higher concentrations they bioaccumulate and lead to poisoning. Metals can enter a water system from industries, consumer waste, vehicles and in some cases from natural sources.

High pH: Is an important limiting chemical factor for aquatic life. If the water in a stream is too acidic or basic, an imbalance may result and harm or kill stream organisms. It is expressed in a range of 0 to 14. Neutral water has a pH of 7. Values less than 7 are considered acidic, with 0 being the most acidic. Generally, streams pH balance is between 6 and 9. A change of 1 unit on a pH scale represents a 10 fold change in the pH, such that a pH of 6 is ten times more acidic than water with a pH of 7, and water with a pH of 5 is hundred times more acidic than water with a pH of 7.

Hydrocarbons: Are a common and naturally occurring organic compound of which the majority is found in oils and grease. In stormwater they can be found as free floating, emulsified (like an oil and vinegar mixture), or adsorbed to suspended solids. They are not soluble in water and can affect respiration of aquatic life, algae and plankton, feeding and reproduction of aquatic life, and aesthetics by sheens. Sources are typically vehicle byproducts related to use and maintenance.

Litter: Small refuse or waste materials carelessly dropped, especially in public places. Or a layer of partly decomposed leaves, twigs, etc, on the ground in a wood or forest.

Nutrients: The primary nutrients are phosphorus and nitrogen. Excess levels of nutrients in our lakes and streams cause the degradation of these water bodies by stimulating the growth of plants and algae (including toxic algae), which reduces the amount of dissolved oxygen available for entire aquatic ecosystems. Sources include fertilizer, manure, organic wastes in sewage, industrial effluent, vehicle exhaust and eroded soils.

Temperature: Aquatic animals are sensitive to changes in water temperature and require a certain temperature range to survive and thrive. Cold water holds more oxygen than warm water.

Total Suspended Solids (TSS): Is a water quality measurement that looks at the sediment suspended in stormwater. High concentrations of suspended solids can cause many problems for stream health and aquatic life. For example, high TSS blocks light from reaching bottom dwelling plants which produce oxygen for aquatic life. Also, suspended solids increase water temperature and can clog fish gills.

Trash: Anything of little use or value.

Prevention Practices: Is a preventative maintenance program that can improve water quality by controlling pollutant discharges to surface water that would result from spills and leaks. Moreover, preventive maintenance programs can also save money by reducing the likelihood of having a system breakdown and the costly cleanup projects. It is similar to Good Housekeeping.

Turbidity: Is the measure of the relative clarity of water. Turbid water is caused by suspended and colloidal matter such as clay, silt, organic and inorganic matter, and microscopic organisms. Turbid water may be the result of soil erosion, urban runoff, algal blooms, and bottom sediment disturbances.

Vegetated buffer: Also called a filter strip is an area along a shoreline, wetland, or stream where sheet flow runoff flows through dense vegetation. The primary function is to reduce runoff volumes, slow down the runoff, filter out suspended sediment and enhance infiltration.

H. Technical Memos

The following Technical Memorandums were developed to assist the Task Force in understanding some of the more technical concepts that relate to stormwater quantity, stormwater quality, cost and program implementation. Also attached are some questions and answers including:

Clean Water Program Frequently Asked Questions

March 20, 2012 Discussion Questions

Questions and Concerns from the April 17, 2012 Meeting

Precipitation in Lincoln, NE

Daily precipitation data of the Lincoln Municipal Airport weather station was obtained through the High Plains Regional Climate Center (HPRCC) for the purpose of conducting this rainfall analysis. The records are also kept by the National Weather Service through the National Climatic Data Center. The Lincoln Airport station (COOP 254795) is part of the National Weather Service (NWS) Cooperative Station Network. NWS Cooperative Summary of the Day, DS3200 was used as it contains 24-hour precipitation totals consistently back to September of 1972. For this analysis daily precipitation totals from 1973 to 2011 were used to develop a precipitation frequency relationship.

Rainfall Analysis

A rainfall frequency analysis was conducted using procedures from the EPA (*Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act, 2009*). The 24-hour daily precipitation totals represent precipitation events. These precipitation events were then summarized to only include those that produce runoff. First, rainfall events of 0.1 inches or less were excluded since these small events generally do not produce any measurable runoff. Similarly, days that had recorded snowfall were eliminated from the analysis as snowfall does not produce immediate runoff. The figure below shows the results of the analysis. The graph describes the relationship between the rainfall depth and corresponding percentage of rainfall events that don't exceed it for the time period. The

90th percentile rainfall depth was derived from these results.

90th Percentile Rainfall Depth

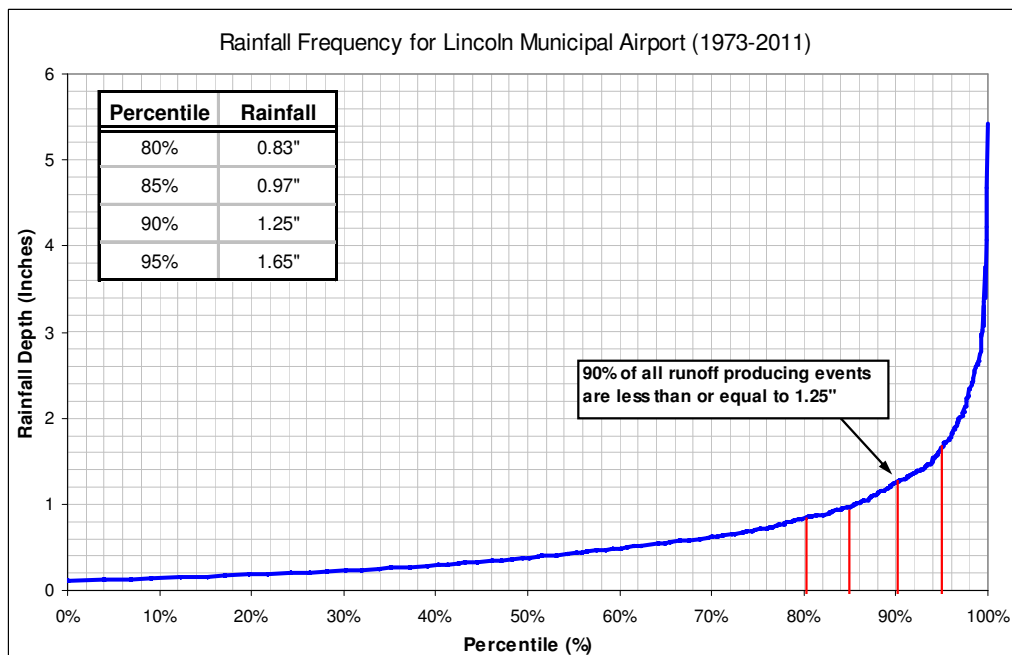
The 90th percentile rainfall depth represents the depth of rainfall which is not exceeded in 90 percent of all runoff producing rainfall events within the time period analyzed. In other words 90 percent of the rainfall storm events that produce runoff will be less than or equal to this depth. It was found for Lincoln the 90th percentile rainfall depth is 1.25 inches, similarly the 95 percent rainfall depth is 1.65 inches. The rainfall depth corresponds directly to rainfall volume (not the same as runoff volume) when applied over an area. For example the 90% rainfall depth applied over 100 Acres equates to 10.4 Acre-Feet.

Summary

One possibility is that a volume based storm event equal to the 90th percent rainfall depth of 1.25 inches be used as the Water Quality Control Volume (WQCV) threshold to capture and treat water quality in stormwater runoff. This approach is simple to understand and easily implemented. It ensures the majority of runoff volume from 90 percent of the storms consists of cleaner water for the site and downstream resources in the short and long term. The 90 percent depth is commonly recognized to maximize the cost of control and water quality benefits, as graphically portrayed by the upward inflection of the curve. The rainfall based criteria also incentivizes limiting impervious areas and promotes green infrastructure.

Other References

- EPA's Section 438 Technical Guidance (2009) recommends control of the 95th percentile storm.
- The Stevens Creek Watershed Masterplan (2005) calculated the 90 percent rainfall depth to be 1.3 inches and subsequently recommended its use for calculating the Water Quality Control Volume for structural BMP's.



Post Construction Standards

Post construction standards (i.e. water quality standards) will be required for the City of Lincoln. Typical standards from other cities require that a specified volume of stormwater (either rainfall or runoff amounts) or pollutant(s) which runs off of new development and redevelopment projects be treated prior to leaving the development site. A list of Midwest cities comparable to the size of Lincoln are shown on the back along with some basic information on their post construction standards.

Typical Post Construction Ordinance

Any proposed ordinance for Lincoln would be placed in a new section of Title 28 – Stormwater Quality and Erosion and Sediment Control. The ordinances would be backed up by information and standards in the Design Standards as well as the Drainage Criteria Manual that provide engineering details for processes and best management practices. A post construction ordinance would probably include the following elements as a minimum:

- Procedures
- Design Criteria
- Inspection and Maintenance
- Enforcement

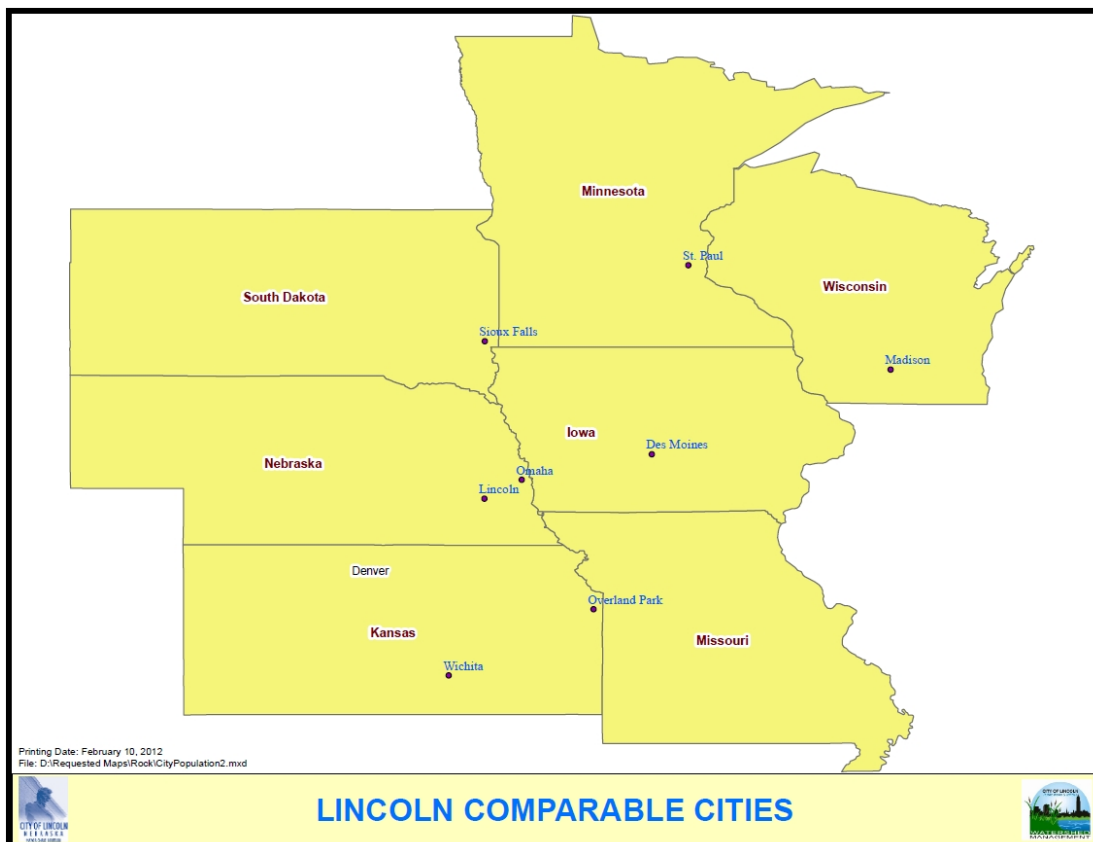
Critical Issues for Consideration

The following issues are elements in a post construction standard that need to be considered:

- Water Quality standards applicable to what type and size of development, e.g.
 - New developments
 - Redevelopments
- Applicable at what date/Exceptions
- Water quality criteria, e.g.
 - Amount of runoff captured
 - % of rainfall events captured
 - % of pollutants captured
- Maintenance agreements/Sureties
- Enforcement

Other Cities

Other Midwest cities similar to Lincoln include; Omaha NE, Wichita KS, Des Moines IA, Overland Park KS, Madison WI, St. Paul MN and Sioux Falls SD. These are cities in the Midwest that are Lincoln comparables for salary and position descriptions. Generally they vary between a population of between half and double of Lincoln.



Ordinance Comparison, February 2012

Ordinance Element	Omaha	Wichita, KS	Des Moines, IA	Overland Park, KS	Madison, WI	Sioux Falls, SD	St. Paul, MN
Ordinance reference:	Article V, Post Construction Stormwater Management Plan	Section 16.32.091 - Stormwater quality management standards	Section 106-136 - Stormwater runoff control	Chapter 16.210 Stormwater Treatment	Chapter 37.09 Stormwater Management Report Requirements	Chapter 12.16.130 Stormwater Management	Title VI Chapter 52.04 (f)
Type/size of Developments:	- new developments and added areas for significant redevelopment projects	- new developments and redevelopments greater than one acre	- new developments greater than one acre	- new developments and significant redevelopments greater than one acre	- new developments and redevelopments greater than 20,000 square feet	- construction activity with greater than 5,000 square feet of impervious surface	- applies to sites larger than a quarter acre going through a city site plan review process
Common Plan of Development:	- single lot residential developments that are a common plan of development	- projects less than one acre that are a common plan of development	- projects less than one acre that are a common plan of development	- single lot residential developments that are a common plan of development	- single lot residential developments that are a common plan of development	- single lot residential developments that are a common plan of development	
Date of Ordinance:	June 13, 2006	November 16, 2010	October 17, 2007	March 1, 2008	March 22, 2007	October 15, 2002	April 7, 2004
Criteria:	- first half inch of runoff	- reduction of 85% total suspended solids from a 1.2" rainfall event (85% event)	- 1.25" rain event or less being released at a rate that provides a 24 hour detention time	- BMP selection based on level of service, which is based on the increase in impervious area	- reduction of 80% total suspended solids based on annual rainfall (requires use of continuous model), 40% for redevelopments	- 0.69" rain event or less (80% event)	- first half inch of runoff from new impervious areas
Other Criteria:	- maintain 2 year peak discharge event				- maintain 1 and 2 year peak discharge events		
Exceptions:	- preliminary plats approved prior to July 1, 2008	- construction plans approved prior to January 1, 2011	- includes a waiver section	- previously approved plans that had final approval prior to June 1, 2009	- previously approved plans prior to the date of the ordinance	- includes a waiver section	
Other Exceptions:		- redevelopment projects consisting of minor revisions		- utility and street construction	- agricultural activities, state buildings, state highways		
Inspections:	- annual inspection required by owner	- inspections required, with inspection report due every 2 years		- post construction certification required and inspection report due every 2 years	- inspection report required annually	- inspection report required annually	
Maintenance Agreement:	- maintenance agreement to be recorded		- maintenance agreement to be recorded	- maintenance agreement to be recorded	- maintenance agreement to be recorded	- maintenance agreement to be recorded	- maintenance agreement to be recorded
Enforcement:	- city has ability to do work and assess the cost of the work	- city has ability to do work and assess the cost of the work			- city has ability to do work and assess the cost of the work	- city has ability to do work and assess the cost of the work	- city has ability to do work and assess the cost of the work
Performance Bonds:			- performance bonds required (surety)	- performance surety required in the amount of 1.25 times the total construction cost	- surety, performance, maintenance bond or irrevocable letter of credit required	- performance surety required in the amount of 1.25 times the total construction cost	- surety, performance, maintenance bond or irrevocable letter of credit required
Penalties:	- maximum penalty of \$500	- maximum penalty of \$2,500			- maximum penalty of \$1,000		
Misc:		- in-lieu of fees OK if approved by Director			- criteria for oil and grease control for first half inch of runoff for commercial and industrial sites		

Web reference: [ci.omaha.ne.us, muni codes, Chapter 32, Article V](http://ci.omaha.ne.us/muni_codes/Chapter_32_Article_V) [wichita.gov/cityofices/law - muni code, Title 16.32](http://wichita.gov/cityofices/law-muni_code/Title_16.32) library.municode.com/HTML/13242/level1/MUCO.html, Chapter 106, Section 136 [opkansas.org/overland-park-municipal-code, Title 16.210](http://opkansas.org/overland-park-municipal-code/Title_16.210) library.municode.com/index.aspx?clientID=50000 sioux-city.org/attachments/article/552/Storm%20Water%20Management%20Ordinance%2012.16.pdf library.municode.com/index.aspx?clientID=10061&stateID=23&statename=Minnesota

Post-Construction Runoff Volume

Post construction standards are planned to be recommended for the City of Lincoln. Typical standards from other cities require that a specified volume of stormwater based on rainfall, runoff or pollutant be treated for new development and redevelopment projects prior to leaving the development site. Following are some typical runoff depth volumes that would need to be treated if a Lincoln approved ordinance was based on a specified percentile of rainfall events. The examples below use the 90% rainfall percentile which is a rainfall amount of 1.25 inches. Depth of runoff or Water Quality Control Volume (WQCV) is based on the rainfall amount and the amount of impervious area, which is dependent upon the type of development.

Type/Size Development	Impervious Area	Depth of Runoff	Volume of Runoff
10 acre Residential	30%	0.4 inches	0.3 acre feet
10 acre Mixed Use	55%	0.7 inches	0.6 acre feet
10 acre Commercial	80%	1.0 inch	0.8 acre feet

Volume Comparisons

An acre is equivalent to 43,560 square feet and an acre-foot (ac ft) is equivalent to 43,560 cubic feet. As a comparison a football field (i.e. 300 feet x 160 feet without the end zones) is about 1.1 acres and a city block of 330 feet x 660 feet is about 5 acres.

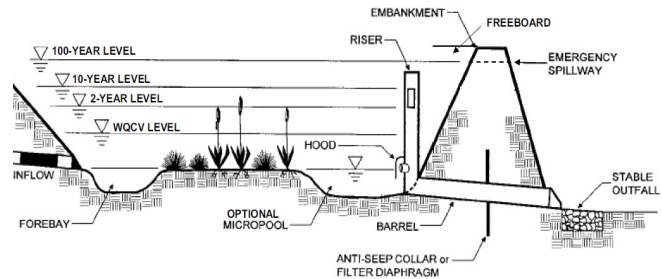
The Water Quality Control Volume from the 10 acre residential example above would cover a football field about 4 inches deep and a city block by about 1 inch deep. The Water Quality Control Volume from the 10 acre commercial example above would cover a football field about 9 inches deep and a city block by about 2 inches deep.

If a storage facility were to be used for the Water Quality Control Volume, it would need to be sized to store that volume of water with a release period of around 40 hours. (Note: The Water Quantity Volume is stored over a significantly less time, as the goal is to reduce peak flows not volume). Assuming a four foot deep storage pond with 4:1 side slopes, the 10 acre residential example would take up about 0.13 acres (about half the size of a single lot). The 10 acre commercial development example would take up about 0.28 acres (about a residential lot size).

Water Quality vs. Water Quantity

The figure at the top right shows the relationship between water quality and water quantity. A rough estimation of the amount of volume needed for Water Quantity can be

estimated by adding the difference in the volumes between the 2 year pre- and post-development rain fall events and

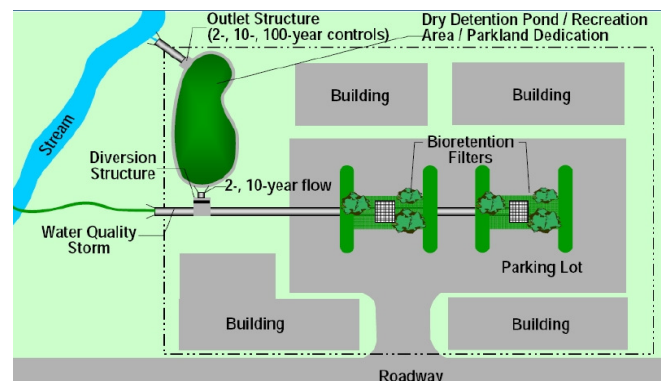


the 100 year pre- and post-development rainfall events for a site. The table below provides an indication of estimated volumes needed for storage of both water quality and quantity for two example sites.

Site	Water Quality Volume	Water Quantity Volume
10 Acre Residential	0.3 acre feet	0.3 acre feet
10 Acre Commercial	0.8 acre feet	1.6 acre feet

Design Approach for the WQCV

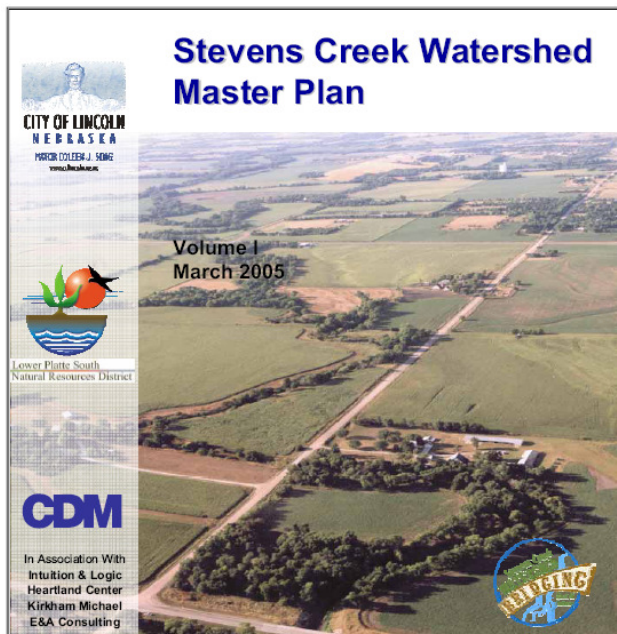
Using a storage pond to control the Water Quality Control Volume provides a way to combine the water quantity detention requirements (2, 10 and 100 year events) and the water quality event (e.g. 90% event) into a single integrated facility. An alternative approach is to treat the Water Quality Control Volume separately through the use of Best Management Practices such as rain gardens, bio-swales, porous pavement, amended soils, etc. An example of such an approach is shown below for a commercial lot. If an Alternate Best Management Practice concept is incorporated into a development upfront, the overall costs of the development can be lower than a more conventional development due to reduced costs in storm drainage infrastructure and grading. Following past examples of lot sales in Lincoln and around the nation, many lots next to outlots and natural areas sell faster and for more than other lots.



Water Quality Control Volume Costs

Costs for incorporating water quality standards vary and are highly dependent upon the site and design. Costs found in literature vary between a cost savings of thousands of dollars a lot (Chicago 700 acre development) to added costs of \$750/lot (Omaha 2008 estimate). In general, developments that look at Best Management Practices (BMPs) holistically from the start of planning and design can save or break even on their use. Conversely developments that add storm water Best Management Practices after the development has been planned and designed spend extra dollars.

There are two examples of costs related specifically to Lincoln. One is the Stevens Creek Master Plan which was completed in 2005. The Plan estimated an additional cost for incorporating water quality standards at \$210/acre (approximately \$50/lot). Another is a report done by Olsson Associates in 2009 that indicated the costs to integrate water quality standards would be similar to those in the Stevens Creek Master Plan if no additional grading or land area were needed. Including both grading and land area, the total additional costs for integrating water quality standards would range between \$170 to \$570 an acre. As an example, assuming a present day cost of \$450/acre (around \$100/lot) an example 10 acre residential site would have an added cost of \$4,500.



As stated in the 'Volume and Land Use Comparisons' Technical Memorandum, incorporating the use of Best Management Practices into the initial concept of a development can actually lead to overall reduced costs in the

development due to less storm drainage structures and less grading. There are also other tangible benefits including lots adjacent to outlots and natural areas selling faster and for higher prices than other lots.

Cost Appropriation

The cost for offsetting the impacts of urban development to water quality and stream stability has typically been the burden of the developer, similar to widely accepted practices for offsetting flooding impacts caused by developments. Many other Midwest communities have faced similar challenges. A review of other community ordinances has shown that the burden for these impacts has been with the development for water quality also.

The cost appropriation was discussed during the Stevens Creek Watershed Master Planning process and this issue was one of the key concerns expressed by the Citizen Advisory Committee and by businesses during stakeholder sessions. As there is both a private responsibility to offset impacts from developments as well as public issues involved with improving water quality and reducing stream bank erosion downstream from the development, there is a potential for continuing the current cost share program currently in place for volunteer Best Management Practice projects. The current program is on a case by case basis with the City of Lincoln and under a more standardized program with the Lower Platte South Natural Resources District.

A potential city cost share program would need to be standardized with priority likely being given to Best Management Practices that holistically incorporate water quality standards and/or are above the requirements set by any water quality standards. Such a cost share program would be subject to yearly budget approvals and voter approval of General Revenue Bonds,

Case Studies

<http://www.bmpdatabase.org> {International Stormwater BMP Database, includes BMP studies}

http://water.epa.gov/infrastructure/greeninfrastructure/gi_c ostbenefits.cfm {compendium of various case studies comparing conventional and BMP developments}

<http://www.stormwaterpa.org/case-studies-all.html> {includes videos so takes a while to load}

What is Water Quality?

Water Quality refers to the chemical, physical, and biological condition of water. Often it is used to describe the suitability of water for swimming, fishing, drinking, agriculture, etc. It has a range of meanings depending on the intended use of the water. For example, the water quality in irrigation might be good for farming but may not be suitable for swimming and maybe dangerous to drink.

History of Water Quality Standards

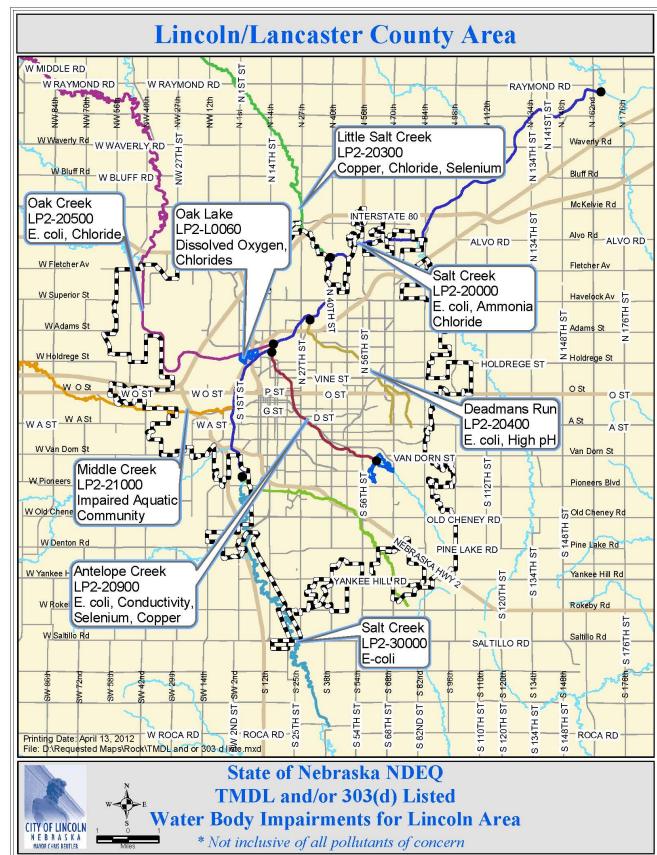
As far back as 1850 there has been a national interest in flood control. However, it wasn't until the 1970's that the United States started evaluating and understanding the impacts of poor water quality. The Nationwide Urban Runoff Program (NURP), for example, which ran from 1973-1983 was one of the first major evaluations of pollution and water quality in urban watersheds. The Federal Water Pollution Control Act of 1956 and the Water Quality Act of 1965 were early efforts in the U.S. to establish water quality standards. As States began to establish standards and face complexities of enforcement, congress passed the Clean Water Act of 1972 to promote a more effective program. The focus of the programs is to restore and maintain the health of U.S. waters for both aquatic life and human recreation by eliminating or reducing discharge of pollutants. In order to implement the requirements of the Clean Water Act, the Environmental Protection Agency (EPA), a federal regulatory agency, developed Water Quality Standards. These Federal Water Quality Standards regulations can be found in 40 CFR Part 131 and are the foundation behind the water quality-based approach to mandate control of the urban stormwater pollution.

EPA's List of Impaired Water Bodies

As part of the Clean Water Act - Section 303, the EPA and subsequently the Nebraska Department of Environmental Quality (NDEQ) is charged with reporting on the quality of water in its jurisdiction. The reports, known as 303(d) reports, are developed by the NDEQ and are submitted to EPA for approval biannually. The NDEQ summarizes the water quality information for the streams, rivers and lakes within the State. For each water body, the water is sampled and compared against corresponding water quality standards based on the intended use. The Clean Water Act requires that a stream, river, or lake be placed on the 303(d) impaired waters list if it

Total Maximum Daily Load (TMDL) is the calculated maximum amount of a pollutant that a water body segment can receive and still safely meet water quality standards. In Nebraska, NDEQ calculates TMDL's for impaired water body segments.

fails to meet the water quality criteria. Furthermore, the law requires that the EPA develop a Total Maximum Daily Load (TMDL) for these impaired waters. A TMDL Management Plan must then be developed



with a strategy to reduce the pollutants in the water body below the TMDL limit. In Lincoln, most of the major urbanized streams and channels have been declared impaired, meaning the water does not meet the thresholds established for their intended use (e.g., recreation or aquatic life).

Antelope Creek - Basin Management Plan

Antelope Creek from Holmes Lake to its confluence at Salt Creek, near Bob Devaney Sports Center, is one of the 303(d) impaired waters listed in Lincoln mainly due to the high levels of *Escherichia coli* (*E. coli*) measured in the creek. In 2007, NDEQ calculated the TMDL of *E. coli* and set a reduction goal as 113 colony forming units per 100 milliliters (cfu/100mL). As a result, in 2010 the City of Lincoln and Lower Platte South NRD hired EA Engineering, Science, and Technology, Inc. to develop the *Antelope Creek Watershed Basin Management Plan*. The purpose of the Basin Plan was to identify sources of the pollutants, provide alternatives to reduce pollutant loads, and to develop a strategy to remove the Antelope Creek waterway from the list of Impaired Waters. The sampling and research completed for the Plan in 2010-2011 indicated the concentration of *E. coli* at the confluence with Salt Creek was 1,511 cfu/100mL, therefore a 93% reduction in the *E. coli* pollutant load is needed to meet the level set by NDEQ.

Summary findings of the Plan include:

1. E. coli bacteria are likely from a diffuse source such as urban wildlife and pets
2. There are no indications of a point source polluting Antelope Creek (e.g., illicit connections from sanitary sewers)
3. Achieving the TMDL standard for E. coli will be difficult, costly, and require a long term systematic approach
4. The most effective pollution control strategies for diffuse sources of E. coli and other pollutants are structural BMPs that achieve stormwater runoff volume reduction or infiltration and source controls (e.g. reducing pet waste)
5. The levels of pollutants found in Antelope Creek are typical of other urban streams found throughout the United States

The Plan formulated a range of recommendations with strong emphasis on the expansion of existing programs and activities, and creation of new activities including development of post-construction standards. Altogether, the estimated total implementation cost for the activities recommended to remove the water body from the 303(d) list exceeded \$50 million for the Antelope Creek watershed given the fact that it's fully urbanized and there were no previous post-construction standards.

Pollutants and Pollution Sources

The sources of pollution can be 'point' sources such as an industrial plant discharging into a creek, or 'non-point' sources such as pet waste, fertilizers, pesticides, etc. Pollution sources often contain, carry, or create, a variety of specific pollutants. As sources contribute pollutants to the streams and lakes, water bodies can become impaired.

The primary pollutants of concern for Lincoln are Total Suspended Solids (TSS), E. Coli (as previously mentioned), and nutrients such as phosphorous (typically from fertilizers). Other pollutants and causes for impairments include heavy metals, pesticides, oil, high pH, and temperature. The table below shows typical pollution sources and associated pollutants found in Lincoln urban water bodies.

Summary

A long term systematic and proactive approach is needed to reduce pollutant levels to local streams and lakes. In addition to reducing pollutant levels, implementing practices that will allow the City to meet water quality standards will have many other benefits. Benefits include:

- Reduced streambank erosion
- Reduced stormwater volume
- Reduced localized flooding
- Increased base flows
- Increased biodiversity in streams and lakes
- Improved public amenities
- Lower long term maintenance costs
- Increase in aquatic riparian habitats

As there is not enough known water quality data in Lincoln, especially on the non-point sources, the best available technology for reducing pollutants is structural Best Management Practices (BMPs) such as bioswales, pervious pavement, green roofs, etc. BMPs reduce storm water volume and promote infiltration for the majority of rainfall events. They have also been shown to be effective in reducing all pollutant levels, especially sediment, which is a carrier of other pollutants. In conjunction with these structural controls, it is also important to continue to implement new controls through education and ordinances.

Pollution Source	Source Explanation	Pollutants						
		Solids (Sediment, TSS)	Nutrients (P, N, Se)	Pathogens (E. coli, bacteria)	Oxygen Demand (BOD, COD)	Metals (Cu, Pb, Zn, Se, As, Hg)	Oils	Synthetic Organics (PCBs)
Wildlife and Pet Waste	Pet waste (typically from dogs & cats) may contribute significantly if waste is not properly disposed. Bird droppings into the streams and creeks often occur at bridges and other structures where birds nest and perch. Also, wildlife (such as raccoons, squirrels, etc.) live in most watersheds and their droppings contribute as a source.	X	X	X	X			
Fertilizers	Improper storage and disposal of fertilizers, over application, or incidental application to impervious surfaces (e.g. driveway & sidewalks), can lead to excess nutrients in stormwater runoff. Excess nutrients often contribute to algal blooms.		X	X	X			
Soil Erosion and Construction Site Runoff	Sediment entering a stream through natural processes, erosion, or from construction sites can decrease the biological function of the water and be detrimental to aquatic habitat. In addition, sediment can 'pick up' nutrients such as nitrogen and phosphorus, and carry them downstream in the waterbody. This can create an incubation zone for bacteria growth.	X	X		X	X		
Pesticides	Pesticides are common in the rural and urban settings used to prevent, destroy, control, or repel pests (such as insects, weeds, microbes, etc). Subclasses of pesticides include insecticides, fungicides, herbicides, etc.				X	X	X	X
Vehicle fluids	Pollutants from vehicles include oil, metals, grease and fuel. Streets and parking lots typically drain directly to urban storm drainage systems.	X		X	X	X	X	
Household Chemicals and Industrial Processes	Industrial processes can knowingly or unintentionally contribute point source pollution to waterbodies. Household chemicals, including paint and preservatives can also contribute to the degradation of water quality. In some cases heavy metals or other pollutants can come from unknown sources such as contaminated soil.	X	X		X	X	X	X

Adapted from: E. Shaver, R Horner, J. Skupien, C. May, G. Ridley. 2007. *Fundamentals of Urban Runoff Management: Technical and Institutional Issues*, 2nd Edition, Madison, WI: NALMS and EPA.)

Frequently Asked Questions

Clean Water Program

1. Q: Why does Lincoln have water quality programs?

A: The City of Lincoln has developed a Stormwater Management Program to comply with State and Federal regulations regarding water quality. The Stormwater Management Program contains activities to help reduce the amount of pollution in the stormwater that runs off into Lincoln's lakes and streams. An objective is fishable swimmable area waters.

2. Q: How do pollutants get into stormwater runoff?

A: Stormwater originates from rainfall. Whatever doesn't soak into the ground runs off into local streams and lakes. Stormwater starts off relatively free of pollutants, but as it flows over the landscape it picks up pollutants from roads, parking lots and lawns and carries these pollutants into the streams and lakes.

3. Q: Where does the water that flows into storm drain inlets go?

A: Stormwater is conveyed through a storm drain system, but unlike the sanitary sewer system, it does **NOT** go to a treatment plant. Stormwater discharges directly to our streams without any treatment. Pollutants picked up by stormwater are a detriment to aquatic and riparian habitat because of the sediment and nutrients which are carried into the streams and lakes fostering excessive algae blooms and causing water quality problems.

4. Q: What types of pollution are found in stormwater?

A: Some of the most common contaminants that are found in stormwater are:

- **Sediment** from eroded soil and construction sites
- **Excess nutrients** from lawn fertilizers
- **Excess organic matter** from leaves and grass clippings
- **Bacteria** and disease causing organisms from animal waste (pets, wildlife, sewage)
- **Debris /Trash** such as plastic bags, cans, bottles, and cigarette butts
- **Household chemicals** like pesticides, paint, solvents, motor oil, and other auto fluids
- **Metal particles** deposited on roadways from automobiles

5. Q: Where do most pollutants come from?

A: Numerous studies have documented that stormwater runoff from urbanized areas in general contributes significant amounts of pollution to lakes and streams. The increase in impervious surfaces when areas are developed, such as rooftops, roads, and parking lots, increase urban runoff. The increased runoff combined with increased traffic and fertilizer and chemical use can increase concentrations of sediment, nutrients, pesticides, road salts, heavy metals, pathogenic bacteria, and petroleum hydrocarbons which are harmful to streams and lakes.

6. Q: What is the best way to deal with pollutants from these areas?

A: The best way to reduce the negative effects of stormwater from urban areas is to use water quality measures to treat, store, and infiltrate runoff onsite, before it can affect downstream streams and lakes.

7. Q: What's a BMP or Best Management Practice?

A: A BMP is a best management practice or water quality measure that reduces pollution in stormwater runoff. A **Construction BMP** is one that is put in place for use during construction while a **Post-Construction BMP** is one that is for use on a permanent basis to control runoff once construction is complete.

8. Q: What are some examples of Post-Construction BMPs?

A: Innovative site designs that reduce impervious area of sidewalks, driveways, parking lots and rooftops to allow more stormwater to soak into the ground before it can run off and affect downstream water bodies is one example. Other examples would be Bioretention/rain gardens, infiltration basins, vegetated bioswales, water quality wetlands, pervious pavers/concrete, etc.

9. Q: What is green space?

A: Generally waterways that have existing trees or native grasses and other natural landscape which help to slow down stormwater and allow it to soak in before it reaches streams and lakes.

Clean Water Task Force – March 20, 2012

Discussion Questions

Listed below are issues commonly addressed by stormwater quality ordinances. The discussion goal for today is to review the issues below to 1) determine whether there are issues you believe should be added, and 2) learn what issues you think are most important to address. Another goal for today is not to make decisions on specifics (such as the exact amount of runoff to be captured, etc.), but rather to determine what types of issues should be covered in a proposed Lincoln ordinance.

You may discuss any of the issues in any order you choose, and may not get to everything. Please avoid getting into detailed discussions on any one issue, instead take a big picture approach.

Have someone in your group take notes to turn in to the facilitators. Choose items that were most important in your discussion to report back to the full group.

Issues:

1. Water quality standards applicable to:

- New developments over X square feet or X acre(s)
- Redevelopments over X square feet or X acre(s)
 - covers all areas in a redevelopment, or
 - cover only any new impervious/disturbed areas in a redevelopment

2. Exceptions:

- Not required for those having planning commission approval within X months after approval of recommended ordinances
- Single family homes

3. Water quality criteria:

- Based on:
 - percentile rainfall event
 - amount of runoff
 - pollutant reduction

4. Maintenance/Inspections:

- Owner education program
- Operations and maintenance plan with submittal
- Surety
 - based on percentile of construction (e.g. \$/acre – feet)
- Periodic inspection and report by owner every X years
- Inspection by City/NRD after completion and during establishment
- Periodic inspection after establishment by City/NRD every X years

5. Compliance (in order of preference):

- Contact owner and coordinate needed inspections/corrections
- Potential use of surety (during establishment period)
- Do needed work and assess owner
- Fines/Liens

Clean Water Task Force Questions/Concerns

Basis of Questions/Concerns

The April 17, 2012 Clean Water Task Force meeting resulted in several questions and concerns regarding the information presented on the draft recommendations for post construction standards. This memorandum provides some basic responses to these questions and concerns as well as website addresses for task force members to link to for obtaining more detailed information. The referenced Technical Memos and most of the other items can be found at the [Clean Water Task Force web page](#).

Questions/Concerns

1. What is the incremental cost difference for Water Quality Best Management Practices (BMPs) between different rainfall percentile events?

Response: The cost of BMPs can be correlated to the amount of rainfall needing to be treated. From Technical Memo No. 1 and also assuming (as an example) an average present cost per acre of \$450 (Technical Memo No. 4) for a 90% rainfall event:

Table 1: Cost and Amount of Rain (and Pollutants) treated as compared to the 90% rainfall event

<u>Rainfall Event, Percentile</u>	<u>Amount of Rain, Inches</u>	<u>Percent Difference</u>	<u>Cost Difference</u>
70%	0.62	- 50%	- \$225/ac
75%	0.70	- 44%	- \$198/ac
80%	0.83	- 34%	- \$153/ac
85%	0.97	- 22%	- \$99/ac
90%	1.25	0%	\$0/ac
95%	1.65	+ 32%	+ \$144/ac

For more information on costs go to [Case Studies: Cost-Benefits of BMPs](#) (under the Resources subsection of the Clean Water Task Force web page) and the [National Menu of Stormwater BMPs](#).

2. What is the pollutant reduction for the different rainfall events?

Response: Similar to costs the amount of typical pollutant reduction is related to the percentile of rainfall event captured and treated. An estimate of pollutants treated can be correlated in a similar manner as was done for costs (for example from Table 1 above, designing a BMP to treat a 85% storm event will be 22% less effective than designing a BMP to treat a 90% storm event). A good explanation on pollutants treated and volume of surface runoff resulting from rainfall can found by going to another item shown

under the Clean Water Program Resources subsection on the Clean Water Task Force page ([Three Keys to BMP Performance](#)).

3. How does runoff and costs relate to rainfall for different types of developments?

Response: From Technical Memo #3, the runoff from an example residential area for a 90% rainfall event (1.25 inches) is approximately 0.4 inches. From an example mixed use development, the runoff would be 0.7 inches and from an example commercial development, the runoff would be 1.0 inch. On a relative basis the cost to treat stormwater from the mixed use development would be 75% more than the cost of treating runoff from the residential area. On a relative basis the cost to treat stormwater from the commercial development would be 150% more than the cost of treating runoff from the residential area.

To look at this a different way (using the examples above) if the above developments were to be designed to treat 0.5 inches of runoff (instead of the 90% rainfall event) they would treat the following rainfall events:

Residential: 1.45 inches of rain (93% rainfall event)
Mixed Use: 1.05 inches of rain (87% rainfall event)
Commercial: 0.75 inches of rain (77% rainfall event)

4. What are the different type of inspections needed for different type of BMPs and what are their costs?

Response: Type of inspections would include:

- A post-construction inspection by the City to insure the BMP was constructed correctly
- Annual inspections by the City during the first few years to make sure BMP is being maintained during establishment
- Annual inspections by the owner(s) to check on BMP functionality
- Periodic inspections, after establishment, by the City (e.g. 5 year interval) to verify BMP is being maintained and is functioning properly

At the Clean Water Task Force website there is a link under the Resources subsection to the Olsson Associate's [BMP Cost Analysis Paper](#). This includes a typical maintenance check list for a detention pond with a water quality outlet. The paper also includes typical maintenance costs.

Another good source to look at for maintenance items is the [Greenspace Handbook](#). At this website click on the General Maintenance Information. Major items to look for during inspection of BMPs are:

- Standing water
- Trash

- Weed growth
- Sedimentation or blockage of outlets
- Need for mowing

Most BMPs once established should be able to be maintained by spring weeding, periodic pick up of trash and seasonal mowing. As an example the established BMPs at the Havelock public parking lot, the NRD rain garden, the porous pavement & rain garden at the public parking lot at 27th & 'F', and the bioswale at 27th & Randolph are all maintained in this manner.

5. Are there studies available regarding pollutants, first flush contaminants, pollutants from urbanization, etc?

Response: Yes, there are several available studies on the web for the above items. Would recommend those referenced in the response to Questions 1 and 2.

6. What is the difference between infill and redevelopment?

Response: Generally redevelopment is any new construction on a site that was previously developed, such as downtown areas, commercial corridors, brownfields, etc, while in-fill is more typically construction on vacant or underutilized property.

7. Why was an exception for single family lots brought forward by staff?

Response: Single family lots were added as an exception to make it clear that an individual lot, that is not part of an overall development, would not be required to meet post construction standards (i.e. an infill lot). However as correctly pointed out this may be a non-issue as the post construction standards as initially proposed are only for those areas of an acre or more. Note: Any development 'as a whole' would be required to meet post construction standards as approved, not each individual lot.

8. How does maintenance responsibility work, can it be transferred?

Response: As proposed maintenance would be the responsibility of the owner. Similar to detention ponds, developers can transfer maintenance responsibility to a home owners association or business group as approved by the City Law Department.

9. What is TSS?

Response: TSS is Total Suspended Solids. This is a water quality measurement that measures the amount of sediment suspended in stormwater. Also see the [Common Stormwater Definitions #3 Sheet](#).

10. Are there any criteria for waivers?

Response: Listed below are some potential criteria for waivers. These could be waivers for the Director to consider under the following circumstances:

- Temporary waiver for unplanned emergency work or repairs necessary to protect life or property
- Existing downstream or shared off-site stormwater quality facility (BMP) that is designed, constructed and maintained to provide a level of stormwater quality equal to or greater than an on-site BMP (allowed if there are no impaired streams as determined by EPA between the planned development and the downstream stormwater quality facility)
- Construction of an on-site BMP that provides the same level of stormwater quality without the proposed storage requirements (e.g. a hydrodynamic separator which has a relative small footprint provides treatment of stormwater)
- In lieu of fee for redevelopment sites if site constraints for redevelopment make installation of any BMPs impractical (e.g. for an existing site that has an existing building footprint over the entire site that is being replaced by another building with a 100% building footprint over the site)

I. Group Memories



Group Memory

Clean Water Program Task Force

Facilitated Meeting #1 January 17, 2012

Requirements for Municipal Post Construction Standards

11:30 am to 1:30 pm

At the Lower Platte South Natural Resources District Meeting Room

This is a draft Group Memory of a facilitated meeting held Tuesday, 1-17-2012, in Lincoln, Nebraska. Note that this is the first draft of the Group Memory and is based on notes taken at the meeting, flip chart pages, comments made, and information shared with the group by presenters as part of the following agenda. The intent of creating a collective group memory is to capture the essence of the information shared, comments made, and questions presented at the facilitated meeting and it is not meant as a transcript of the meeting. This draft is subject to correction by contacting The Mediation Center at info@themediationcenter.org by 2-21-2012.

Task Force Members present:	
Bud Dasenbrock	
Dave Potter	
Bob Caldwell	
Don Linscott	
Rick Onnen	
Brock Peters	
Tom Franti	
Carl Eskridge	
Tim Texel	
DaNay Kalkowski	
Milo Mumgaard	
Jim Wathen	
Jeff Emanuel	
Reba Schafer	
Dennis Scheer	
Pam Dingman	
Peter Katt	

Members of the Public present:	
Vicki Twerdochlib	

Support Staff and Resources present:
Ed Kouma, Ben Higgins, Roger Tiedeman, Devin Biesecker, Nicole Fleck-Tooze, JJ Yost, Paul Zillig, JB Dixon, John Chess, Jocelyn Golden, Mike Benker, Ellen Wright, Rock Krzycki, Jared Nelson, Blayne Renner, Wynn Hjermsstad, Glenn Johnson
Facilitators:
Lorrie Benson, Dave Hubbard

AGENDA

1. Welcome, Introductions & Overview 30 min
 - Introduction of Mayor Chris Beutler
 - Introductions of Task Force Members
 - Introductions of Staff and Support Resources
 - Discussion of ground rules and consensus process
2. Clean Water Program Presentations 30 min
 - Overview for Task Force
 - Informational PowerPoint Presentation
 - NDEQ/EPA Requirements
3. Exploration and discussion in small group 30 min
 - Break into small groups to discuss worksheet
 - Facilitated large group de-brief
4. Proposed Post Construction BMP Standards Presentation 15 min
 - What is needed (required)
 - Federal – Proposed design performance Standards
5. Next steps, action plan and time line 15 min

Reminder: this and other material is available at Lincoln.ne.gov, keyword 'clean water program'

Mayor Chris Beutler:

- Provided thanks for agreeing to serve on the Clean Water Program Task Force, which is important and critical for the City of Lincoln
- The Task Force is charged with proposing recommendations for guidelines, policies, procedures, ordinances, and regulations to address post-construction best management practices to reduce stormwater runoff and enhance water quality

Mutually Agreed Upon Ground Rules: (Aspirations and Enforced as Appropriate)

- Keep in mind the Overall Goal of Clean Water Task Force: Formulate recommendations for post-construction stormwater best management practices (BMPs) for new development and redevelopment projects for sustainable clean quality water
- Agenda will go out via email prior to each meeting. Please follow and stick to the Agenda
- A hard copy of applicable documents will be handed out at each meeting
- Documents handed out at the meeting will be available prior to each meeting at the Clean Water Task Force website: lincoln.ne.gov keyword: *clean water program*
- Meeting starts at 11:30am and ends not later than 1:30pm
- Please set mobile phones, pagers, radios & computers to vibrate or silent during the meeting
- Any & all process concerns should be raised ahead of time or immediately when they occur
- A written group memory, capturing the essence of the meeting will be provided to the Task Force prior to the next meeting by the facilitators for Task Force review and comment
- Listen first to understand before seeking to be understood
- Be curious and open to learn. Speak for yourself. Communicate your own truth
- Engage in one conversation at a time; keeping to agreed upon agenda, tasks and topics
- Allow for one person talking at a time in a respectful manner to all present
- Participate in and commit yourself to the process of being open and gathering information
- Share ownership of comments, ideas, options, proposals, thoughts and any recommendations
- Be fully present and of the moment. Freedom to express ideas openly is preferred
- Act with professional courtesy and respect towards others with no personal attacks on others
- Have a balanced conversation: Inquire with a curious mind open to new ideas; Acknowledge the other; and Kindly & Respectfully Advocate your ideas with "I Messages"
- Focus is on the future
- Participants can preserve the opportunity to revisit a consensus vote
- The written Group Memory can be amended and added to
- The "Agenda" can be amended, changed, and added to by The Mediation Center (TMC) and comments can be sent to TMC before each meeting for consideration for future meetings

OVERVIEW for the Task Force:

- Clean Water Program – Development of Recommended Ordinances for Water Quality presentation
- See PowerPoint Presentation and associated Video on the website (Lincoln.ne.gov, keyword ‘clean water program’)
- Highlights of the Development of Recommended Ordinances for Water Quality presentation are listed below
 - Lincoln has 100’s of miles of underground pipes for drainage system, thousands of inlets all of which are permitted through the City’s state and federal required stormwater permit known as the National Pollutant Discharge Elimination System for Municipal Separate Storm Sewer Systems (NPDES – MS4)
 - When rainfall occurs on impervious areas it typically has a direct connection to streets, gutters and storm drain systems that drain directly to local streams and lakes
 - Unlike wastewater systems there is no treatment of storm drainage
 - Increased urbanization leads to increased runoff and pollutants due to more impervious areas from streets, driveways, rooftops and sidewalks and quicker conveyance
 - With urbanization, pollutants don’t have as much of a chance to be treated as under natural systems
 - All of us contribute to the runoff of rainfall and everyone is affected by drainage (even if you live upstream and your home is not directly impacted by runoff)
 - Current thinking is to look at stormwater in a more holistic manner through the use of Best Management Practices to slow rain water runoff and to treat it in a more natural and sustainable manner
 - Benefits of a Post Construction Program besides the federal requirement for reducing pollutants include:
 - reduction in localized flooding
 - reduction in stream bank erosion
 - an increase in base flows to streams
 - provides for more walk able and bike able areas
 - improvement in health & overall quality of life for Lincoln citizens
 - promotion of sustainability concepts
 - supports aquatic and riparian habitats, provides more biodiversity
 - less maintenance and more sustainable landscapes

NDEQ/EPA Requirements:

- Presentation by NDEQ, Blayne Renner
 - With the Clean Water Act, a commitment was made to the interim goals of Fishable/Swimmable waters
 - Low hanging fruit (wastewater streams) were the first to be addressed, with impairments continuing, additional sources were brought under scrutiny (stormwater sources)
 - Reducing pollutants from stormwater sources is not as straightforward as wastewater which can be treated or minimized with a greater level of ease

- The Post Construction requirement in the City of Lincoln's Municipal Separate Storm Sewer System (MS4) permit is not unique to the City of Lincoln, but is a standard requirement of MS4 permits
- The Post Construction requirement of the City of Lincoln's MS4 permit will continue to be a requirement from the NDEQ in the next permit cycle
- This requirement has also been one of the requirements with the least amount of guidance from EPA regarding standards and implementation
- This may be changing as the EPA considers a rulemaking effort which could address Post-Construction control standards
- It is possible that communities who develop and implement a local standard prior to the implementation of a nationwide standard would be allowed to maintain the local standard if it could be justified as substantially equivalent

Questions/Concerns from Discussion in Small Groups

- 1: What is the purpose of the requirements, are we going to recommend minimum EPA requirements or go to a higher level?
 - Response: This is part of what the task force will be considering
 - Follow up note: The current requirements are to have a post construction program. EPA is in the process of drafting requirements for post construction programs that are expected to include treatment of a set percentage of rain storm events for new developments and redevelopment type projects. See NDEQ's comments on this (presentation previous to discussion group)
- 2: How is this going to be paid for, where are the costs/funds coming from?
 - Response: This will need to be discussed at future meetings (Parking Lot item)
- 3: How much detail are we getting into for this process?
 - Response: The goal is to develop recommendations for Post Construction Standards. For example the task force won't be getting down into the details of specifications for Best Management Practice standards
- 4: What is our defined peer-group?
 - Response: We have no defined peer-group related to stormwater, however Omaha will be here for the March meeting
 - Follow up note: Lincoln's peer group for responsibilities/salaries are Des Moines, IA; Madison, WI; Omaha, NE; Overland, KS; Sioux Falls, SD, St Paul, MN; Wichita, KS. All these cities have populations of approximately no more than double or no less than half the population of Lincoln. Summaries and website links will be provided for all of these cities regarding their post construction programs
- 5: Who does financial input analysis regarding costs?
 - Response: Costs for having this program in place will be provided at future meetings.
 - Follow up note: Will be providing costs that are from local consultants.
- 6: How is this concept going to work?

- Response: Task Force is to come to a consensus on a recommendation. Recommendation then goes to the Mayor, then to the City Council as an ordinance. Recommendations are subject to being revised and amended through this and subsequent processes
- 7: What education is City providing to the public regarding pollutant, e.g. fertilizer?
 - Response: The city has a stormwater public education/outreach program. This program works with other entities and on it's own for several educational programs.
 - Follow up note: Some of the educational programs include rain barrel and rain garden classes through SECC, constructed rain garden program, volunteer clean streams program, inlet stenciling program, no/low phosphorus fertilizer program, signage. Also provide outreach at annual Home and Garden show, earth day events, Waterfest, Public Works week events, Saturday markets, Earth wellness festival, public service announcements, various brochures and many other educational venues
- 8: Is there a way to measure success of educational outreach?
 - Response: Every year for the last 9 years we've done annual surveys and have tracked the results
- 9: How do current detention requirements compare to the Water Quality Control Volume?
 - Response: Detention and the Water Quality Control Volume are two different items
 - Follow up note: The differences between these two items will be discussed in presentations at future meetings
- 10: Are current retention requirements enough to capture the first flush?
 - Responses: Probably yes, however not know unless looked at each case on it's own
 - Follow up note: Detention is the most common method currently employed by developers for detaining the peak flows from the 2, 10 and 100 year storm events. Retention is not required, but is sometimes constructed for esthetics typically with higher end developments and provides for both water quantity reduction (required) and as stated in many cases probably also helps improve water quality downstream
- 11: Quantified standards would be helpful to have. Also an idea for the typical person of how much volume is an inch over an acre in every day terms.
 - Response: Will provide information at a subsequent meeting
- 12: A definition of Terms Sheet would be helpful. Also look at posting the hand out sheets as one pdf.
 - Response: Will do

Proposed Post Construction BMP Standards Presentation:

- Presentation by Lower Platte South Natural Resources District, J.B. Dixon
 - Anticipated EPA Regulations for Post-Construction Stormwater
 - New Approach: Integrate Green Infrastructure into the design of a project for stormwater management.
 - Key Elements of Proposed Rule:
 - Element 1: Establish performance standards for discharges from:

- Newly developed sites
 - Control a specific percentile storm
- Redeveloped sites
 - Control a lesser percentile storm than new development.
- Element 2: Require MS4s to develop plans to address discharges from existing sites (retrofits).
- Element 3: Extend protection of MS4 Program.
 - Potentially change boundaries of MS4 jurisdiction based on watersheds.
- Performance Standards: Capture and treatment of small storm events.
 - Common performance standards based on Water Quality Control Volume (WQCV)
 - WQCV: a specific volume of stormwater runoff related to the amount of rainfall from 80-90% of all storms for an area, in a given year.
- Locally, 80-90% of all rainfall events in a year are 1" or less.
- "First Flush" of runoff has the highest concentration of pollutants.
- Treatment cost increases from 0.5" to 1" are low (pipe, rock, excavation, plants).
- Stormwater treatment after first 1" of runoff is minimal.

Parking Lot:

How should costs be appropriated?

Next Task Force Meeting is February 21, 2012 at the NRD from 11:30 a.m. to 1:30 p.m.

Thank You,

Lorrie Benson & David Hubbard
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 Lincoln, Nebraska 68508
 Main 402-441-5740
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 Fax 402-441-5749
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***Reminder: this and other material is available at Lincoln.ne.gov,
 keyword 'clean water program'***



Group Memory

Clean Water Program Task Force

Facilitated Meeting #2 February 21, 2012

Requirements for Municipal Post Construction Standards

11:30 am to 1:30 pm

At the Lower Platte South Natural Resources District Meeting Room

This is a Rough Draft of a Group Memory of a facilitated meeting held Tuesday, 2-21-2012, in Lincoln, Nebraska. Note that this is the first draft of the Group Memory and is based on notes taken at the meeting, flip chart pages, comments made, and information shared with the group by presenters as part of the following agenda. The intent of creating a collective group memory is to capture the essence of the information shared, comments made, and questions presented at the facilitated meeting and it is not meant as a transcript of the meeting. This draft is subject to correction by contacting The Mediation Center at info@themediationcenter.org by 3-20-2012.

Task Force Members present:
Bob Caldwell
Bud Dasenbrock
Pam Dingman
Jeff Emanuel
Carl Eskridge
Tom Franti
Paul Johnson
DaNay Kalkowski
Peter Katt
Don Linscott
Milo Mumgaard
Rick Onnen
Brock Peters
Dave Potter
Reba Schafer
Tim Texel
Jim Wathen

Members of the Public present:
Vicki Twerdochlib

Support Staff and Resources present:
J.B.Dixon, Nicole Fleck-Tooze, Jocelyn Golden, Ted Hartsig, Ben Higgins, Wynn Hjermstad, Carter Hubbard, Ed Kouma, Rock Krzycki, Jared Nelson, Roger Tiedeman, Ellen Wright, J.J.Yost, Paul Zillig
Facilitators:
Lorrie Benson, Dave Hubbard

AGENDA

- | | |
|---|--------|
| 1. Welcome & Overview | 20 min |
| <ul style="list-style-type: none"> - Welcome and overview of previous meeting - Discussion of follow-up items <ul style="list-style-type: none"> • Technical Memo #1 Rainfall Frequency • Technical Memo #2 Ordinances | |
| 2. Current Water Quality Standards | 30 min |
| <ul style="list-style-type: none"> - PowerPoint Water Quality/Quantity Standards Presentation | |
| 3. Exploration and discussion in small group | 30 min |
| <ul style="list-style-type: none"> - Break into small groups to discuss worksheet questions - Facilitated large group de-brief <p>(Themes captured on flipchart pages)</p> | |
| 4. Best Management Practice (BMP) Presentation | 30 min |
| <ul style="list-style-type: none"> - PowerPoint BMP Presentation | |
| 5. Wrap up, Closure | 10 min |

Next Clean Water Program Task Force Meeting
Tuesday, March 20th 2012 11:30 a.m. to 1:30 p.m.

*Reminder: this and other Task Force materials are available at
Lincoln.ne.gov, keyword 'clean water program'*

Mutually Agreed Upon Ground Rules: (Aspirations and Enforced as Appropriate)

- Keep in mind the Overall Goal of Clean Water Task Force: Formulate recommendations for post-construction stormwater best management practices (BMPs) for new development and redevelopment projects for sustainable clean quality water
- Agenda will go out via email prior to each meeting. Please follow and stick to the Agenda
- A hard copy of applicable documents will be handed out at each meeting
- Documents handed out at the meeting will be available prior to each meeting at the Clean Water Task Force website: lincoln.ne.gov keyword: *clean water program*
- Meeting starts at 11:30am and ends not later than 1:30pm
- Please set mobile phones, pagers, radios & computers to vibrate or silent during the meeting
- Any & all process concerns should be raised ahead of time or immediately when they occur
- A written group memory, capturing the essence of the meeting will be provided to the Task Force prior to the next meeting by the facilitators for Task Force review and comment
- Listen first to understand before seeking to be understood
- Be curious and open to learn. Speak for yourself. Communicate your own truth
- Engage in one conversation at a time; keeping to agreed upon agenda, tasks and topics
- Allow for one person talking at a time in a respectful manner to all present
- Participate in and commit yourself to the process of being open and gathering information
- Share ownership of comments, ideas, options, proposals, thoughts and any recommendations
- Be fully present and of the moment. Freedom to express ideas openly is preferred
- Act with professional courtesy and respect towards others with no personal attacks on others
- Have a balanced conversation: Inquire with a curious mind open to new ideas; Acknowledge the other; and Kindly & Respectfully Advocate your ideas with "I Messages"
- Focus is on the future
- Participants can preserve the opportunity to revisit a consensus vote
- The written Group Memory can be amended and added to
- The "Agenda" can be amended, changed, and added to by The Mediation Center (TMC) and comments can be sent to TMC before each meeting for consideration for future meetings

Discussion of follow-up items

- Goal of discussing and formulating recommendations for stormwater ordinances
- Technical Memo #1 Rainfall Frequency handout was discussed and explained (Technical Memo #1 Rainfall Frequency is available on the Task Force website)
- Technical Memo #2 Ordinances handout was discussed and explained (Technical Memo #2 Ordinances is available on the Task Force website)

Current Water Quality/Quantity Standards Presentation

- See Water Quality/Quantity Standards Presentation on Task Force website
- Presentation of the flood control approach in comparison to the water quality approach
 - Flood control projects designed using design storms, which are storms that have a probability of occurring over a set time period. Lincoln's design storms for flood control are storms that have a 50% (2 year storm event), 10% (10 year storm event) and 1% (100 year storm event) of occurring each and every year
 - For example the 2 year – 24 hour storm event for Lincoln is 3 inches and has a 50% chance of occurring each and every year
 - Flood control projects are typically designed to limit the post-development peak flows for the above storm events to the pre-development peak flow rate
 - Water quality projects are typically designed to control a volume of runoff known as the Water Quality Control Volume (WQCV)
 - For example a project would need to capture a rainfall event of 1.25 inches or less to capture 90% of all rainfalls in Lincoln
 - The Water Quality Control Volume can be calculated by:
 - Capturing a quantity of runoff (e.g. first half inch of runoff)
 - Capturing a percentage of all rainfalls (e.g. capturing all storm events that are 1.25 inches or less)
 - Base the design off a frequency based event similar to flood control projects (e.g. 1 year 24 hour storm event)
 - Base the design of continuous simulation modeling
 - Water quality to date has gone largely uncontrolled with current urban drainage design and practices in Lincoln
 - The majority of rainfall events in Lincoln are smaller rainfall events that carry the majority of pollutants that adversely impact local streams and lakes
- Presentation of water quality standards
 - Lincoln has existing voluntary water quality standards as listed in the 2005 Stevens Creek Watershed Master Plan in Section 7
 - Controlling the water quality event will not only help in reducing pollutant loads to local streams and lakes, but will also significantly reduce stream bank stabilization issues
 - Controlling water quality can be accomplished through the augmented use of existing standard practices for flood control (i.e. detention/retention structures), and also through the use of alternate Best Management Practices such as pervious pavement, bio-swales, rain gardens, etc
 - The City of Lincoln has existing documentation and projects for Best Management Practices
 - A proposed ordinance for water quality standards (i.e. post-construction standards) would be in Chapter 28, which is the chapter on Stormwater Quality and erosion and Sediment Control and would probably include sections on provisions, definitions, procedures, design criteria, maintenance and enforcement
 - Major issues that would be covered by the ordinance would include:
 - Water quality standards applicable to what type of developments
 - Standards applicable at what date
 - Exceptions
 - Criteria
 - Maintenance/Sureties
 - Enforcement

Comments, Reflections, Thoughts and Questions from Small Group Discussions

- 1: What water quality benefits resulting from requiring stormwater quality practices do you believe will be valued by the community?
 - Reduction in runoff
 - Long-term benefit to reduce pollution
 - Beauty
 - Economic benefit
 - Public health benefit – reduces toxins entering water
 - Reduction of contaminants in waterways
 - Clean lakes
 - Monitoring of Salt Creek
 - Removal of sediment
 - Enhanced reputation
 - Reduce potential for flooding
 - Water quality
 - Visual benefit / aesthetically pleasing
 - Erosion control
 - Avoiding Federal penalties
 - Concern that none of this matters to the general public except the beauty/aesthetics
 - Concern that water quality is under-appreciated
 - Concern about community response
 - Concern that there is no recognition of the pollution problem from storm water
 - *Note: The City of Lincoln, Watershed Management Division has been doing annual surveys (approximately 300/year) at the February Home and Garden show for several years. The surveys show a significant increase from the public in the general understanding that stormwater runoff is a source of pollution to our local streams and lakes. For example:*
 - *96% of those surveyed in 2012 stated that they were aware that dumping oil, grass and leaves, pet waste and trash into a storm drain is illegal. As a comparison in 2007, 59% of the respondents thought these practices were legal*
 - *91% of those surveyed 2012 were aware that runoff from yards flow untreated into streams and lakes. As a comparison in 2007, 70% acknowledged that storm drains are directly connected to streams and lakes*
 - *In 2012, 70% of those surveyed have seen and taken notice of billboards related to stormwater waster as compared to 45% in 2009*
 - *The survey also provided some measurement of behaviorial changes. However the survey results indicate no significant behaviorial changes to date related to stormwater practices by the public including increased picking up of dog waste, increased soil tests prior to fertilizing, or decreasing fertilization of lawns*
- 2: What concerns might the community have about requiring stormwater quality practices?
 - What will it cost
 - Who will pay for it
 - Don't understand the need
 - Will pests (bugs, animals) use as a home

- Limited knowledge/appreciation of benefits from costs
 - Who should be required – developer vs. residential
 - Will there be exemptions – e.g., UNL, LPS, State
 - Need for level playing field for private sector
 - Education leap
 - Cost of maintenance – put practices in place that are viable over the long-term
 - Is there the expertise for maintenance
- 3: What additional information, if any, do you need to have an informed discussion of stormwater quality programs and/or ordinances?
 - What are the pollutants in the First Flush? Are standards for this different in residential vs commercial?
 - What are the contaminants that we are trying to deal with?
 - What solids are we concerned about collecting?
 - What do the studies say about collecting solids?
 - What does success look like?
 - Desire to avoid huge fines
 - Community concerns and Government entities: are they held to same standards?
 - Do rules apply to all, e.g., nonprofits, schools, etc.?
 - Need for cost/benefit analysis to address public concerns
 - Transfer development rights
 - Do we have the expertise for designing, building, and maintaining?
 - How will the aesthetics be maintained long-term?
 - What is the value to the overall community?
 - Who is sharing the cost?
 - Create incentives – performance standards, transfer of development rights
 - Is the treatment of our water resource as high a priority as it needs to be compared to our other resources?
 - Will there be exemptions?
 - *Note: Most if not all of the above questions will be addressed in the upcoming third task force meeting or within upcoming technical memos including one on Costs and one on Water Quality Pollutants*

Best Management Practice (BMP) Presentation

- Presentation by Ted Hartsig and Carter Hubbard from Olsson Associates
- This presentation (The Application of Stormwater Best Management Practices in Lincoln) is available on the Task Force website
 - Why Best Management Practices (BMPs)?
 - Reduced stormwater runoff volume
 - Improved water quality
 - Reduced landscape maintenance
 - Stream stability
 - Reduced infrastructure cost downstream
 - They're practical
 - They're aesthetic amenities in the community
 - Reduce demands on Public Works
 - Changes to existing practices are minimal

- The best way to mitigate stormwater impacts from new developments is to use practices to treat, store, and infiltrate runoff onsite before it can affect water bodies downstream (reference: EPA)
- Structural BMPs include storage practices such as:
 - Rain gardens and bioretention gardens
 - Wet ponds and extended-detention basins
 - Filtration practices such as grassed or vegetated swales, and filter strips
 - Pervious pavements
 - Silva cells
 - Green roofs
- BMPs in Lincoln
 - 27th and F Street
 - Aspen Greens Common Area
 - Norris Lane and Allen Road
 - Havelock Rain Garden
 - Lewis Ballfields Parking Lot
 - Capital Parkway and J Street
 - Peterson Park Wetland
 - Pine Lake Heights
 - 56th Street and Old Cheney Road
 - Tierra Park
 - Lower Platte South NRD Office
- Federal Requirements
 - Phase I and Phase II communities must develop, implement, and enforce a program to address stormwater runoff
 - New development
 - Redevelopment projects
 - Structural and non structural controls
 - Any program must ensure that controls are in place that would prevent or minimize water quality impacts.
- State Requirements, mirror Federal requirements, including
 - 1. Public Education and Outreach
 - 2. Public Participation and Involvement
 - 3. Illicit Discharge Detection and Elimination
 - 4. Construction Site Runoff Control
 - 5. Post Construction Runoff Control
 - 6. Pollution Prevention and Good Housekeeping
 - 7. Industrial and Related Facilities
 - 8. Monitoring Program
- Concept of Sustainable Design, community planning and design that:
 - Integrates sustainable, natural environment to
 - Reduce water consumption
 - Improve water quality
 - Reduce energy use
 - Native landscapes balance function with aesthetic
 - Reduces long-term costs for operations and maintenance
 - Sustainable Design Benefits

- High aesthetic value -- seasonal changes, diverse foliage, flower and fruit, healthy plants, year-round interest, wildlife
- Sustainable Design Benefits
 - Easy on the environment -- reduced pesticides, fertilizers, water use, habitat enhancement
 - Sustainable Design Benefits
 - Potential for cost savings -- less maintenance, healthier plants, reduced resource inputs
- Effective stormwater management requires integrated management of water, vegetation, and soil
 - The Wisdom of Native Plants
 - Adapted to this region
 - Water and nutrient stingy
 - Deep roots
 - Beautiful leaves and flowers
 - The Health of Soil
 - Key to the health of plants
 - Storage of water, nutrients
 - Filtering/cleansing pollutants
 - Base support of vegetation
 - Managing Water
 - Capturing and filtering stormwater
 - Conserving water deep in the soil
 - Reducing volume discharged to streams
 - Reduced erosion and property destruction
- BMP Costs
 - Costs for Stormwater BMPs vary
 - Type of BMP
 - Size and structure
 - Amount of stormwater captured and treated
 - Cost is less when design and construction is part of the planning process
 - BMPs integrated into community design reduce infrastructure needs and reduce costs
 - Cost is more for retrofitting into existing landscapes
 - Costs will come down as BMPs become more common, and as design standards are developed and implemented
- Benefits
 - Increased land values – people enjoy natural amenities
 - Sale-ability of land – neighborhoods with BMPs and Low Impact Development concepts have been shown to sell quicker than conventional neighborhoods
- BMP Maintenance
 - BMP maintenance is highest after installation and during the first year
 - Maintenance requirements diminish during second year, and beyond
 - Minimal or no need for fertilizers, pesticides, water
 - Maintenance cost about 10% of construction during first year, about 2% to 3% of construction cost during subsequent years

Parking Lot:

No new items

Next Task Force Meeting is March 20th, 2012 at the NRD from 11:30 a.m. to 1:30 p.m.

The group memory was presented to the Clean Water Program Task Force members in an e-mail on 3-15-12 as a draft and at the March 20th Task Force meeting in hard copy and no additions, corrections, or revisions have been received by The Mediation Center as of 3-21-12

Thank You,

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Reminder: this and other Task Force materials are available at Lincoln.ne.gov, keyword ‘clean water program’



Group Memory

Clean Water Program Task Force

Facilitated Meeting #3 March 20, 2012

Requirements for Municipal Post Construction Standards

11:30 am to 1:30 pm

At the Lower Platte South Natural Resources District Meeting Room

This is a Rough Draft of a Group Memory of a facilitated meeting held Tuesday, 3-20-2012, in Lincoln, Nebraska. Note that this is the first draft of the Group Memory and is based on notes taken at the meeting, flip chart pages, comments made, and information shared with the group by presenters as part of the following agenda. The intent of creating a collective group memory is to capture the essence of the information shared, comments made, and questions presented at the facilitated meeting and it is not meant as a transcript of the meeting. This draft is subject to correction by contacting The Mediation Center at info@themediationcenter.org by 4-17-2012.

Task Force Members present:	
Rick Onnen Dennis Scheer Wilbur Dasenbrock Donald Linscott David Potter Peter Katt Paul Johnson Tom Franti Carl Eskridge DaNay Kalkowski Reba Schafer Tim Texel	

Members of the Public present:	
Vicki Twerdochlib Lalit Jha	

Support Staff and Resources present:
John Chess, J.B.Dixon, Miki Esposito, Jocelyn Golden, Sara Hartzell, Ben Higgins, Selma Kessler, Ed Kouma, Rock Krzycki, Jared Nelson, Roger Tiedeman, Ellen Wright, Paul Zillig
Facilitators:
Lorrie Benson, Dave Hubbard, Sandy Wolfe

AGENDA

IMPLEMENTING A PROGRAM

1. Welcome & Overview 20 min
 - Welcome and overview of previous meeting
 - Discussion of follow-up items
 - Technical Memo #3 Volume & Land Use Comparisons
 - Technical Memo #4 Cost

2. Post Construction Standard Processes 30 min
 - Submittals / Review
 - Maintenance / Inspection
 - Compliance
 - Cost
 - Cost Share Program

3. Exploration and discussion in small group 30 min
 - Break into small groups to discuss worksheet questions
 - Facilitated large group de-brief
(Themes captured on flipchart pages)

4. Omaha's Program 20 min
 - Omaha's Clean Water Program Presentation

5. Wrap up, Closure 20 min

Next Clean Water Program Task Force Meeting
Tuesday, April 17th 2012 11:30 a.m. to 1:30 p.m.

*Reminder: this and other Task Force materials are available at
lincoln.ne.gov keyword: clean water program*

Mutually Agreed Upon Ground Rules:

(please refer to Group Memory #1 from January 17, 2012 meeting)

Discussion of follow-up items

- Goal of discussing and formulating recommendations for stormwater ordinances
- Technical Memo #3 Volume & Land Use Comparisons handout was discussed and explained (Technical Memo #3 Volume & Land Use Comparisons is available on the Task Force website)
- Technical Memo #4 Costs handout was discussed and explained (Technical Memo #4 Costs is available on the Task Force website)

Post Construction Standard Processes Presentation

- See Post Construction Standard Processes Presentation on Task Force website
- Presentation by City of 'How Lincoln Stormwater Quality Requirements Would Work'
 - Submittals / Review
 - Developer submits plans
 - Water quality standards required for new development or redevelopment if greater than specified amount of square feet
 - Cost share considered at concept stage
 - Plan reviewed through existing Planning Department processed
 - Best Management Practices reviewed by City/NRD staff, similar to existing manner in which detention ponds are reviewed
 - Sureties would be assessed
 - Maintenance Agreement
 - Maintenance/Inspections
 - Potentially owner responsible for maintenance
 - Initial inspection by City upon completion of Best Management Practice
 - Periodic inspection by City during establishment for 1 to 3 years
 - Four year inspection by City after establishment
 - Compliance
 - Education to property owners via guidance documents, checklists, inspection forms, Operation and Maintenance Plans (provided by Engineer)
 - Initial inspection by City upon completion of Best Management Practice
 - Follow up with owner as needed, use of surety if necessary
 - Partial release of surety if all OK
 - Periodic inspection by City during establishment for 1 to 3 years
 - Follow up with owner as needed, use of surety if necessary
 - Total release of surety if all OK after establishment
 - Four year inspection by City after establishment
 - Follow up with owner as needed
 - Do work and assess owner if necessary
 - Enforcement through Law Department if necessary
 - Costs to developer for incorporating water quality standards
 - Stevens Creek Master Plan had cost at \$210/acre
 - Olsson Associates Report had cost of between \$150 to \$570/acre

- Cost Appropriation
 - Cost for offsetting impacts of urban development have historically been the burden of the developer
- Cost Share
 - Current water quality cost share program with Lower Platte South NRD
 - Current case by case cost share program with the City
- Current NRD cost share program
 - Priority and eligibility based on impact to water bodies, water quality improvement potential, public outreach
 - Not currently available if required locally or by the State
 - Cost share of 50% for eligible materials and contracted labor
 - Maximum cost share of \$10,000 per project, which may be exceeded if desired by the NRD
- Task Force members had questions regarding maintenance of these projects:
 - Regarding the proposed maintenance method and keeping people from getting sued by City law Department for lack of proper maintenance
 - Risk is that people are doomed to failure trying to comply with maintenance Best Management Practices
 - Maintenance of detention cells is much different
 - Maintenance and inspections will be expensive for the commercial developer

Comments, Reflections, Thoughts and Questions from Small Group Discussions

1. Water quality standards applicable to:

- New developments over X square feet or X acre(s)
- Redevelopments over X square feet or X acre(s)
 - covers all areas in a redevelopment, or
 - cover only any new impervious/disturbed areas in a redevelopment
- Storm water BMP required for commercial, industrial, and multi-family developments of 3 acres or more and single-family developments/subdivisions of 10 acres or more.
- Multi-family and commercial developments – concrete hard surface
- Industrial? – Yes
- Question regarding smaller family homes and infill and individual pieces and how they connect to big picture and deal with chemicals
- Prefer regional with more City involvement
- Regional does not need to be defined by ownership – e.g., more than one owner, when site has enough people/# of owners sharing – closer to regional
- Want to avoid the problems of the past from such systems
- EPA standards unknown at this time

2. Exceptions:

- Single-family dwellings not part of a new subdivision and all infill developments
- No exception for government or non-profits
- No exceptions – all owners are responsible for not polluting their water
- Necessary to have exceptions

- Single-family infill?
- Existing developments (residential) – define?
- Quality of life in the city
 - best division between public lands/private lands?
 - best mix for dealing with conflict

3. Water quality criteria based on:

- percentile rainfall event
- amount of runoff
- pollutant reduction
- Size of development and surface runoff
- Use low rainfall event criteria
- % event?
- Pollutant reduction? – should be used but what pollutants and how much reduction?
- Single-family chemicals
- Amount of runoff
- How do you go about figuring out pollutants?
- Could a private, qualified/insured contractor perform the inspections?
- Want more information on Steven's Creek

4. Maintenance/Inspections:

- Maintenance inspections important
- Education for homeowner's associations important as some will not care
- Devise system that people can really maintain and keep up – so much depends on owner
- Long-term sustainability of the system and inspections by regional qualified people
- Accountability
- Maintenance issue and recognize what kind of system is being set up within the government system
- Have licensed contractors or certified maintenance contractors to be available to assist developers or homeowner's associations
- Different needs for different types of sites
- Frequent inspections in the early years
- Could be where owner's contract maintenance/inspections to a public/private contractor ("write a check")
- Contractor – licensed, qualified inspector
- Required
 - Homeowners
 - Business
 - Developers
 - Associations (will need education from city)
 - City
- Long-term maintenance and sustainability concerns
 - Funding
 - Who responsible
 - Frequency
- Annual – is homeowner inspection adequate?
- Long-term sustainability of maintenance by unqualified people
- Treat maintenance like street trees with 3 options:

- Owner plants with surety
- Contract with a nursery to plant
- Contract with Park & Rec Department
- The Community views street trees as a community asset with community benefit. If applied this view to BMPs regarding storm water it could support this type of model

5. Compliance (in order of preference)

- Contact owner and coordinate needed inspections/corrections
- Potential use of surety (during establishment period)
- Do needed work and assess owner
- Fines/Liens
- Make BMP as part of the subdivision/land development agreement.
- City inspection on regular basis and then lien on property if necessary for maintenance

6. Missing Issues

- If located in ROW then maybe city responsibility. If on private property or common area then somebody else is responsible
- We want more information about Steven's Creek Master Plan and clean water aspects (here at this meeting)
- Standards will satisfy future EPA rules
- Will EPA accept what is proposed or will other standards be applied

Omaha's Clean Water Program Presentation

- See Omaha's Post Construction Ordinance Presentation on Task Force website
- Presentation by Selma Kessler, P.E. from City of Omaha Public Works Department
 - Ordinance is in Chapter 32 of the City of Omaha Ordinances
 - Article V. Post Construction Stormwater Management (criteria)
 - Article VII. Papillion Creek Watershed (fees)
 - Omaha currently has two types of stormwater permits
 - MS4 or Municipal Separate Storm Sewer Permit (similar to Lincoln's)
 - CSO or Combined Sewer Outfall Permit (required as they have combined storm sewer and sanitary sewers in east Omaha). Lincoln does not have this issue
 - In the MS4 area the criteria is treat the first half inch of runoff and maintain the 2 year pre project runoff conditions
 - Applies to all grading work and redevelopments of at least 5,000 square feet
 - References for the ordinance can be found at the www.omahastormwater.org and www.papiopartnership.org websites
 - Submittal process includes:
 - Application with Drainage Study, Plan Sheets and Maintenance Agreement by owner
 - Conditional Approval by City
 - BMP Certification and As-Built Plans by owner
 - Final Approval by City
 - Preferred Best Management Practices include:
 - Infiltration, Water Quality Detention, Green Roof, Pervious Pavement/Pavers, Subsurface storage, Hydrodynamic separators, inlet filters
 - General Design Guidelines
 - Omaha Regional Stormwater Design Manual

- Chapter 8, Stormwater Best Management Practices (currently being updated)
- Maintenance
 - Maintenance agreement and easement is recorded
 - Maintenance responsibility of owner
 - Omaha has authority to charge owners for maintenance cost
- Omaha still on a learning curve. Presenter stated that Lincoln is ahead of Omaha in certain aspects of Watershed Management (e.g. the Watershed Master Plan program) is well respected in the Watershed Community
- Presenter recommended Lincoln adopt a rate and a volume criteria (e.g. X% of storm event) rather than the criteria that Omaha implemented (i.e. the half inch of runoff program)

Parking Lot:

No new items

Next Task Force Meeting is
April 17th, 2012 at the NRD 11:30 a.m. - 1:30 p.m.

Thank You,

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***Reminder: this and other Task Force materials are available at
 Lincoln.ne.gov, keyword 'clean water program'***



Group Memory

Clean Water Program Task Force

Facilitated Meeting #4 April 17, 2012

Requirements for Municipal Post Construction Standards

11:30 am to 1:30 pm

At the Lower Platte South Natural Resources District Meeting Room

This is Group Memory of a facilitated meeting held Tuesday, 4-17-2012, in Lincoln, Nebraska. Note that this is the first draft of the Group Memory and is based on notes taken at the meeting, flip chart pages, comments made, and information shared with the group by presenters as part of the following agenda. The intent of creating a collective group memory is to capture the essence of the information shared, comments made, and questions presented at the facilitated meeting and it is not meant as a transcript of the meeting. This draft is subject to correction by contacting The Mediation Center at info@themediationcenter.org by 5-14-2012.

Task Force Members present:
Bob Caldwell Wilbur Dasenbrock Pam Dingman Jeff Emanuel Carl Eskridge Tom Franti Paul Johnson Danay Kalkowski Peter W. Katt Don Linscott Milo Mumgaard Rick Onnen Brock Peters Reba Schafer Tim Texel Jim Wathen

Members of the Public present:
Vicki Twerdochlib Michael Bash

Support Staff and Resources present:
Devin Biesecker, John Chess, Nicole Fleck-Tooze, Jocelyn Golden, Ben Higgins, Wynn Hjermstad, Ed Kouma, Rock Krzycki, Roger Tiedeman, Ellen Wright, J.J. Yost, Paul Zillig
Facilitators:
Lorrie Benson, Dave Hubbard, Sandy Wolfe

AGENDA

IMPLEMENTING A PROGRAM

1. Welcome & Overview 40 min
 - Welcome and overview of previous meeting
 - Review of Previous Meetings
 - Federal, State, and Local Requirements
 - Existing Standards
 - Proposed Development Standards
 - Proposed Program
 - Process/Development Review
 - Program Implementation
 - Technical Memo #5 – Water Quality Standards

2. Large Group Discussion & Polling of Draft Recommendations and Policies 70 min
 - Draft Recommendations
 - Criteria
 - Applicability to sites
 - Exceptions/Waivers
 - Application date
 - Inspections
 - Draft Programs
 - Education Program
 - Training Program
 - Cost Share

3. Wrap Up, Closure 10 min

Next Clean Water Program Task Force Meeting Tuesday, May 15, 2012 11:30 a.m. to 1:30 p.m. Bus Tour

*Reminder: this and other Task Force materials are available at
Lincoln.ne.gov, keyword 'clean water program'*

Review of Previous Meetings

- See Review Presentation on Task Force website
- Presentation by City on past presentations
 - Task Force charge statement
 - “Have an ordinance or other regulatory mechanism requiring the implementation of post construction runoff controls”
 - Public Works memorandum re Post construction Best Management Practices (on Task Force website – see EPA Stormwater Runoff Regulation for Post Construction)
 - Federal, State, and Local Requirements
 - NDEQ/EPA stormwater requirements “Have an enforceable ordinance requiring the implementation of post construction standards”
 - January 17th Meeting
 - Lincoln has a state and federal required stormwater permit
 - Current trends are to implement BMP strategies in a more natural and sustainable manner by limiting runoff and treating stormwater where it falls or as soon as possible
 - Listing of other benefits to post construction water quality standards
 - Listing of surrounding cities having post construction water quality standards
 - Key element of upcoming EPA proposed rule is the establishment of performance standards based on a Water Quality Control Volume
 - A current common practice is to base Water Quality Control Volume on a specific percentile storm event
 - February 21st meeting
 - Handed out technical memorandums #1 and #2 (on Task Force website) regarding the Rainfall Frequency Curve and Ordinance Comparison, respectively
 - Discussed major issues covered by proposed post construction water quality standards
 - Went over existing voluntary water quality standards from the Stevens Creek Master Plan
 - Stevens Creek Master plan approved in 2005
 - Presented two alternate approaches for water quality; regional based BMPs and Site Specific BMPs
 - Citizens Advisory Committee and subsequently the Master Plan recommended Site Specific BMPs
 - Master Plan recommended design of BMPs to be based on the 90% storm event
 - Citizens Advisory Committee and subsequently the Master Plan recommended that each private development should bear the cost of offsetting impacts to water quality and stream stability (similar to the current practice for offsetting flooding impacts caused by developments)
 - Also came up with a cost share program by the City and Lower Platte South Natural Resources District
 - Presentation by Olsson Associates
 - Current BMPs in Lincoln
 - Federal requirements
 - Other benefits (increased land values and sale-ability of land)
 - Costs are less when considered with initial design as compared to retrofit projects
 - March 20th Meeting

- Handed out technical memorandums #3 and #4 (on Task Force website) regarding Volume & Land Use Comparisons and Costs, respectively
- Discussed post construction processes (submittal/review of plans, maintenance/inspection, compliance, current Lower Platte South Natural Resources District cost share program)
- During group discussion talked about the major post construction standard issues
 - Water quality standards applicable to:
 - Exceptions
 - Criteria
 - Maintenance/inspections
 - Compliance
- Discussed presentation by City of Omaha on their post construction water quality standards
 - Omaha recommended that Lincoln adopt a rate and volume criteria (i.e. specific percentile of rainfall events)
- Technical memorandum #5 (on Task Force website)
 - Memorandum on water quality
 - List of impaired water bodies in Lincoln
 - Antelope Creek Watershed Basin Plan
 - Pollutants and pollution sources
- April 17th Meeting
 - Discussion of draft ordinance issues (see separate handout of issues with comments from this meeting)

Comments, Thoughts and Questions from Large Group Discussion on Draft Recommendations for Post Construction Standards

- Process not fair because inadequate time to prepare options
- This is the beginning of a longer process
- All of costs of program shouldn't be shifted to private/new development with exceptions for redevelopment.
- Many costs born by public/community in developed areas.
- Concern that people in new developments will pay for their development as well as public benefits.
- Fundamental question is fairness

Issue #1: New Development Standard Criteria

Recommendation: 1.25" of rainfall or less, equivalent to the 90% rainfall event for Lincoln (detained over a 40 hour period)

- 90% chosen because EPA is leaning toward 90% - also based on other cities
- What will >90% cities do?
- Next permit will require higher %
- TSS?
- Using WQCV means easier concept – don't have to measure specific solids

- See EPA green sheet regarding WQ
- 90% mainly addresses WQ
- Runoff is not equal to rainfall
 $\frac{1}{2}$ " runoff is not equivalent to 90% for residential area – more for commercial area
- 40 hours refers to how long it takes for water to infiltrate or flow out
- 90% of storms are 1.25" or less
- Studies regarding pollutant concentrations related to storm quantity?
- Higher % number is better for water quality – have "first flush" regardless of rain amount
- Are studies regarding first $\frac{1}{2}$ " of flush contaminants?
- How do costs increase as go from 60% to 70% to 80% to 90%?

Issue #2: Redevelopment Standard Criteria

Recommendation: 0.83" or less, equivalent to the 80% rainfall event for Lincoln (detained over a 40 hour period)

- Redevelopment harder – percentage lower because there is not always much you can do.
- Empirical data regarding built environment issue? Very diffuse: oils, greases, heavy metals, ecoli
- Redevelopment defined?
- Examples of current redevelopment: LPS site, 48th & O site
- What is the status of redevelopment now?
- Are we going to require built onsite vs off site? Is there a way for waiver, cash/fee, etc.?
- What options are available if redevelopment encompasses whole block surrounded by concrete?
 How would it effect standards?
 ANSWER: Good example of options is 13th & Q Block 38 has Green Roof that captures that runoff.
- Concern that no one in private sector would do Green Roof because of the cost. Block 38 had TIFF and government funding available.
- Examples of private developers picking up cost: Village Gardens & Fallbrook.
- Lost in all this conversation is that options are very expensive.

Issue #3: Standards Applicable to New Development and Redevelopment for Areas Equal to or Greater Than:

Recommendation: 43,560 sq ft (one acre) or more (for redevelopments this is the area disturbed: e.g., demolition, grading, new impervious area, etc.)

- Reason for 1 acre recommendation: it is the same as for erosion and sediment control. One acre is a commonality.
- How does this apply in new development? If residential development and each lot is an acre does each owner capture/store on site or is it a subdivision quality?
 ANSWER: Either/or or a mixture of both. All efforts apply – will be specific to a development.
- Cost hugely dependent on details of what we are talking about. The complexity for developers is enormous.
- How are costs allocated? Can developer transfer maintenance responsibility?

- Factor maintenance issues into original planning. Complex but there are options available.
- Could address who has long-term responsibility for projects – would be part of plan with City.
- Fairness issue – let's treat all properties in town the same. Pay impact fee if can't comply.
- Concern that this is on track to affect only new development in Lincoln.

Issue #4: Exceptions

Recommendation: single family dwellings not part of a new subdivision

- Why exception for single family dwelling?
- Bring BMPs into play for any improvement
- If one acre is standard, why do you need exception?
- If capture at source is important why not single family dwelling?
- If come in for any kind of permit should have to bring water quality into compliance.
- If permitting city is already looking at BMPs.
- Ideas all coming from Federally mandated requirements – these are minimum requirements. Target goal is to aim for Federal requirements – not impose a higher standard.

Issue #5: Waivers

Recommendation: Allow for waivers

- Is it possible to 'bank' credit if do more than required on a project? Apply credit to a more challenging site in the future?
- Wichita has "in lieu of fee" – based on a waiver policy –Director's discretion
- Sometimes 'Director discretion' hard to interpret. Can there be criteria or formula established that are more predictable?
- Issue of clients – some more interested in green efforts than others, some have more ability to pay than others – so banking would be helpful.
- Wondering about projects that are difficult to do making project financially unfeasible – should be waiver for cost reasonableness – cost/benefit standard.

Issue #6: Effective Date of Ordinance

Recommendation: Effective date of this ordinance is immediate, except for those projects currently in the planning process and that obtain Planning Commission approval within 90 days of ordinance adoption

- What is the benefit of date prior to EPA passing?
- Voluntary program until EPA makes us
- Benefit is that EPA will let you go with what you've adopted when becomes law – otherwise may have to do it their way.
- One year is more reasonable – 6 months minimum
- Cycle of planning/development is long
- 12 months would allow most developers time to react
- What if development is already through Planning, has streets in place but no lots sold?

- Details important
- Plotted single family lots – possible solution

Issue #7: Requirements for Owner Inspection of BMPs

Recommendation: Owner inspection and inspection report required annually

- Recommendation based on what peer cities have done – also requirement will help keep owners aware of need to maintain, etc.
- What criteria will be used for inspections?
- City staff will have a form/check sheet. Engineer inspection not required.
- Training will be done to assist homeowners to inspect themselves
- Are we expecting HOAs to do inspections themselves?
- Could have list on website of trained inspectors.
- Probably no certification process for inspectors.
- Benefit of annual inspection is to catch problems earlier when easier and cheaper to fix.
- Inspection e.g. – volunteer trees, plugged drains, etc.
- Could do inspection checklist for different kinds of BMPs

Executive Summary

- What about issues not raised
- Public or private improvements?
- Assuming private sector pays and maintains – public benefit
- Policy could be different
- Seems like fundamentally unfair policy

Wrap Up

- Rock offered to put a list together for a self-guided tour of clean water systems already in place.

Parking Lot:

No new items

Next Task Force Meeting is Bus Tour
May 15th, 2012 11:30 a.m. - 1:30 p.m.

Thank You,

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***Reminder: this and other Task Force materials are available at
Lincoln.ne.gov, keyword 'clean water program'***



Group Memory

Clean Water Program Task Force

Facilitated Meeting # 5 May 15, 2012

**Best Management Practices Tour by Bus
Departing from and Returning to Fallbrook 11:30 to 1:30**

Requirements for Municipal Post Construction Standards

This is a Group Memory of a facilitated meeting held Tuesday, 5-15-2012, in Lincoln, Nebraska. Note that this is the Group Memory and is based on notes taken at the meeting, pictures taken, comments made, and information shared with the group by presenters as part of the following agenda. The intent of creating a collective group memory is to capture the essence of the information shared, comments made, and questions raised during the BMP Tour and it is not meant as a transcript of the BMP Tour. For additional pictures of the tour and BMP Tour maps see the Clean Water Program's web site.

Task Force Members present:
Bob Caldwell
Wilbur Dasenbrock
Pam Dingman
Carl Eskridge
Tom Franti
Paul Johnson
DaNay Kalkowski
Peter Katt
Don Linscott
Rick Onnen
Dave Potter
Reba Schafer
Dennis Scheer
Tim Texel
Jim Wathen

Members of the Public present:
Jim Abel Calit Jha Bill Schmeeckle Phil Wenta

Support Staff and Resources present:
J.B.Dixon, Ted Hartsig, Ben Higgins, Wynn Hjermstad, Ed Kouma, Rock Krzycki, Jared Nelson, Brad Stritmatter, Roger Tiedeman, Ellen Wright, J.J.Yost, Paul Zillig
Facilitators:
Lorrie Benson, Dave Hubbard

AGENDA

Meeting at the **Big Bus** by TOAST (Coffee, Deli, Bar) in Fallbrook
570 Fallbrook Boulevard #105, Lincoln, NE 68521 Tele: 402-261-8859
(Snacks & Water will be provided on the Big Bus and available starting at 11:15 a.m.)

11:30 at the Bus Welcome & Overview of the BMPs Tour

Fallbrook Tour

Lewis Ball Fields

Assurity

Back to Fallbrook

1:15 Arrive back at Fallbrook for a sack Lunch from Toast at CONCORDIA UNIVERSITY
570 Fallbrook Boulevard, Suite #203 after the Tour

Next (and possible final) Clean Water Program Task Force Meeting @ NRD
Tuesday, June 19, 2012 11:30 a.m. to 1:30 p.m.

If needed there could be a final Clean Water Program Task Force Meeting in July @ NRD
Please Save the date of Tuesday, July 17, 2012 from 11:30 a.m. to 1:30 p.m.

***Reminder: additional pictures from the BMP Tour and other
Task Force materials are available at
Lincoln.ne.gov, keyword 'clean water program'***

Mutually Agreed Upon Ground Rules: (Aspirations and Enforced as Appropriate)

- Keep in mind the Overall Goal of Clean Water Task Force: Formulate recommendations for post-construction stormwater best management practices (BMPs) for new development and redevelopment projects for sustainable clean quality water
- Agenda will go out via email prior to each meeting. Please follow and stick to the Agenda
- A hard copy of applicable documents will be handed out at each meeting
- Documents handed out at the meeting will be available prior to each meeting at the Clean Water Task Force website: lincoln.ne.gov keyword: *clean water program*
- Meeting starts at 11:30am and ends not later than 1:30pm
- Please set mobile phones, pagers, radios & computers to vibrate or silent during the meeting
- Any & all process concerns should be raised ahead of time or immediately when they occur
- A written group memory, capturing the essence of the meeting will be provided to the Task Force prior to the next meeting by the facilitators for Task Force review and comment
- Listen first to understand before seeking to be understood
- Be curious and open to learn. Speak for yourself. Communicate your own truth
- Engage in one conversation at a time; keeping to agreed upon agenda, tasks and topics
- Allow for one person talking at a time in a respectful manner to all present
- Participate in and commit yourself to the process of being open and gathering information
- Share ownership of comments, ideas, options, proposals, thoughts and any recommendations
- Be fully present and of the moment. Freedom to express ideas openly is preferred
- Act with professional courtesy and respect towards others with no personal attacks on others
- Have a balanced conversation: Inquire with a curious mind open to new ideas; Acknowledge the other; and Kindly & Respectfully Advocate your ideas with "I Messages"
- Focus is on the future
- Participants can preserve the opportunity to revisit a consensus vote
- The written Group Memory can be amended and added to
- The "Agenda" can be amended, changed, and added to by The Mediation Center (TMC) and comments can be sent to TMC before each meeting for consideration for future meetings

Thank You,
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Group Memory

Clean Water Program Task Force

Facilitated Meeting #6 June 19, 2012
Requirements for Municipal Post Construction Standards
11:30 am to 1:30 pm
At the Lower Platte South Natural Resources District Meeting Room

This is a Group Memory of a facilitated meeting held Tuesday, 6-19-2012, in Lincoln, Nebraska. Note that this is the Group Memory and is based on notes taken at the meeting, flip chart pages, comments made, and information shared with the group by presenters as part of the following agenda. The intent of creating a collective group memory is to capture the essence of the information shared, comments made, and questions presented at the facilitated meeting and it is not meant as a transcript of the meeting.

Task Force Members present:
Bob Caldwell Wilbur Dasenbrock Jeff Emanuel Carl Eskridge Tom Franti Paul Johnson DaNay Kalkowski Peter W. Katt Don Linscott Milo Mumgaard Rick Onnen Brock Peters David Potter Reba Schafer Dennis Scheer Jim Wathen

Members of the Public present:
Vicki Twerdochlib

Support Staff and Resources present:
Devin Biesecker, John Chess, J.B. Dixon, Nicole Fleck-Tooze, Jocelyn Golden, Ben Higgins, Rock Krzycki, J.J. Yost, Paul Zillig
Facilitators:
Lorrie Benson, Dave Hubbard, Sandy Wolfe

AGENDA

- | | |
|--|--------|
| 1. Welcome, Reminders & Mentions | 10 min |
| <ul style="list-style-type: none"> - Consensus – yet Majority Vote - Ground Rules - Legal Memo - Mayor’s Charge to Task Force - Quick Review of Previous Meetings - Apologize for Time Frame – July Meeting can you make it & Vote if needed - Overview of Today – Opportunity for Fresh Poll, then discussion - Questions | |
| 2. Climate and Check-In Poll | 15 min |
| <ul style="list-style-type: none"> - Review of compilation of April’s post-it-note polling and new options - Review of Questions and Ben’s Answers - Fresh Climate Poll explained | |
| 3. Voting (with opportunity to comment on new) Agree or Not | 10 min |
| 4. Review of Votes – areas of majority removed from discussion | 5 min |
| 5. Discussion regarding New Areas Lacking Clear Majority
Or Areas of Concern | 50 min |
| 6. Final Vote | 20 min |
| 7. Wrap Up, Closure | 10 min |

*Reminder: this and other Task Force materials are available at
Lincoln.ne.gov, keyword ‘clean water program’*

Welcome, Reminders & Mentions

- Consensus – yet Majority Vote

- Ground Rules
- Legal Memo
- Mayor's Charge to Task Force
- Quick Review of Previous Meetings
- Apologize for Time Frame – July Meeting can you make it & Vote if needed
- Overview of Today – Opportunity for Fresh Poll, then discussion

First Fresh Look Straw Poll:

Issue #1: New Development Standard Criteria – 90% (0.125")

Agree – 8

Comments: None

Disagree – 8

Comments:

- Want to look at lower standard/80%
- 80%
- Revised criteria at .83" (80%) is OK
- More detail needed on how required criteria is calculated for residential vs. commercial and industrial development
- The 90% would work for residential but not for commercial uses
- Should be at 80%
- Bank credits for extra

Issue #2: Redevelopment Standard Criteria – 80% (0.83")

Agree – 12

Comments: None

Disagree – 4

Comments:

- Should be 1.25" (90%)
- Waivers or credits should be available to offset difficult or expensive situations

Issue #3: Standards Applicable to Areas Equal to or Greater than 1 Acre

Agree – 15

Comments: None

Disagree – 1

Comments:

- Should be all areas
- Transfer maintenance to owner

Issue #4: Exceptions – Single family dwellings not part of a subdivision

Agree – 16
Comments: None

Disagree – 0
Comments: None

Issue #5: Allow for Waivers

Agree – 16
Comments:
- Allow for waivers and cost share

Disagree – 0
Comments: None

Issue #6: Effective Date of Ordinance – Ordinance not applicable to new developments and redevelopments that obtain planning commission approval within:

3 months of ordinance adoption

Agree – 2
Comments:
- Need option to defer some approved developments with plans submitted

Disagree – 14
Comments:
- 1 year effective date
- 1 year
- 12 month effective date
- Should be 12 months
- Should be 6 – 12 months
- One year
- 12 month for implementation
- Held at least 1 year plus exempt current plans unless significantly revised

12 months of ordinance adoption

Agree – 14
Comments: None

Disagree – 2
Comments: None

Issue #7: Requirements for Owner Inspection of BMPs – owner inspection and inspection report required annually.

Agree – 9

Comments:

- Should be every 2 years and inspection by certified individuals

Disagree – 7

Comments:

- Public responsibility cost/expense!!!!
- Incentive
- One year to implement
- More formal system
- Need to establish if this is being required to mitigate effects of development of generally improve water quality

General Discussion Fresh Straw Poll, Areas of Majority & Areas Lacking Clear Majority

Rainfall Event %

- Whatever the standard is fairness is a concern: 80-90%
- Old and new should be treated the same
- Trade-offs with costs
- Question: What sub-basin needs to be approved?
- To comply with EPA regulations need to be by sub-watershed?
- Net result by Lincoln or watershed
- Maybe we need an ordinance by watershed?
- 80% instead of 90% could have impacts such as more monitoring
- Going from 90% to 80% reduces by 33% the water to be filtered
- Keep simple with fewest loopholes, etc.

Inspection/Maintenance

- This is a public benefit so the public should pay
- This would be a burden
- Surface Water Quality Development Project at Antelope Valley is a public benefit.
Public should pay
- JPA tax levy could be reallocated
- Unfair if not public responsibility
- Sidewalks are an example
- Question: Favor implementing storm water utility to care for BMPs?
- Have developers care for initially and then transfer responsibility to city.
- If have a program like the sidewalk program maintenance and repair won't happen when there is no funding
- To what degree are we going to remind homeowners they have a liability to maintain?
- Reminders depend on what kind of BMPs. Rain garden needs much more maintenance than a pond.
- It is impractical to get Home Owners' Associations to buy into this. HOA's are not that active
- The most maintenance and work is in the beginning when being established and then there is less work and maintenance as BMP matures
- HOA's can have difficulty with maintenance over long-term
- Don't know how this will develop – may have contractors similar to yard maintenance

- Inspection not as much of a concern as maintenance and replacement over time
- Many HOAs will use more or larger detention ponds
- In Omaha the city cares for ponds but this is rare, usually cities don't
- In Lincoln ponds are inspected by city but maintained by owner
- 2 discussions: who inspects and who maintains
- It is more complicated than just who inspects and who maintains
- Would have to have standards and guidance regarding what needs to be done for inspection and maintenance
- A requirement to inspect gets people involved
- But . . . will people get involved?
- If City/NRD maintains it won't get citizen buy-in
- HOAs would need capital improvement fund for future maintenance/replacement, etc.
- The question is where does funding come from for capital fund?

Incentives/Credit Banking

- Banking incentives
 - every project is different
 - get credit for exceeding the standard on one development that can be used on another
- Question: Could you sell credits?
- Credits would inspire people to do more
- Credits would deal with reality of tough projects
- Credits could off-set the waivers
- New projects vs. old
- Math in administration – looking at calculations – who maintains credit bank?
- This is a young program and credits may complicate it.
- Need to keep it simple and up front
- Positive incentives
- Want to establish incentive structure to aid and encourage developers to do more
- Part of recommendation to Mayor: Develop banking/incentive structure to encourage developers to do more. Implement this as part of ordinance or with ordinance rather than in the future.
- Cost Share may already be used
- Incentives and banking are 2 different things
- Overwhelming support for incentives
- Concern: will run out of money
- Banking avoids problem of exhausting funds
- If in same watershed the City would benefit
- Would credits have to be used within same basin?
- Different areas flow to different watersheds
- Watershed happens in physical boundary not political boundary
- Should we adopt a different ordinance for each watershed area?
- Should we customize the ordinance by watershed?
- That would not be practical
- Question: Who's responsible if owners don't comply? – The City because it holds the NPDES permit?

Final Vote

Issue #1: New Development Standard Criteria – 90%

Agree – 9

Comments:

- Only with incentive bank

Disagree – 6

Comments: None

Issue #2: Redevelopment Standard Criteria – 80%

Agree – 12

Comments: None

Disagree – 2

Comments: None

Issue #3: Standards Applicable to Areas Equal to or Greater than 1 Acre

Agree – 12

Comments: None

Disagree – 2

Comments: None

Issue #4: Exceptions – Single family dwellings not part of a subdivision

Agree – 14

Comments: None

Disagree – 1

Comments: None

Issue #5: Allow for Waivers

Agree – 13

Comments: None

Disagree – 2

Comments: None

Issue #6: Effective Date of Ordinance – Ordinance not applicable to new developments and redevelopments that obtain planning commission approval within:

12 months of ordinance adoption

Agree – 12
Comments: None

Disagree – 0
Comments: None

Issue #7A: Requirements for Annual Inspection

Public – 6
Comments: None

Private Owner – 8
Comments: None

Issue #7B: Requirements for Maintenance

Public – 6
Comments: None

Private Owner – 9
Comments: None

Issue #7C: Requirements for Replacement

Public – 12
Comments: None

Private Owner – 3
Comments: None

Continued Discussion of Incentive Program

- Question: Does the science work for banking/credits?

Hand Vote by CWP Task Force, June 19, 2012, at 1:15 p.m. for Incentive Program

Overwhelming majority of Task Force support Incentive/Credit/Banking Program.

“Banking/Credit” System: If possible to make it work scientifically/administratively the CWP Task Force Recommends

Agree – 12
Comments:
- On watershed basis

- Agree only if it is possible to make this work from an engineering/”scientific” perspective. Don’t diminish the standard.

Disagree – 0

Comments: None

Next Steps

Public Works will draft an ordinance based on the Clean Water Program Task Forces’ final recommendations as determined by majority vote and email the draft to Task Force members.

Concern: Nobody should interpret the majority vote outcomes on the Task Force recommendations as an overwhelming consensus from Task Force, because on several of the Task Force recommendations the majority vote was very close.

Thank You,

Lorrie Benson, David Hubbard, & Sandy Wolfe

THE MEDIATION CENTER

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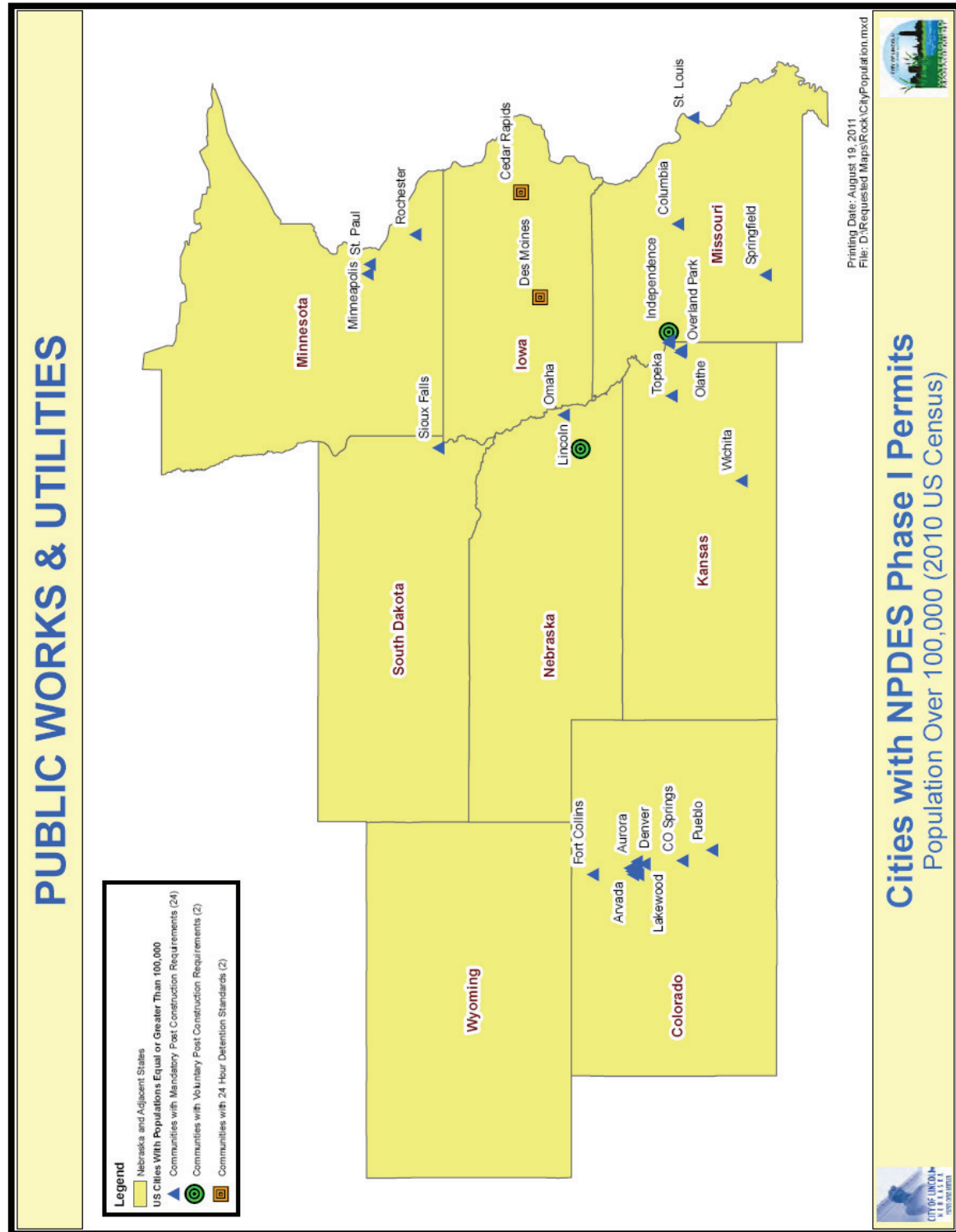
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***Reminder: this and other Task Force materials are available at
Lincoln.ne.gov, keyword ‘clean water program’***

J. Cities with NPDES Permits



K. Stormwater Phase II Final Rule (to date, i.e. from 2005)

Part 40 of the Code of Federal Regulations (CFR), Section 122.26(d)(2)(iv)(D) is the regulation requiring Best Management Practices (BMPs) be incorporated into the planning of areas of development and re-development for cities with a population of 100,000 or greater (Phase I of the National Pollutant Discharge Elimination System (NPDES) program). On March 10, 2003 Phase II of the NPDES program permitting requirements lowered the regulatory threshold for construction site disturbance from five, to one acre, and also required communities with a population of 10,000 and up to 99,999 persons to comply with the Clean Water Act mandates for the NPDES program. The following EPA Fact Sheet was created for the Phase II communities, but the program requirements equally apply to the Phase I communities (which Lincoln is included in).



Stormwater Phase II Final Rule

Post-Construction Runoff Control Minimum Control Measure

Stormwater Phase II Final Rule Fact Sheet Series

Overview

1.0 – Stormwater Phase II Final Rule: An Overview

Small MS4 Program

2.0 – Small MS4 Stormwater Program Overview

2.1 – Who's Covered? Designation and Waivers of Regulated Small MS4s

2.2 – Urbanized Areas: Definition and Description

Minimum Control Measures

2.3 – Public Education and Outreach

2.4 – Public Participation/Involvement

2.5 – Illicit Discharge Detection and Elimination

2.6 – Construction Site Runoff Control

2.7 – Post-Construction Runoff Control

2.8 – Pollution Prevention/Good Housekeeping

2.9 – Permitting and Reporting: The Process and Requirements

2.10 – Federal and State-Operated MS4s: Program Implementation

Construction Program

3.0 – Construction Program Overview

3.1 – Construction Rainfall Erosivity Waiver

Industrial "No Exposure"

4.0 – Conditional No Exposure Exclusion for Industrial Activity

This fact sheet profiles the Post-Construction Runoff Control minimum control measure, one of six measures that the operator of a Phase II regulated small municipal separate storm sewer system (MS4) is required to include in its stormwater management program in order to meet the conditions of its National Pollutant Discharge Elimination System (NPDES) permit. This fact sheet outlines the Phase II Final Rule requirements for post-construction runoff control and offers some general guidance on how to satisfy those requirements. It is important to keep in mind that the small MS4 operator has a great deal of flexibility in choosing exactly how to satisfy the minimum control measure requirements.

Why Is The Control of Post-Construction Runoff Necessary?

Post-construction stormwater management in areas undergoing new development or redevelopment is necessary because runoff from these areas has been shown to significantly affect receiving waterbodies. Many studies indicate that prior planning and design for the minimization of pollutants in post-construction stormwater discharges is the most cost-effective approach to stormwater quality management.

There are generally two forms of substantial impacts of post-construction runoff. The first is caused by an increase in the type and quantity of pollutants in stormwater runoff. As runoff flows over areas altered by development, it picks up harmful sediment and chemicals such as oil and grease, pesticides, heavy metals, and nutrients (e.g., nitrogen and phosphorus). These pollutants often become suspended in runoff and are carried to receiving waters, such as lakes, ponds, and streams. Once deposited, these pollutants can enter the food chain through small aquatic life, eventually entering the tissues of fish and humans. The second kind of post-construction runoff impact occurs by increasing the quantity of water delivered to the waterbody during storms. Increased impervious surfaces (e.g., parking lots, driveways, and rooftops) interrupt the natural cycle of gradual percolation of water through vegetation and soil. Instead, water is collected from surfaces such as asphalt and concrete and routed to drainage systems where large volumes of runoff quickly flow to the nearest receiving water. The effects of this process include streambank scouring and downstream flooding, which often lead to a loss of aquatic life and damage to property.

What Is Required?

The Phase II Final Rule requires an operator of a regulated small MS4 to develop, implement, and enforce a program to reduce pollutants in post-construction runoff to their MS4 from new development and redevelopment projects that result in the land disturbance of greater than or equal to 1 acre. The small MS4 operator is required to:

- ☐ Develop and implement strategies which include a combination of structural and/or non-structural best management practices (BMPs);
- ☐ Have an ordinance or other regulatory mechanism requiring the implementation of post-construction runoff controls to the extent allowable under State, Tribal or local law;

- ☐ Ensure adequate long-term operation and maintenance of controls;
- ☐ Determine the appropriate best management practices and measurable goals for this minimum control measure.

What Is Considered a “Redevelopment” Project?

The Phase II Final Rule applies to “redevelopment” projects that alter the “footprint” of an existing site or building in such a way that there is a disturbance of equal to or greater than 1 acre of land. Redevelopment projects do not include such activities as exterior remodeling. Because redevelopment projects may have site constraints not found on new development sites, the Phase II Final Rule provides flexibility for implementing post-construction controls on redevelopment sites that consider these constraints.

What Are Some Guidelines for Developing and Implementing This Measure?

This section includes some non-structural and structural BMPs that could be used to satisfy the requirements of the post-construction runoff control minimum measure. It is important to recognize that many BMPs are climate-specific, and not all BMPs are appropriate in every geographic area. Because the requirements of this measure are closely tied to the requirements of the construction site runoff control minimum measure (see Fact Sheet 2.6), EPA recommends that small MS4 operators develop and implement these two measures in tandem.

☐ Non-Structural BMPs

- **Planning Procedures.** Runoff problems can be addressed efficiently with sound planning procedures. Local master plans, comprehensive plans, and zoning ordinances can promote improved water quality in many ways, such as guiding the growth of a community away from sensitive areas to areas that can support it without compromising water quality.
- **Site-Based BMPs.** These BMPs can include buffer strip and riparian zone preservation, minimization of disturbance and imperviousness, and maximization of open space.

☐ Structural BMPs

- **Stormwater Retention/Detention BMPs.** Retention or detention BMPs control stormwater by gathering runoff in wet ponds, dry basins, or multichamber catch basins and slowly releasing it to receiving waters or drainage systems. These practices can be designed to both control stormwater volume and settle out particulates for pollutant removal.

- **Infiltration BMPs.** Infiltration BMPs are designed to facilitate the percolation of runoff through the soil to ground water, and, thereby, result in reduced stormwater runoff quantity and reduced mobilization of pollutants. Examples include infiltration basins/trenches, dry wells, and porous pavement.
- **Vegetative BMPs.** Vegetative BMPs are landscaping features that, with optimal design and good soil conditions, remove pollutants, and facilitate percolation of runoff, thereby maintaining natural site hydrology, promoting healthier habitats, and increasing aesthetic appeal. Examples include grassy swales, filter strips, artificial wetlands, and rain gardens.

What Are Appropriate Measurable Goals?

Measurable goals, which are required for each minimum control measure, are intended to gauge permit compliance and program effectiveness. The measurable goals, as well as the BMPs, should reflect needs and characteristics of the operator and the area served by its small MS4. Furthermore, the measurable goals should be chosen using an integrated approach that fully addresses the requirements and intent of the minimum control measure.

EPA has developed a Measurable Goals Guidance for Phase II MS4s that is designed to help program managers comply with the requirement to develop measurable goals. The guidance presents an approach for MS4 operators to develop measurable goals as part of their stormwater management plan. For example, an MS4 program goal might be to reduce by 30 percent the road surface areas directly connected to storm sewer systems (using traditional curb and gutter infrastructure) in new developments and redevelopment areas over the course of the first permit term. Using “softer” stormwater conveyance approaches, such as grassy swales, will increase infiltration and decrease the volume and velocity of runoff leaving development sites. Progress toward the goal could be measured by tracking the linear feet of curb and gutter not installed in development projects that historically would have been used.

For Additional Information

Contacts

- ☞ U.S. EPA Office of Wastewater Management
<http://www.epa.gov/npdes/stormwater>
Phone: 202-564-9545
- ☞ Your NPDES Permitting Authority. Most States and Territories are authorized to administer the NPDES Program, except the following, for which EPA is the permitting authority:

Alaska	Guam
District of Columbia	Johnston Atoll
Idaho	Midway and Wake Islands
Massachusetts	Northern Mariana Islands
New Hampshire	Puerto Rico
New Mexico	Trust Territories
American Samoa	
- ☞ A list of names and telephone numbers for each EPA Region and State is located at <http://www.epa.gov/npdes/stormwater> (click on “Contacts”).

Reference Documents

- ☞ EPA’s Stormwater Web Site
<http://www.epa.gov/npdes/stormwater>
 - Stormwater Phase II Final Rule Fact Sheet Series
 - Stormwater Phase II Final Rule (64 *FR* 68722)
 - National Menu of Best Management Practices for Stormwater Phase II
 - Measurable Goals Guidance for Phase II Small MS4s
 - Stormwater Case Studies
 - And many others
- ☞ Other EPA Web sites
 - Ordinance Database
www.epa.gov/owow/nps/ordinance
 - Urban Nonpoint Source Guidance
www.epa.gov/owow/nps/urbanmm/index.html
 - Low Impact Development Web site
www.epa.gov/owow/nps/lid