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# Fountain Creek Watershed Policy Evaluation Report

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## **1 Background**

In order to protect and restore the Fountain Creek Watershed, regulations and policies must address the non-point source origins of problems in the watershed and recognize specific issues related to watershed health, particularly water quality, erosion, sedimentation and flooding. Regulatory requirements can effect land uses and thus influence drainage patterns, rates and volumes, water quality and other factors. These factors, in turn, affect watershed health and will influence resulting impacts to downstream communities. It is important to determine how progress can be achieved to ensure that each of the 11 local governments implement regulations that consider the regional and cumulative effects of their programs and activities within the Fountain Creek Watershed.

Generally, it is more cost effective to prevent water quantity and quality impacts through proper planning practices than it is to treat those impacts. This recognition is important because limited funds are available in the prevention and treatment of water quantity and quality impacts. The most effective way of addressing these impacts is through the development, consistent application, and enforcement of local regulations and incentives to minimize possible impacts. Policies should be implemented as deemed locally appropriate through adoption and enforcement of development review procedures, and through financial or other incentives.

The Fountain Creek Watershed Flood Control and Greenway District (the District) undertook this policy evaluation project, through a grant from the Colorado Water Conservation Board (CWCB), to encourage the implementation of applicable policy recommendations contained in the Fountain Creek Watershed Vision Task Force Strategic Plan and the U.S. Army Corps of Engineers Fountain Creek Watershed Study. These plans have been adopted by the District Board.

The District contracted with Matrix Design Group (Matrix) to complete this project. The District Technical Advisory Committee (TAC) established a subcommittee to work with Matrix to provide information, review sections of the report, and help coordinate a workshop.

## 2 Purpose

The purpose of this project is to encourage governments, businesses and landowners operating within the watershed to adopt policies and operating practices that promote the protection of watershed health by:

- Educating planners, elected officials, scientists and engineers about the need for promoting watershed health and a range of methods and policies that can be utilized.
- Educating planners, elected officials, scientists and engineers regarding the importance of regulations, policies and opportunities that exist for improving regulations and policies.
- Developing a basis for governments and stakeholders to engage in future discussions regarding policies and regulations that promote watershed health and develop uniform criteria addressing land use and drainage criteria.

## 3 Overview

This project will consist of five tasks:

- 1) Synthesis of existing information;
- 2) Development of a policy evaluation report that integrates the review of local policies with those already being evaluated through the City of Colorado Springs stormwater manual project;
- 3) Dissemination of report for review and comment by the District Technical Advisory Committee (TAC), District Citizens Advisory Group (CAG) and other stakeholders;
- 4) Presentations and a workshop which will consist of a presentation on the policy evaluation report and breakout groups to discuss implementation of the strategies; and
- 5) Formation of Plan implementation Groups.

This project will build on and expand upon Section VI of the 2003 *Fountain Creek Watershed Plan*, Summary of Technical and Policy Management Strategies, and will evaluate local, state and federal regulations and policies. It will also recommend regulations and/or policies used in other areas of Colorado and throughout the U.S. that might be applicable to the Fountain Creek Watershed. Evaluation of existing regulations and policies for each of the 11 local governments will help provide a common, consistent basis for decision-making.

The presentations and a workshop will be used to review the policy evaluation report, provide an overview of the potential strategies and the status of the City of Colorado Springs stormwater manual project and formation of breakout groups to discuss implementation of recommendations.

#### **4 Summary of the 2003 *Fountain Creek Watershed Plan*, Section 6 Policy and Technical Management Strategies**

In November 2003, PPACG published a revision of the *Fountain Creek Watershed Plan* (the Plan) that included a summary of local, state, and federal policies relevant to the Fountain Creek Watershed. This summary was included as Section 6 of the Plan and was entitled, "Summary and Evaluation of Policy and Technical Management Strategies". Section 6 was divided into 4 primary subsections with an appendix summarizing local regulatory programs. The following excerpt is from page 6-1 of the *Fountain Creek Watershed Plan* (November 2003) and describes the contents of Section 6.

- "Section 6.1 outlines federal and state regulatory programs that affect activities within the watershed.
- Section 6.2 contains a comprehensive summary of local (county and municipal) regulatory programs. A matrix summarizing local regulatory programs is included as Appendix F.
- Section 6.3 identifies a broad range of potential management practices that protect and restore watershed health.
- Section 6.4 contains general channel stabilization methods for problems in the Fountain Creek Watershed."

Since 2003, continued policy and technical planning progress has been made in the Fountain Creek Watershed including the completion of the U.S. Army Corps of Engineers Fountain Creek Watershed Study and the summary *Fountain Creek Watershed Management Plan* (January 2009), the *Fountain Creek Vision Task Force Strategic Plan* (March 2009), the City of Colorado Springs Stormwater Management Assessment and Standards Development project (ongoing), as well as advances in stormwater management policies, strategies, and techniques in local jurisdictions and across the country.

#### **4.1 Federal and State Regulatory Programs**

The summary of federal and state regulatory programs provided in Section 6.1 of the Plan is still applicable and provides a good description of federal and state regulations related to 7 specific areas:

1. Floodplain
2. Riparian and Wetland Habitat
3. Stormwater and Urban Runoff
4. Construction Discharge Permits
5. Water Quality
6. Water Resource Development
7. Wastewater Treatment Plant and Industrial Discharge Permits.

One noteworthy addition to the Riparian and Wetland Habitat Section 6.1.2.3, related to the Colorado Division of Wildlife, since renamed the Colorado Division of Parks and Wildlife, is Senate Bill 40 (33-5-101-107, CRS 1973). Senate Bill 40 requires any agency of the state to obtain wildlife certification from the Division when the agency plans construction in "...any stream or its bank or tributaries...". The bill emphasizes the protection of fishing waters, but does cite the need to protect and preserve all fish and wildlife resources associated with streams in Colorado. The bill would also apply to state-funded (e.g. CWCB or GOCO grants) projects completed by local jurisdictions.

Many of the regulatory programs described in Section 6.2 of the Plan are periodically updated. It is always recommended that planners and designers working in the Fountain Creek Watershed coordinate with the respective agencies at the beginning of a project.

#### **4.2 Local Regulatory Programs**

The summary of local regulatory programs provided in Section 6.2 of the Plan describes local regulations and ordinances that affect stormwater management, grading and erosion control, floodplain requirements, water quality protection, and related development, land use, subdivision, or streets criteria in the 3 counties and 8 municipalities within the Fountain Creek Watershed as of 2003. A comprehensive tabular summary of local regulations is provided in a Policy Matrix (Appendix F of the Plan). The Policy Matrix allows for comparison of regulatory categories that are common across jurisdictions in the watershed and identifies categories where documents or policies do not exist or are not comprehensive. A more detailed discussion in the Plan's subsequent sections indicates both the common points and

differences in policies and ordinances throughout the watershed. While this discussion is still relevant, recent policy survey results, compiled for this project and described in Section 5 below, indicate changes in local regulatory programs since 2003.

#### **4.3 Policies in Other Watersheds**

The summary of watershed organizations in Colorado and elsewhere in the U.S. is provided in Section 6.3 of the Plan and describes potential policy and management strategies and their relevance to the Fountain Creek Watershed. Notable additions to the list of organizations include AWARE Colorado and the Rocky Mountain Land Institute. A summary of the resources and strategies available from these organizations is provided in Section 6 below. In addition, a comprehensive assessment of stormwater management policies along the Front Range and throughout the U.S. was completed as part of the City of Colorado Springs Stormwater Management Assessment and Standards Development project and is summarized in Section 5.1 below.

#### **4.4 Technical Strategies**

The summary of technical strategies in Section 6.4 of the Plan section provides information and references on technical design criteria for best management practices (BMPs) and channel stabilization techniques. While still relevant, the channel design criteria being prepared for the City of Colorado Springs stormwater manual project will provide more recent, comprehensive guidance.

### **5 Recent Local Policy Evaluation Survey**

In April 2012, Matrix distributed a brief local policy survey via email to the 3 counties and 8 municipalities within the Fountain Creek Watershed. The email distribution included both planning and engineering representatives from each jurisdiction, where applicable. The email provided background on this project and provided a link to an internet survey, entitled "Fountain Creek Watershed Policy Evaluation Survey". The survey posed 6 questions as provided below. Attached to the email were the draft introductory chapters (Chapters 1, 2, and 3) from the City of Colorado Springs Drainage Criteria Manual project that were referred to in several of the survey questions. Major themes from these chapters are summarized in the Section 5.1.

1. Has your jurisdiction established any new policies, regulations, or criteria for stormwater, floodplain management, drainage, detention, water quality, grading,

erosion control or related development, land use, subdivision, or streets criteria or comprehensive plan since 2003, when the summary of local policies was completed for the PPACG Fountain Creek Watershed Plan? If so, please inform us of what's new and how we can obtain a copy?

2. Is there anything in the draft proposed Chapters 1, 2, & 3 of the City of Colorado Springs Stormwater Management Manual that you find inconsistent with your jurisdictions policies?
3. Should the stormwater policies proposed in Chapters 1, 2, & 3 of the City of Colorado Springs be proposed for watershed-wide adoption, what are the policy issues/barriers/impediments that may exist for your jurisdiction to adopt?
4. Do you plan on implementing the new City of Colorado Springs Stormwater Management Manual in your jurisdiction once it is completed?
5. What unique technical or policy problems exist in your jurisdiction that aren't addressed by the Colorado Springs manual (e.g. steep slopes, vegetation, climate, etc.)?
6. Is there any other information or feedback that you would like to provide us for this effort?

### **5.1 City of Colorado Springs Drainage Criteria Manual Chapters 1, 2, & 3**

The City of Colorado Springs is nearing completion on a multi-year project to assess their stormwater management program and develop new standards and a new drainage criteria manual. The project has involved considerable policy research, stakeholder participation, and the development of new draft chapters for the manual (12 chapters to date). As noted previously, a comprehensive assessment of stormwater management policies along the Front Range and throughout the U.S. was completed as part of the City of Colorado Springs project. As a community represented in the District, the City of Colorado Springs effort will directly help this project by providing information on stormwater management practices that may be appropriate for all of the local governments within the watershed.



During the early stages of this policy evaluation project, the project subcommittee of the District TAC evaluated using the draft chapters of the City's drainage criteria manual as a foundation for this policy effort. The TAC subcommittee determined that, given the exhaustive nature of the City's research and draft chapter development, this policy project and the associated survey should build from the City's effort. The City's provisions, policies, and principles for stormwater management are defined in draft Chapters 1, 2, and 3, respectively. These chapters are attached in Appendix 10.1.

The draft introductory chapters were distributed with the "Fountain Creek Watershed Policy Evaluation Survey" email. The chapters were provided for background and were referred to in several of the survey questions. Some of the major themes from the three chapters are outlined below.

#### 5.1.1 City of Colorado Springs Stormwater Major Themes

The *City of Colorado Springs Drainage Criteria Manual* Draft Chapter 1 defines the general provisions for the proposed stormwater criteria. Key elements include enactment authority, jurisdiction, purpose, and enforcement along with provisions for amendments, revisions, review, and variances. Should the manual be considered for watershed-wide adoption or adoption by the District it is likely that the text in this chapter would require revision. As an alternative, if the manual is adopted by each jurisdiction then additions or exceptions could be included in that jurisdiction's enabling resolution. One noteworthy provision in the chapter delineates the items not specifically addressed "shall follow the provisions of the Urban Drainage and Flood Control District's (UDFCD) Urban Storm Drainage Criteria Manual, Volumes 1, 2, and 3 (UDFCD Manual), which is incorporated in these *Criteria* by reference."

The City of Colorado Springs Draft Chapter 2 defines the stormwater management principles reflected in the proposed criteria. Key principles include:

- Drainage is a regional multi-jurisdictional, or watershed-wide, phenomenon does not respect governmental boundaries.
- Urbanization and the associated impervious surfaces and infrastructure introduces significantly increased flows, both rate and volume, that can cause negative impacts such as flooding, water quality degradation, erosion and sedimentation, and pose risks to man-made improvements and natural systems.
- The effect of development is most pronounced by runoff from the smaller, more frequent storm events.

- Resources, both financial and personnel, necessary to implement stormwater plans and improvements are limited.
- Natural systems possess a number of beneficial features that should be preserved and incorporated into the design of the stormwater management system.
- An assessment of potential downstream impacts such to flooding, erosion and sedimentation, and water quality should be based on quantifiable measures.
- Operation and maintenance procedures and activities are essential to the success of stormwater infrastructure.
- The preservation of floodplains serves to reduce flood flows, minimize hazards, preserve habitat and open space, improve water quality, create a more livable environment, and protect the public health, safety, and welfare.

The City of Colorado Springs Draft Chapter 3 defines the stormwater management policies incorporated in the proposed criteria. Selected policies include:

- A jurisdictionally unified approach to drainage is necessary to insure an integrated and comprehensive regional plan.
- Individual plans should be consistent with the regional stormwater plan as well as plans for land use and infrastructure.
- Drainageways and stormwater runoff can be a resource having aesthetic, recreational, and water quality value compatible with adjacent land uses and Colorado water law.
- Initial planning must identify important natural features or environmentally sensitive areas, such as floodplains, riparian areas or wetlands and protection of those areas should be incorporated into the site plan or development plan concept.
- Site planning and design techniques should be incorporated, which reduce imperviousness, minimize directly connected impervious areas and increase infiltration in order to decrease the rate and volume of stormwater runoff from a site.
- Best Management Practices (BMPs) should be implemented to minimize and mitigate increases in runoff and pollutant loads due to development to reduce runoff quantity, improve runoff quality, and reduce project costs.
- Natural channel characteristics should be preserved and enhanced wherever possible to provide ecological and hydrologic benefits such as riparian habitat, flood storage and opportunity for groundwater recharge and reduced improvement costs.

- Major drainageways shall be preserved in their natural state, to the extent possible, and stabilization measures shall be designed to complement and enhance their natural character.
- Encroachment into the regulatory floodplains is strongly discouraged and encroachment into unregulated floodplains is also undesirable as both provide riparian amenities including habitat, aesthetics, and recreation, and avoidance provides protection for public safety and infrastructure.
- Detention storage facilities serve a critical role in the management of increased runoff due to development and must be carefully integrated into the first stages of planning.
- Previous detention schemes have been ineffective in mitigating the impacts of development on downstream drainageways.
- Detention storage facilities should be designed to mitigate the full range of developed condition runoff rates and volumes by mimicking runoff from the undeveloped basin.
- “Full-Spectrum Detention” provides the best known opportunity to mimic undeveloped runoff rates and volumes.
- Full-spectrum detention ponds should be placed on tributaries where the contributing drainage area is less than 1sq mi to accomplish important stormwater management goals including preservation of natural channels, habitat, and floodplains, as well as proving water quality benefits.
- When public improvements that are necessary to properly manage stormwater runoff, mechanisms for funding the improvements are required and should equitably distribute the construction and maintenance costs in proportion to the benefits received as determined through the drainage basin fee program.
- Design of all stormwater management facilities must be performed with access and short-term and long-term operation and maintenance being priority considerations and an operation and maintenance plan must be developed.
- The construction of stormwater management facilities will require permitting in compliance with local, state, and federal regulatory programs.

## **5.2 Summary of Local Jurisdictions Survey Responses**

Matrix received responses from 6 of the 8 local municipalities and all 3 counties. The responses are summarized below.

1. *Has your jurisdiction established any new policies, regulations, or criteria for stormwater, floodplain management, drainage, detention, water quality, grading, erosion control or*

*related development, land use, subdivision, or streets criteria or comprehensive plan since 2003, when the summary of local policies was completed for the PPACG Fountain Creek Watershed Plan? If so, please inform us of what's new and how we can obtain a copy?*

The degree of policy updates varied by jurisdiction with most communities reporting amendments to or adoption of new regional or comprehensive plans. A few of the notable policy changes included:

- engineering criteria specifications update and adoption
- stormwater and erosion control regulations adoption by reference
- streamside ordinance revision and streamside design manual update
- new pavement design and construction standards which include porous asphalt pavement as an option
- code amendments to revamp land development, subdivision and zoning regulations
- revision of annexation language to require the control of flood flows and volumes to the maximum extent practical and add water quality requirement
- as noted previously, the City of Colorado Springs is developing a new drainage criteria manual

The new regulations and design criteria/manuals noted above are available through each jurisdiction's website.

2. *Is there anything in the draft proposed Chapters 1, 2, & 3 of the City of Colorado Springs Stormwater Management Manual that you find inconsistent with your jurisdictions policies?*

The response to this question was evenly split between "no"; there was not anything in the proposed chapters that was inconsistent, and "don't know"; because they have not yet reviewed the Colorado Springs chapters. However, one municipality did note that their jurisdiction would allow on-site and underground detention and would not have a drainage basin fee program. One county commented on the need for policy clarification with respect to when permanent water quality best management practices will be required and responsibility for inspection and maintenance. They also noted the need to clarify the use of drainage basin planning studies to identify needed and reimbursable improvements within a basin.

3. *Should the stormwater policies proposed in Chapters 1, 2, & 3 of the City of Colorado Springs be proposed for watershed-wide adoption, what are the policy issues/barriers/impediments that may exist for your jurisdiction to adopt?*

Most communities noted the obvious process of approval by their respective council or board. One municipality noted that they had recently adopted the current version of the City of Colorado Springs Drainage Criteria Manual and that it was relatively easy. They recommended all jurisdictions adopt the new manual and include any necessary additions or exceptions in the enabling resolution or ordinance. A couple of municipalities noted the demands on personnel and limited budget/personnel resources as a barrier. One respondent noted that they would not be amenable to adopting anything that “does not result in a direct benefit to our citizens and/or goes beyond the impacts that we create.” Another jurisdiction commented that the proposed chapters do not provide enough flexibility for implementation throughout the watershed.

4. *Do you plan on implementing the new City of Colorado Springs Stormwater Management Manual in your jurisdiction once it is completed?*

The overwhelming response to this question was “yes”; they plan on implementing. One municipality added “with modifications”. The outlying responses were “probably not” and “don’t know”.

5. *What unique technical or policy problems exist in your jurisdiction that aren’t addressed by the Colorado Springs manual (e.g. steep slopes, vegetation, climate, etc.)?*

The examples in the question of steep slopes, differing climate or rainfall, and differing vegetation rang true with most respondents. One respondent noted differing soils. One county noted that water quality impairment and pending Total Maximum Daily Load requirements on Fountain Creek is not addressed and added that more specific water quality best management practices standards may be required. One municipality added the use of specific drainage structures (e.g. inlets) unique to their jurisdiction that would have to be incorporated for application of the Colorado Springs manual in their community. Another municipality noted the need for

consideration of gravel roads for application in their community. One respondent added that the differing climate would necessitate differing irrigation requirements.

6. *Is there any other information or feedback that you would like to provide us for this effort?*

One respondent commented that the draft chapters do not allow much flexibility from a water quality regulatory perspective. One respondent thought that more specific design and maintenance standards were needed for plant materials in detention ponds along with associated irrigation and weed management guidelines. Another respondent noted lack of funding for comprehensive drainage planning and floodplain studies/remapping as an issue in their community.

## **6 Policies Recommended by Others to Protect Watershed Health**

### **6.1 Other Jurisdictions - City of Colorado Springs Stormwater Assessment**

In, 2009 Wright Water Engineers (WWE) and Matrix reviewed targeted storm drainage criteria manuals from within Colorado and around the U.S. to identify themes, criteria and approaches that the City might consider as part of its drainage criteria manual update. The review was summarized in a memorandum which is attached in Appendix 10.2. This memorandum built on an effort WWE completed in 2004 as part of their work on the Denver Water Quality Management Plan, which is an attachment to the memo and also included in the appendix.

Colorado manuals reviewed included the City of Colorado Springs, the UDFCD Criteria Manual, Arapahoe County, Douglas County, Boulder, Fort Collins, Pueblo and Fort Carson. Additional manuals from around the country included the Mid America Regional Council (MARC), Kansas City American Public Works Association (APWA) stormwater guidance, San Diego, Portland, Prince George's County, Maryland and Brunswick County, North Carolina. Also reviewed, was information and guidance from organizations and agencies including the USEPA, United States Army Corps of Engineers (USACE) the Center for Watershed Protection, the Low Impact Development Center and others.

Many of the key themes have been since been incorporated into the draft chapters of the City of Colorado Springs manual as outlined above. The following selected national themes were excerpted from the memo:

- “Comprehensive approaches are being used to address drainage, flooding, erosion, aquatic life, habitat, and water quality in an integrated manner. There is also a shift in philosophy from “water disposal” to “water as an overall resource.”
- Stormwater management approaches that are multi-layered, combining a variety of structural and non-structural practices, are advocated and implemented. Particularly for Low Impact Development (LID) designs, clear guidance is needed for non-structural practices such as preservation of soils with high infiltration capacity.
- Watershed-based approaches are being used for planning and problem solving. One of the primary conclusions from the [National Research Council] (2008) was that a watershed-based approach is needed to protect the nation’s waterways. This can be challenging, particularly when watersheds cross political jurisdictions. The Drainage Basin Master Plan concept used in Colorado Springs agrees well with the watershed approach.
- Storm runoff volume reduction practices are being used in the majority of these communities. These practices include a variety of LID techniques such as bioretention, permeable pavement, etc.
- Strong public education campaigns in combination with extensive web sites are substantive components of many programs. Education is not an “afterthought”— it is being aggressively used in several of these communities as a key strategy to improve runoff quality. If Colorado Springs wanted to expand its public education program, there are many excellent examples from which to choose.
- Significant financial investments, spanning from several hundred thousand to several million dollars, have been required for these communities to complete their planning processes. Most of the communities also recognize that significant future expenditures from tens to hundreds of million dollars will be required to meet their future goals and are planning accordingly. “

## **6.2 Recommendations and Goals from the U.S. Army Corps of Engineers Fountain Creek Watershed Management Plan and the Fountain Creek Vision Task Force Strategic Plan**

The U.S. Army Corps of Engineers developed a set of general recommendations for the Fountain Creek Watershed related to development, rehabilitation/preservation, modeling/project design, and administration through discussions with project sponsors and stakeholders and analysis of the baseline conditions data and modeling. These

recommendations along with specific project recommendations were outlined in the *Fountain Creek Watershed Management Plan* published in January 2009 as a capstone to the comprehensive watershed study.

Then, in March 2009 the Fountain Creek Vision Task Force published a strategic plan for the watershed that included goals, objectives, and strategies for “Flooding and Stormwater Management”, “Water Quality and Sedimentation”, and “Land Use Planning and Development” among nine topic areas.

These plans have been adopted by the District Board as guiding documents. As such, the combined direction from these two plans were compiled into a goals and recommendations matrix and adopted by the District Board in 2010. The matrix identifies responsibility for accomplishing the goal or recommendation and associated commentary. The goals and recommendations matrix is attached in Appendix 10.3.

### **6.3 Better Site Design Guidelines**

Better Site Design, is a design and planning policy approach compiled by the Center for Watershed Protection. Like Low-Impact Development, Environmentally-Sensitive Development, and Green Infrastructure, Better Site Design guidelines are intended to minimize the negative impacts of new development on water resources.

#### **6.3.1 Community Codes and Ordinances Worksheet.**

The Better Site Design Community Codes & Ordinances Worksheet is a simple worksheet that can be used to see how the local development rules in a community stack up against the model development principles outlined in the Better Site Design Handbook. The worksheet consists of a series of questions that correspond to each of the model development principles. A blank Community Codes and Ordinances Worksheet is attached as Appendix 10.4.

#### **6.3.2 Community Results.**

In 2008, several of the community representatives participating in the Fountain Creek Vision Task Force completed the Better Site Design worksheet for their jurisdiction. Generally, the total scores for the communities indicated an “inadequate” level of codes and ordinances when compared to the Better Site Design Handbook model development principles. The highest ranking opportunities for ordinance improvement were related to street widths, buffers, land conservation incentives, open space management, and parking. A summary of



the scoring results and opportunities ranking from the 2008 exercise is attached as Appendix 10.5.

Matrix completed the worksheet for this policy project using local representative standards. For the purposes of this evaluation, if it was not definitive which way a current policy could be applied or interpreted, Matrix selected the lesser score to consider the “worst case”. The community score was calculated at 62 out of 100 indicating an “inadequate” level and confirming previous results. Some of the lowest scores were related to development features including street width, right-of-way width, cul-de-sac radius, lot setbacks, and driveway width. These results emphasize the importance of the integration of stormwater management and water quality with site planning.

#### **6.4 Rocky Mountain Land Use Institute**

The Rocky Mountain Land Use Institute of the Sturm College of Law at the University of Denver pioneered the *Sustainable Community Development Code Framework* to provide a comprehensive and user-friendly, the framework that “embeds the best sustainability ideas in actual land use laws by way of an information and evaluation framework, aligning means with ends. It allows municipalities, regions and states to seamlessly audit and upgrade their development laws to remove barriers, create incentives and fill regulatory gaps based on a core set of sustainability objectives.” The Code Framework is available on the internet at <http://www.law.du.edu/index.php/rmlui/rmlui-practice/code-framework>.

##### **6.4.1 Goals outlined within the Sustainable Community Development Code**

- Mimic predevelopment hydrology to meet water quality and channel protection goals using natural system functions (infiltration, absorption and evapotranspiration)
- Reduce negative impacts of increased imperviousness on waterways, riparian areas and overall water quality
- Developed land should mimic/function similar to undeveloped land

##### **6.4.2 Community Objectives/Opportunities to Advance Sustainable Goals**

- Remove regulatory obstacles to LID/Green Infrastructure Design
- Provide incentives to encourage developments to use LID/Green Infrastructure Design
- Provide opportunities for LID techniques in the public right of way
- Provide regulatory guidance on LID/Green Infrastructure design
- Require that land development mimic pre-development hydrology

- Require that redevelopment incorporate LID/green infrastructure approaches to restore pre-development hydrology to the maximum extent possible
- Address offsite costs of drainage-based design

#### 6.4.3 Land Use Planning and Policy Considerations include among others:

- Reduce minimum off-street parking standards
- Permit or encourage flush curbs or wheel stops and sumped landscape islands in parking lots
- Provide same review timeframe for LID design projects
- Provide credit towards open space dedication and set-aside requirements for protection of sensitive natural areas and wildlife habitat
- Allow pervious materials for sidewalks in accordance with ADA requirements
- Allow alternative/narrow street designs that reduce imperviousness but maintain emergency access
- Provide LID site development templates for residential, commercial and industrial development
- Base fees, charges and standards upon the true cost of drainage-based land development to the community. Provide incentives such as eliminating or reducing stormwater drainage fees, providing density credits, expediting case processing/approval time if the development/redevelopment incorporates LID/Green infrastructure concepts.

### **6.5 AWARE (Addressing Water and Natural Resource Education) Colorado**

AWARE Colorado provided information to community leaders statewide about the impacts of land use on water quality, and suggested strategies to protect our rivers, lakes and streams.

AWARE Colorado visited communities to inform local officials and others about ways to protect local water quality through community planning. Many of the strategies are found in the *Water Protection Toolkit for Local Officials* published in February 2006. The toolkit is available on the internet at <http://www.npscolorado.com/toolkit.pdf>.

#### 6.5.1 Goals/Objectives outlined within the AWARE Water Protection Toolkit for Local Officials

- Preventing pollution at the source through wise planning is the best, most effective approach to protect water resources

- Land use is directly linked to water quality
- Land use decisions makers play a key role in protecting water quality and preventing pollution
- Strategic community planning can enhance water quality and potentially reduce expenses related to stormwater management

#### 6.5.2 Community Strategies

- Collaborate with other governmental entities within your community's watershed(s) to cooperatively address water quality concerns
- Engage all affected governmental departments in a collective effort to reduce polluted runoff and achieve community water quality goals
- Work with other groups, businesses and organizations to protect water resources within the watershed.

#### 6.5.3 Land Use Planning, Policy and Design Considerations include among others:

- Clustered Development – reduces impervious surfaces, increases open space, promotes preservation of sensitive areas and provides more opportunities for stormwater infiltration.
- Promote landscape and riparian buffers through setbacks to protect water resources
- Disconnect impervious surfaces with filter strips to interrupt direct runoff into storm sewer systems.
- Work with private landowners and land trusts to identify and preserve wetlands and other sensitive, disappearing landscapes
- Cooperate with land trusts to protect areas critical to water resource protection
- Reduce impervious areas of streets by narrowing street widths to minimum requirements for parking and emergency response
- Minimize cul-de-sacs and consider alternative turnarounds
- Eliminate curbs where feasible and use vegetated swales for conveyance and treatment
- Separate sidewalks from streets and grade to drain into vegetated filter strips
- Consider permeable materials for sidewalks to promote infiltration
- Reduce sidewalk widths where possible
- Encourage shared and ribbon driveways to reduce impervious areas
- Reduce front yard setbacks to reduce driveway lengths
- Allow and promote the use of porous driveway surfaces

- Revise regulations to encourage or require porous surfaces for parking lots
- Design parking lots to drain to landscape islands and vegetated filter strips
- Provide snow-piling sites in locations other than parking lots or within a porous section of the parking area
- Lower required parking ratios to reduce parking lot size requirements and, therefore, impervious surfaces

## **7 Policy Recommendations for the Fountain Creek Watershed**

The following list of recommendations was developed based on a review of the information contained in this report in conjunction with the Fountain Creek Watershed Technical Advisory Committee and Community Advisory Group.

1. Adoption of the new City of Colorado Springs Drainage Criteria Manual as appropriate to each jurisdiction within the watershed.
2. Advancement of the stormwater “spin-off” projects proposed by the City of Colorado Springs from the drainage criteria manual through an intergovernmental agreement. A Scope of Work to address these projects has already been developed and tasks include:
  - a. Integration of site planning to accomplish Better Site Design and LID objectives in both development and redevelopment projects
  - b. Addition of watershed wide considerations including:
    - i. Hydrology/rainfall
    - ii. Vegetation/soils
    - iii. Steep slopes
  - c. Review of floodplain administration policies such as improved definition of floodplain management policy & criteria
  - d. Evaluation and incorporation of financial or other incentives to encourage the application of LID
3. Section 404 and 401 permits should be reviewed for consistency with Fountain Creek Watershed Vision Task Force Strategic Plan, the U.S. Army Corps of Engineers Watershed Management Plan recommendations and drainage criteria to determine potential impacts to streams, critical riparian and wetland areas, and the potential to cause erosion and sedimentation problems.

4. To advise local governments where impacts on water quality will be minimized and/or controllable and where areas of high erosion, sedimentation, and degraded water quality exist.
5. Remove regulatory barriers and provide selective incentives for LID, sustainable design, and green building to improve water quality and compliance with water quality standards.
6. The integration of site planning and plan approval with an efficient and effective enforcement program is needed to accomplish the goals and objectives of the Fountain Creek Watershed Vision Task Force Strategic Plan and the U.S. Army Corps of Engineers Watershed Management Plan.
7. Continued education of elected officials, senior leadership, planners, engineers, stakeholders in both the private and public sector of the need and benefit for promoting watershed health and improving land use and drainage policies and criteria.

**\*\*Note:** A workshop was completed on June 20<sup>th</sup>, 2012 and an agenda, attendee list, and slides are attached as Appendix 10.6. Red text on the slides indicates comments and changes captured on recommendations, barriers, and implementation during the workshop.

## **8 Barriers to adopting recommended policies**

The primary barriers identified via the local policy survey and from the Fountain Creek Watershed Technical Advisory Committee and Community Advisory Group are listed below.

1. Approval by their respective council or board
2. Existing time demands on personnel
3. Limited budget/personnel resources
4. Perception that there is no direct benefit to citizens
5. Perception that the proposed policies do not allow enough flexibility

**\*\*Note:** A workshop was completed on June 20<sup>th</sup>, 2012 and an agenda, attendee list, and slides are attached as Appendix 10.6. Red text on the slides indicates comments and changes captured on recommendations, barriers, and implementation during the workshop.

## **9 Implementation Strategy**

The preliminary implementation strategy is to conduct a workshop and form ongoing implementation groups as outlined below.

### **9.1 Workshop**

A policy workshop is scheduled for June 20<sup>th</sup>, 2012 at the Pikes Peak Area Council of Governments in Colorado Springs. The purpose for the workshop is to outline project progress and share ideas about how to advance common, consistent stormwater-related policies that promote the health of Fountain Creek.

The tentative agenda for the workshop includes the following topics:

- Presentation on project findings
- City of Colorado Springs Drainage Criteria Manual outline
- Recommendations
- Barriers/Issues
- Implementation Groups

Objectives for the workshop include:

1. Description of the needs and options, so that all participants have a common understanding of the issues to be discussed.
2. Review the policy evaluation report.
3. Discussion of opportunities for applying policies and regulations from other watersheds and agencies.
4. Discussion of cities and counties who are in the process of updating regulations.
5. Recommendations for pursuing strategies that could be beneficial to the watershed.
6. Facilitate a discussion considering discipline and location about the report findings, issues, and possible actions.
7. Develop action groups for further work.

### **9.2 Form implementation groups**

Form individual implementation groups consisting of representatives from a given location that will meet on a regular basis to discuss progress made in implementing the recommended policies in the report.

**\*\*Note:** The workshop was completed on June 20<sup>th</sup>, 2012 and an agenda, attendee list, and slides are attached as Appendix 10.6. Red text on the slides indicates comments and changes captured on recommendations, barriers, and implementation during the workshop.

## **10 Appendices**

**10.1 City of Colorado Springs Draft Chapters 1, 2, & 3**

**10.2 May 7, 2009 WWE/Matrix memo**

**10.3 District Goals & Recommendations Matrix**

**10.4 Better Site Design Community Codes and Ordinances Worksheet**

**10.5 Better Site Design Worksheet - 2008 Summary of Local Results**

**10.6 June 20, 2012 Policy Workshop Agenda, Attendee List, & Slides**



**Appendix 10.1 - City of Colorado Springs Draft Chapters 1, 2, & 3**



# Chapter 1

## General Provisions

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## 1.0 Introduction

These criteria and design standards together with all future amendments shall be known as the City of Colorado Springs Drainage Criteria Manual (hereafter called the “*Criteria*”), including both Volumes 1 and 2. The two volumes are to be applied as complimentary documents and the requirements of each shall be jointly applied to create fully integrated drainage systems. All drainage reports and plans, drainage system analyses, and drainage system designs, submitted as a requirement of the Engineering Criteria Manual, Zoning or Subdivision Codes, Ordinances, Resolutions or guidelines adopted by the City of Colorado Springs (hereafter called *Regulations*), shall comply with these *Criteria*. In addition, it is the responsibility of the owner, developer, planner and designer (hereafter called *Applicant*) to ensure that the proposed improvements are consistent with other applicable documents such as the Comprehensive Plan, land use master plans, transportation plans, utility plans, etc. and that all applicable permits are in place and have been complied with.

## 2.0 Enactment Authority

These *Criteria* have been adopted pursuant to the statutory authority conferred within: Article 2 of Title 43 (State, County, and City Highway Systems); Article 67 of Title 24 (Planned Unit Development Act); Article 20 of Title 29 (Land Use Control and Conservation); and other applicable sections of Colorado Revised Statutes, as amended. (have attorneys change this for city.)

## 3.0 Jurisdiction

These *Criteria* shall apply to all land within the incorporated areas of the City of Colorado Springs, including any public lands. These *Criteria* shall apply to all storm drainage systems and facilities constructed in or on public Rights-of-Way, easements dedicated for drainage across public or private property, easements or tracts for public use, and to all privately owned and maintained stormwater conveyance, detention, retention, or water quality facilities.

## 4.0 Purpose

Presented in these *Criteria* are the policies and minimum design procedures and technical criteria for the planning, analysis and design of storm drainage systems within the boundaries of the jurisdiction with the goal of protecting the public health, safety and welfare. All subdivisions, resubdivisions, planned unit development, or any other proposed construction submitted for acceptance under the provisions of the *Regulations* shall include adequate and appropriate storm drainage system planning, analysis, design and improvements. Such planning, analysis, and design shall conform with or exceed the criteria set forth herein. Storm drainage system planning, analysis, and design that require policies, guidance, technical methods, or criteria not specifically addressed in these *Criteria* shall follow the provisions of the Urban Drainage and Flood Control District’s (UDFCD) Urban Storm Drainage Criteria Manual, Volumes 1, 2, and 3 (*UDFCD Manual*), which is incorporated in these *Criteria* by reference. Since the UDFCD Manual may be revised from time to time, the version as stated in the Preface to these *Criteria* shall apply.

## 5.0 Amendments and Revisions

When the provisions of these *Criteria* are not adequate to provide clear guidance it is the responsibility of the *Applicant* to seek guidance from the appropriate responsible party so that the intent of these *Criteria* is implemented. The application of methodologies or standards not defined in these *Criteria* shall not be accepted in submittals without amendments to these *Criteria* or an approved variance as defined in these

*Criteria.* Policies and criteria may be amended as new technology is developed or if experience gained in the use of these *Criteria* indicates a need for revision. All proposed changes must be approved in writing prior to their implementation. Minor revisions require the approval of the designated official and a public notification process. The designated official will make reasonable accommodations and modify the proposed minor revision(s), as appropriate, based on comments received through the public notification process. Major revisions also require the approval of the designated official and, in addition, will require adoption, by resolution or ordinance, by the appropriate governing body in accordance with the required procedures. The designated official shall monitor the performance and effectiveness of these *Criteria* and recommend and implement amendments as needed to correct inadequate guidance or results or to better accomplish the goals of these *Criteria*.

**Table 1-1.  
Examples of Minor and Major Revisions**

Minor	Major
Grammar, typographic errors and formatting	Policy changes (such as storm frequency and freeboard requirements)
Submittal Requirements	Criteria Changes (such as allowable flow depth, hydraulic grade line limits and maximum velocities)
Clarifications	
New Construction Details or Revisions	
Revisions to Recommended Parameters	
Revisions to Standard Methods	
Updating of Reference Document Versions	
Application of Manufactured Devices	
Material Specifications	
Adaptation to State and Federal Regulations that are not a Major Revision	
Application of Alternate Materials	

IN ADDITION TO THE APPROVAL PROCESS FOR MINOR AND MAJOR REVISIONS DESCRIBED ABOVE, CHANGES TO VOLUME 2 OF THESE *CRITERIA* THAT AFFECT THE CITY'S NPDES PERMIT MUST BE APPROVED BY THE CDPHE.

## 6.0 Enforcement Responsibility

Within the City of Colorado Springs the City Engineer is the designated official responsible for the review of all drainage reports and plans, drainage system analyses, and drainage system designs and constructed improvements, submitted as a requirement of the *Regulations*, for compliance with these *Criteria* and is authorized to approve minor revisions to the *Criteria*. When deemed necessary, the designated official shall also approve and propose major revisions to these *Criteria* and submit them to the governing body for adoption. (Coordinate this with other jurisdictions. Maybe define “designated officials” and “governing body” in the Preface for each jurisdiction?)

The most recent version of these *Criteria* as available on the city’s web site at Springsgov.com shall be the basis for enforcement.

## 7.0 Review and Acceptance

- 7.1 **All drainage submittals shall be reviewed for compliance with these *Criteria* and approved prior to their implementation.** However, acceptance of submittals does not relieve the *Applicant* from the responsibility of ensuring that the design, calculations, plans, specifications, construction, and record drawings are in compliance with the intent of these *Criteria* as stated in the developer’s and engineer’s certifications in Chapter 4 of these *Criteria*.
- 7.2 **When appropriate, submittals shall be referred to other agencies having jurisdiction.** It is the responsibility of the Applicant to identify the appropriate referral agencies and provide the required documentation to acquire the necessary approvals and/or permits. Other review agencies may include Springs Utilities, PPRBD, water and sanitation districts that have accepted stormwater drainage responsibilities through intergovernmental agreements, State (CWCB, CDPHE, etc.) or Federal agencies (USACE, USFWS, NRCS, etc.) responsible for floodplains and water quality, water rights, environmental impacts and other stormwater related issues, the FCWD, or any other relevant jurisdictions.
- 7.3 **Submittals that impact FEMA designated floodplains will be required to be submitted to FEMA for review in accordance with the provisions of Chapter 5 of these *Criteria*.**
- 7.4 **Facilities designed or constructed without provision for satisfying maintenance requirements will not be eligible for acceptance as a public facility.**

## 8.0 Interpretation

In the interpretation and application of the provisions of these *Criteria*, the following shall govern:

- 8.1 **The provisions shall be regarded as the minimum requirements for the protection of the public health, safety, comfort, morals, convenience, prosperity, and welfare of the residents or property owners.** These *Criteria* shall therefore be regarded as remedial and shall be liberally construed to further its underlying purposes.

**8.2** Whenever a provision of these Criteria and any other provision of the Regulations or any provision in any applicable law, ordinance, resolution, rule or regulation, contains requirements covering the same subject matter, the requirements that are more restrictive or impose higher standards shall govern.

**8.3** These Criteria shall not abrogate or annul any easements, permits, drainage reports or construction drawings, recorded, issued, or accepted prior to the effective date of these Criteria. All submittals made prior to the effective date of these Criteria, but not approved within six (6) months of the effective date, may be required to be revised to comply with these Criteria at the discretion of the designated official. A determination by the designated official that a previous submittal must be revised to comply with these Criteria shall be documented in writing to the Applicant. All submittals made after the effective date of these Criteria shall be prepared and submitted in compliance with the Criteria and the Regulations.

## **9.0 Relationship to Other Standards or Permits**

IF OTHER ENTITIES THAT HAVE JURISDICTION IMPOSE MORE STRINGENT CRITERIA, THIS DIFFERENCE IS NOT CONSIDERED A CONFLICT. IF THE STATE OR FEDERAL GOVERNMENT IMPOSES STRICTER CRITERIA, STANDARDS, OR REQUIREMENTS, EITHER THROUGH LAW OR THROUGH CONDITIONS OF A PERMIT, THESE MAY BE INCORPORATED INTO THE REQUIREMENTS AFTER DUE PROCESS AND PUBLIC HEARING(S), IF NEEDED, TO MODIFY THE *REGULATIONS* AND THESE *CRITERIA*.

## **10.0 Variances from these Criteria**

Variance requests must be submitted in writing and must, at a minimum, contain the following information:

- Identification of *Applicant* and project for which the variance will be applied.
- Recitation of criteria or standards from which the *Applicant* seeks a variance.
- Justification for not complying with these *Criteria*.
- Alternate or standard that is proposed to comply with the intent of these *Criteria* and other applicable guidance documents.
- Supporting documentation, including necessary calculations, reference materials, software, specifications, etc. adequate to evaluate how the proposed variance satisfies the intent of these *Criteria*.
- The variance request must be signed and stamped by a Professional Engineer licensed in the state of Colorado.

## **11.0 Acronyms**

As used in these *Criteria*, the following acronyms shall apply:

ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
BCD	Baffle Chute Drop
BFE	Base Flood Elevation
BMP	Best Management Practice
CAP	Corrugated Aluminum Pipe
CAPA	Corrugated Aluminum Pipe Arch
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CEC	Consulting Engineers Council
CGIA	Colorado Governmental Immunity Act
CLOMA	Conditional Letter of Map Amendment
CLOMR	Conditional Letter of Map Revision
CMP	Corrugated Metal Pipe
CMPA	Corrugated Metal Pipe Arch
CRS	Colorado Revised Statutes
CSP	Corrugated Steel Pipe
CSPA	Corrugate Steel Pipe Arch
CWA	Federal Clean Water Act
CWCB	Colorado Water Conservation Board
DCIA	Directly Connected Impervious Area
DBPS	Drainage Basin Planning Study
EDB	Extended Detention Basin
EGL	Energy Grade Line
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
EURV	Excess Urban Runoff Volume
FAA	Federal Aviation Administration
FCWD	Fountain Creek Watershed Flood Control and Greenway District
FEMA	Federal Emergency Management Agency
FHAD	Flood Hazard Area Delineation
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FPE	Flood Protection Elevation
GSB	Grouted Sloping Boulder
HDS	Hydraulic Design Series
HEC	Hydraulic Engineering Center
HEC-HMS	Hydraulic Engineering Center Hydrologic Modeling System
HEC-RAS	Hydraulic Engineering Center River Analysis System
HERCP	Horizontal Elliptical Reinforced Concrete Pipe
HGL	Hydraulic Grade Line
HUD	U.S. Department of Housing and Urban Development
H:V	Horizontal to Vertical Ratio of a Slope
ICC	Increased Cost of Compliance
LID	Low Impact Development
LOMA	Letter of Map Amendment
LOMR	Letter of Map Revision
MDCIA	Minimized Directly Connected Impervious Area
NAVD	North American Vertical Datum



NFIA	National Flood Insurance Act
NFIP	National Flood Insurance Program
NGVD	National Geodetic Vertical Datum
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
NWS	National Weather Service
P.E.	Professional Engineers Licensed by the State of Colorado
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PPRBD	Pikes Peak Regional Building Department
PWD	Public Works and Development
RCBC	Reinforced Concrete Box Culvert
RCP	Reinforced Concrete Pipe
ROW	Right-of-Way
SBA	Small Business Administration
SEO	Colorado State Engineer's Office
SFHA	Special Flood Hazard Area
SFIP	Standard Flood Insurance Policy
SPP	Structural Plate Pipe
SPPA	Structural Plate Pipe Arch
SWMM	Stormwater Management Model
TRC	Technical Review Committee
TWE	Tailwater Elevation
UDFCD	Urban Drainage & Flood Control District
UDSWMM	Urban Drainage Stormwater Management Model
USFWS	United States Fish and Wildlife Service
USACE	United States Army Corps of Engineers
WQCV	Water Quality Capture Volume

(Add others and Volume 2 acronyms as needed)

# Chapter 2

## Stormwater Management Principles

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## 1.0 Introduction

Provisions for adequate stormwater management are necessary to preserve and promote the general health, welfare, and economic well being of the region. Drainage affects all governmental jurisdictions and parcels of property. This characteristic makes it necessary to formulate a program that balances both public and private involvement. The governmental agencies most directly involved must provide coordination and planning, but stormwater management must also be integrated on a regional/watershed basis.

When planning stormwater management facilities, certain underlying principles provide direction for the effort. The principles are made operational through policy statements (see Chapter 3). The application of the policy is, in turn, facilitated by technical criteria and data, procedures, funding, construction and operation and maintenance for stormwater improvements. When considered in a comprehensive manner, on a regional level with public and private involvement, stormwater management facilities can be provided in a manner that will enhance the general health and welfare of the region and assure optimum economic, environmental and social benefits. The effectiveness of these policies will depend on their faithful and consistent application and integration into policies and practices in related areas such as land use and transportation planning and design.

## 2.0 Principles

The following principles for stormwater management shall guide the planning, design and implementation of stormwater facilities.

- 2.1 Drainage is a regional phenomenon that does not respect the boundaries between governmental jurisdictions or between properties.** Systems that are not planned and designed without considering regional implications can be ineffective and costly. Therefore, it is necessary to formulate programs that include public, private and multi-jurisdictional involvement. The governmental agencies involved must provide coordination, consistent standards, master planning, and possibly, joint-funding for key projects to achieve optimum results.
- 2.2 A stormwater management system is a subsystem of the total urban infrastructure system.** Developing a stormwater system independent of consider for other infrastructure systems limits the potential for compatible integration and increases the probability of conflicting systems that detract from each others functions. Stormwater management system planning and design must be compatible with local and regional comprehensive plans, and must be coordinated with planning and designs for land uses, open space, utilities, wildlife, recreation and transportation corridors and other infrastructure.
- 2.3 Development activity can greatly alter the amount and character of runoff resulting in significant impacts to man-made or natural systems.** Development of land and the supporting infrastructure introduces significantly increased flows, both rate and volume, that can cause negative impacts such as flooding, water quality degradation, erosion and sedimentation, risking damage to man-made improvements and to natural systems. Increased flows can result from more rainfall runoff or snowmelt from more impervious areas and from excess irrigation. Water quality degradation can result from the mixing of runoff with pollutants resulting from human activity or by increasing sediment loads. The effect of development is most significant on runoff from the more frequent storm

events. Events that previously may not have produced runoff do so after development and can significantly alter the hydrologic conditions in the basin and must be considered in the implementation of water quality features and conveyance and stabilization systems. Changes in stormwater runoff quality, associated with urbanization, can have significant impacts on rivers, streams, and lakes. Some of the urban stormwater pollutants are sediments, nutrients, microbes, organic matter, toxic pollutants, and trash and debris.

- 2.4 Every urban area has a minor and a major drainage system, whether or not they are actually planned and designed.** The minor drainage system is designed to provide public convenience and to accommodate low to moderate, frequently occurring flows. The major system carries more water less frequently and operates when runoff exceeds the capacity of the minor system. To provide for orderly urban growth, reduce costs to future generations, and avoid loss of life and property damage and environmental impacts, both systems must be properly planned, designed and constructed.
- 2.5 Handling runoff properly is largely a space allocation problem.** The volume of water present at a given point in time in an urban region cannot be compressed or diminished. If adequate space is not provided, stormwater runoff can conflict with other land uses, increasing the potential for damages, environmental impacts and the disruption of other urban systems.
- 2.6 The diversion of storm runoff from one watershed or basin to another can introduce significant capacity, legal and social problems.**
- 2.7 Diversions should be avoided unless specific and prudent reasons justify and dictate such a transfer and downstream damages are sufficiently mitigated.**
- 2.8 Resources to implement stormwater plans and improvements are limited.** Drainage systems should be a multi-objective and multi-means effort. The many competing demands placed upon space and resources require a stormwater management strategy that meets a number of objectives, including the preservation of ecological systems, water quality enhancement, groundwater recharge, recreation, wetland preservation, enhancement and creation, protection of landmarks/amenities, control of erosion and sediment deposition, and creation of open spaces.
- 2.9 Natural systems possess a number of beneficial features that should be preserved and incorporated into the design of the stormwater management system.** Good designs incorporate the effectiveness of the natural systems rather than negate, replace or ignore them. Existing features such as natural drainageways, depressions, wetlands, floodplains, permeable soils, habitat and vegetation provide for infiltration, help control the volume and rate of runoff, extend the travel time, prevent erosion, filter sediments and other pollutants, and recycle nutrients and support the ecology.
- 2.10 Natural drainage systems respond to and are dependent upon the full range of hydrologic conditions and sources of water including, snow melt, groundwater and the full range of rainfall events.** To be effective, the planning and design of stormwater

systems must address all of these potential sources of water and the full range of potential rates of flow and volumes and how they may be altered by development activity.

- 2.11 The stormwater management system must be designed, beginning with the outlet or point of outflow from the project, giving full consideration to potential impacts and the effects of off-site flows entering the system.** The design of the stormwater management system shall take into account runoff from upstream sites and shall evaluate the downstream conveyance system to ensure that it has sufficient capacity to accept design discharges without adverse backwater or downstream impacts such as flooding, stream bank erosion, channel degradation, and sediment deposition. An assessment of potential downstream impacts should be based on quantifiable measures that relate to basin conditions immediately after project completion and with regard to future development and its timing.
- 2.12 Poorly maintained systems may not function properly reducing their effectiveness and reducing the benefits from the economic investment required to construct them.** Operation and maintenance procedures and activities must be developed and documented with the facility design, including the identification and acquisition of rights of access. Clear assignment of maintenance responsibilities must be identified, and assigned to an established entity with the resources and understanding required to ensure proper ongoing maintenance.
- 2.13 Floodplains, both regulated floodplains and unregulated floodplains, are areas of potential hazard due to high rates of runoff and require large investments in resources to alter them and risks can increase when they are not properly managed.** Flooding potential exists throughout the drainage system and is not limited to “regulatory” floodplains. In addition, flooding potential is not limited to regulated flows and flow estimates may not accurately represent risk. It is not a question of whether regulatory flows will be exceeded, but when they will be exceeded. The preservation of floodplains serves to reduce flood flows, minimize hazards, preserve habitat and open space, improve water quality, create a more livable environment, and protects the public health, safety, and welfare.
- 2.14 Sufficient land rights must be reserved.** When the space requirements are considered, the provision for adequate drainage becomes a competing use for space along with other land uses. If adequate provision is not made in a land use plan for the drainage requirements, stormwater runoff can conflict with other land uses and impair or even disrupt the functioning of other urban systems. In addition, natural processes possess a prescriptive easement for intermittent occupancy by runoff. Encroachments into this easement can adversely affect adjacent properties and natural systems during inevitable periods of natural easement occupancy.
- 2.15 Drainage law places certain obligations on those who cause or oversee modifications to the natural affects of the hydrologic cycle and the conveyance of runoff overland.** It is incumbent on individuals and agencies to safeguard the right of those potentially

impacted by modifications to stormwater runoff to reduce the potential for injury and maintain the orderly development of man-made systems.

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# Chapter 3

## Stormwater Management Policies

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## 1.0 Introduction

Stormwater management is an integral component of overall development planning and site design that must be addressed in the earliest planning stages. Initial feasibility studies or preliminary site analyses cannot be properly performed without a clear understanding of stormwater management policies, regulatory requirements and criteria, site design practices which lead to more effective management of stormwater, existing site characteristics or features which affect stormwater management concepts, and the fact that stormwater cannot be properly managed by allocating minimal space in a portion of a site or development which is convenient or “out of sight”.

Incorporating stormwater management planning in the initial stages can lead to reduced infrastructure costs, better long term function of stormwater management facilities and increased property values. Facilities which are designed as site amenities can lower maintenance costs and provide potential mitigation of impacts to properties or drainageways. Initiating stormwater management planning independently, after development planning or site layout has been accomplished, can lead to space allocation problems, increased infrastructure costs, difficulties in meeting regulatory requirements and criteria, and designs that compromise long term function and maintainability, which may hinder the approval process.

## 2.0 Planning and Design

The following sections provide policies for addressing the impacts of urbanization and factors to consider when planning for stormwater management in the site design or development layout and project planning and design processes. Additional guidance for planning of the urban storm runoff system is provided in Chapter 4, Planning, Volume 1, of the *UDFCD Manual*.

### 2.1 Reports and Plans.

All project proposals shall receive full site planning and engineering analyses. Drainage reports and plans in compliance with the submittal requirements in these Criteria or other Regulations shall be required for all new development and redevelopment.

### 2.2 Early Planning.

Stormwater management planning shall be required for all developments in the initial planning stages to ensure that adequate space is allocated for the required stormwater management facilities and that key issues are identified and adequately addressed. This includes the preservation and enhancement of natural features and functions whenever possible.

### 2.3 Integrated, Comprehensive Planning.

A jurisdictionally unified approach to drainage is required to ensure an integrated comprehensive regional drainage plan. Individual development plans shall be consistent with regional stormwater plans and other regional plans for land use and infrastructure systems. These *Criteria* have been created considering these regional goals and objectives, however, where projects relate to regionally significant improvements, it may be necessary to modify project requirements to better implement or comply with the regional goals.

## 2.4 Multi-purpose Resource.

Although sometimes considered a liability to urbanization, drainageways and stormwater runoff can be an urban resource, having many potential beneficial uses that are compatible with adjacent land uses and Colorado water law. When treated as a resource, aesthetic and water quality aspects become increasingly important. The stormwater urban sub-system should be multi-purpose to satisfy the competing demands for resources and land. For example, stormwater management facilities can be designed to fulfill recreational purposes and open space requirements along with stormwater runoff conveyance or storage. In addition, facilities not intended primarily for stormwater management purposes may be designed to incorporate water quantity and quality benefits. This may include street medians, parking space islands, parking lots, landscaped areas, etc.

## 2.5 Stormwater Master Plans.

Stormwater systems must be planned through the development of detailed master plans, which will set forth site requirements for development and identify the required public improvements. Developers and project planners and designers are required to incorporate master plan features into their development plans to accomplish the purposes of the plan. In the absence of a master plan, the developer may be responsible for providing a plan that implements these *Criteria* and additional information as necessary. Where projects are expected to be phased, master plans shall address the conditions that may occur in the period between the phases to comply with these *Criteria*. Master plans will be approved, adopted, and revised as necessary to accommodate changes that occur within the development or drainage basin.

## 2.6 Site Design and Layout.

Good site planning and development layout is key to effective stormwater management. Initial planning must identify important natural features or environmentally sensitive areas, such as floodplains, riparian areas or wetlands. Protection of those areas should be incorporated into the site plan or development plan concept. Other existing site characteristics such as topography, geologic features, or soils may also present unique challenges when developing the stormwater management plan for a site or development. Generally, there can be significant benefits to implementing practices that reduce runoff volumes, slow runoff rates, and ensure careful placement of water quality treatment facilities. The incorporation of infiltration, and stormwater conveyance into landscaped areas furthers the concept of developing stormwater management facilities that are amenities, which are aesthetically pleasing and effective.

## 2.7 “Minor” System.

The “minor” stormwater system shall be designed to convey runoff up to a storm event with a return period of five (5) years (20% annual exceedance probability as defined by and with the parameters in these *Criteria*. The minor drainage system, as a minimum, shall be designed to transport runoff with minimum disruption to the urban environment and to preserve and protect the natural environment.

“Minor” storm drainage can be conveyed in the curb and gutter area of the street or roadside ditch, by storm sewer, channel, or other conveyance facility, provided that capacity exists when future development is considered. The design shall consider the effect of “nuisance” flows that result from excess irrigation, snow melt and other sources and avoid problems that might result from biological growth or decay, ice formation or other hazards.

Inlets, when needed, shall be located and designed to maximize collection or interception efficiency and with consideration of the proposed use in the vicinity of the inlet locations. Inlets in vehicular traffic or

parking areas are much different than inlets in landscaped or pedestrian traffic areas. Inlet types and grate designs must be chosen with those considerations in mind. Potential inundation depths and limits at inlets must also be acceptable when considering the adjacent property use.

Underground storm sewer systems, required to convey stormwater runoff collected at inlets, must be integrated and located within the site, to facilitate proper function and ease of maintenance. Issues to be considered when developing preliminary storm sewer locations include, but are not limited to, proximity to proposed structures, other utilities, and adjacent properties, depth of cover, traffic loading, proposed surface improvements, and accessibility for future maintenance.

## **2.8 “Major” System.**

The “major” stormwater system shall be designed to convey runoff events up to a return period of one hundred (100) years (1% annual exceedance probability) as defined by and with the parameters in these *Criteria*. The major drainage system shall be designed to convey runoff in a manner, which minimizes health and life hazards, damage to structures, natural systems and interruption to traffic and services. Major storm flows can be carried in the street system, channels, storm sewers and other facilities, provided that capacity exists when future development is considered. While the 100-year event is designated as the “major” event, larger events can and will occur. In cases with significant risk to public health, safety and welfare, events in excess of the “major” event may need to be considered.

## **2.9 Detention Storage.**

Detention storage facilities serve a critical role in the management of increased runoff due to development and must be carefully integrated into the first stages of planning. Detention storage facilities shall be provided and strategically located to mitigate the effects of increased runoff due to new development, redevelopment or expansion. Detention storage facilities should be designed to mitigate the full range of developed condition runoff rates and volumes by mimicking runoff from the upstream basin under undeveloped conditions up to the “major” storm event. Mitigation should include approximating the time for the peak flow to be reached.

Detention storage facilities have special design considerations and space allocation requirements. Sufficient space must be allocated to allow for designs that meet all technical requirements and that ensures long-term function and maintainability of stormwater facilities. These facilities should not be designed based on minimum required volume calculations, by assuming that retaining walls or steep slopes can be used to minimize the land area needed for the improvements. Generally, aesthetics and long-term operation and ease of maintenance are severely compromised when detailed design criteria and maintenance access requirements are not integrated into the site plan early in the planning stages. Detention pond designs that incorporate detention storage into the overall site and landscape plans can lead to multi-purpose detention ponds that are safer and viewed as site amenities.

## **2.10 Locating Detention Storage Facilities.**

The location of detention storage facilities may depend on its intended function within the drainage system. Detention storage may be needed upstream of existing system facilities that are hydraulically deficient, upstream of natural systems to be protected or to reduce flows downstream and mitigate adverse impacts. Locating detention facilities where sediment loads will be reduced due to upstream stabilization or development is also beneficial for lowering maintenance costs. Detention storage facilities should be designed to be multipurpose, aesthetic, safe, maintainable community assets and to promote infiltration.

Detention storage facilities should also be located so that “non-jurisdictional” structures can be

constructed that do not require regulation by the Office of the State Engineer. The criteria for non-jurisdiction dams are defined in the Rules and Regulations for Dam Safety and Dam Construction, State of Colorado Department of Natural Resources, Division of Water Resource, Office of the State Engineer. It is the responsibility of the design engineer to plan and design facilities that meet the criteria for non-jurisdictional dams. Jurisdictional dam structures must be reviewed and approved by the State Engineer, may require special design and construction consideration, potentially increasing their cost, and require an ongoing inspection and maintenance program.

### 2.11 Previous Detention Schemes.

Past detention storage schemes that allowed flows from development to be conveyed long distances before being attenuated in detention facilities have resulted in systems that degrade or eliminate the natural functions of drainageways and have been difficult to implement and economically inefficient. These schemes have also placed large facilities on the major drainageways where the natural process of sediment transport is interrupted. There has been a common misconception that providing detention storage facilities that control flood flows adequately mitigates development impacts to downstream drainageways. Detention facilities that do not provide mitigation for the more frequent runoff events or increases in runoff volume can result in significant downstream impacts due to erosion and sedimentation. Analyses of alternative detention storage schemes have shown that multiple ponds placed in a parallel configuration (located on tributaries to major drainageways and not on the major drainageways), and collecting relatively small drainage areas, provide the best opportunity to accomplish stormwater management goals and results in lower overall system costs.

### 2.12 “Full-spectrum Detention”.

A specific approach for implementing this concept, referred to as “full-spectrum detention”, provides the best known opportunity to mimic undeveloped runoff rates and volumes. By placing “full spectrum detention” ponds where the contributing drainage area is between 130 to 640 acres, important stormwater management goals can be accomplished, including natural channel preservation, habitat preservation and floodplain preservation. In addition to reducing runoff rates, “full-spectrum detention” can also include provide water quality benefits. Therefore, unless an alternative detention concept is approved through a master planning process, the “full spectrum detention” approach, as defined in these *Criteria*, shall be implemented as the standard detention storage scheme.

The “full-spectrum” detention approach, described more fully in **Chapter 13** of these *Criteria*, is expected to more effectively mitigate increases in the full range of runoff events, but will not eliminate the need for effective channel stabilization downstream. Also, to maximize the benefits of this approach it must be implemented throughout a drainage basin and downstream floodplain storage must be preserved. If the a mixture of detention schemes are implemented in a drainage basin or if downstream floodplain storage is reduced through encroachment, the full cost benefits will probably not be realized due to the higher cost of protecting against higher flow velocities and environmental benefits will probably not be realized due to floodplain encroachments that damage natural conditions. Alternative detention schemes will be evaluated based on their ability to achieve similar results as full-spectrum detention and not only based on potential cost reductions.

### 2.13 On-site Detention.

When development or redevelopment is proposed within a basin where a master plan has not been completed, or where downstream facilities are inadequate to pass estimated flows, local or “on-site” detention may be required. Implementing “on-site detention” is described more fully in **Chapter 13**. The

appropriateness of “on-site” detention will be evaluated on a case-by-case basis. “On-site” detention shall not be allowed when a master plan including detention storage has been approved. If a proposed development contains land uses that are significantly different from those assumed in the approved master plan an amended master plan may be required.

#### **2.14 Rooftop and Underground Detention.**

Rooftop and underground detention for flood control is prohibited except as approved by the variance process as provided for in these *Criteria*. Variances may only be appropriate when there are severe space limitations or when the downstream system capacity is very limited. Underground Best Management Practices facilities may be allowed as described in **Volume 2 of these *Criteria***.

#### **2.15 Runoff Reduction.**

Whenever practical and feasible, site planning and design techniques should be incorporated, which reduce imperviousness, minimize directly connected impervious areas and increase infiltration in order to decrease the rate and volume of stormwater runoff from a site. A series of Best Management Practices should be implemented to meet the goals of these *Criteria* and reduce project costs. The combination of minimizing and mitigating increases in runoff and pollutant loads due to development should result in discharges that mimic historic, undeveloped rates and volumes, timing and pollutant loads, limiting impacts. The mitigation of both runoff quantity and quality may be accomplished together by certain stormwater management features and the dual benefits can be recognized and integrated into the assessment of development impacts, potentially reducing costs. **Chapter 1, Stormwater Management and Planning in Volume 2 of these *Criteria*** should be consulted for a detailed discussion regarding the implementation runoff reduction practices.

Stormwater runoff volume reduction is currently a desirable goal that is beneficial to accomplishing overall storm water management goals and can, potentially, reduce the cost of development, but is not currently required by regulation or permit. However, it is anticipated that future regulations and permit requirements may require the incorporation of runoff reduction practices into development and project plans.

#### **2.16 Best Management Practices.**

The implementation of Best Management Practices shall be as described in Volume 2 of these *Criteria*. The optimum implementation of water quality Best Management Practices may be addressed hand-in-hand with stormwater conveyance and detention storage facilities.

#### **2.17 Major Drainageways.**

Natural channel characteristics should be preserved and enhanced wherever possible. Preserving natural channels provides ecological and hydrologic benefits such as riparian habitat, flood storage and opportunity for groundwater recharge and usually reduces improvement costs. Natural channels can also function as or be integrated into Open Space areas. Channelizing natural drainageways usually speeds up flow and reduces floodplain storage, causing higher downstream peaks and higher drainage costs and degrades the environment.

A major drainageway is defined as any channel draining a tributary area of approximately 130 acres or more. The purpose of this designation is for guidance in the implementation of “natural channel” design concepts, the location of detention storage facilities and the establishment of reimbursable improvements for the drainage basin fee program. It is anticipated that flows entering major drainageways will be

mitigated to levels similar to undeveloped basin conditions which are necessary for implementing “natural channel” design concepts. This designation may vary depending on specific site conditions including, the density of upstream development, opportunities for detention embankment construction, street channel crossing locations, the quality of natural channel features downstream and the capacity of the downstream system.

Major drainageways shall be preserved in their natural state, to the extent possible, and stabilization measures shall be designed to complement and enhance their natural character. Some improvements are normally needed to mitigate the increase in more frequent runoff events associated with development since it is anticipated that measures to reduce runoff rates and volumes may not be fully implemented or effective. In addition, urbanization of drainage basins is anticipated to reduce the availability of sediment in drainageways over time and that water released from detention facilities will be “hungry” or “clear water” with a greater potential to erode downstream drainageways. Therefore, some degree of drainageway stabilization will probably always be required to mitigate the effects of urbanization. Major drainageway runoff shall not be conveyed in storm sewer pipes.

In order to preserve the natural character of major drainageways, velocities shall be limited, future rehabilitation and maintenance costs shall be minimized and potential safety hazards shall be mitigated. Major drainageway channels shall be constructed to provide a natural, smooth transition from the channel to the natural topography. The use of constructed retaining walls, and/or bank slopes greater than 4:1 for major drainageway channels will not be allowed. Varying side slopes and the channel cross section throughout the channel reach is encouraged, to provide a less structural, more natural appearance.

### **2.18 “Minor” Drainageways.**

A minor drainageway is defined as any conveyance that drains a tributary area of less than approximately 130 acres. It is anticipated that minor drainageways will be designed to carry undetained flood flows from developed areas and that these drainageways will probably require significant alteration. However, the application of the major drainageway standards and criteria to minor drainageways is encouraged, where possible, such as where development densities are low or where minor drainageways have desirable natural features.

### **2.19 Flood Flows.**

Risks due to flooding and the delineation of the “regulatory” floodplain, shall be based of a runoff event with a return period of one hundred (100) years as defined by and based on the parameters in these *Criteria*. Flood flows shall be based on fully developed future land use conditions, except as flows may be mitigated by detention storage facilities implemented in compliance with approved master plans. Where “critical” facilities, such as hospitals, fire stations, wastewater and water treatment plants, police stations, electrical sub-stations or other facilities, provide important public services and emergency response capabilities, protection from a more severe storm event, such as the 500-year event, should be considered. For the purposes of floodplain delineation, flood flows shall be evaluated as described in **Chapter 5** of these *Criteria*.

### **2.20 Floodplain Encroachment.**

Encroachment into the regulatory floodplains is strongly discouraged and encroachment into unregulated floodplains is undesirable. When considering requests for floodplain filling or relocation, the impacts to adjacent properties, the channel hydraulics and design and the channel aesthetics, loss of flood storage, loss of riparian habitat and impact to adjacent land uses shall be considered and mitigated. Alterations to floodplains must acknowledge that anticipated flood flows may not be accurately estimated and that less

frequent events will occur. Any alteration of the regulatory floodplain must be reviewed by the Floodplain Administrator and approved by FEMA according to the local floodplain regulations.

### **2.21 Building Above Floodplains.**

When developing adjacent to floodplains buildings shall be constructed sufficiently above the estimated flooding elevation to allow for the uncertainties related to flood flows and hydraulic calculations.

### **2.22 Right-of-way, Tracts and Easements.**

All developments must include the allocation of space for drainage facility construction and maintenance, which includes the preservation of natural systems and the conveyance of adequate right-of-way and/or easements or tracts through the execution of appropriate legal documents. Right-of-way for floodplains must also account for potential increases in flood flows due to development and for the preservation of floodplains and their natural functions.

### **2.23 Intra-basin Diversions.**

Some intra-basin diversion of runoff may occur within major basins, as sub-basin boundaries are changed with a development. Those diversions should be minimized and, to the extent possible, historic outfall locations to natural drainageways shall be maintained. When a diversion is necessary, any potential adverse impacts that result shall be mitigated with proper stormwater management design and adequate right-of-way.

### **2.24 Inter-basin Diversions.**

Inter-basin diversion of runoff from one major drainageway basin to another major drainageway basin shall be avoided unless specific and prudent reasons justify and dictate a diversion. These diversions must be part of a master plan that fully recognizes the potential impacts and provides for adequate mitigation measures.

### **2.25 Groundwater Resources.**

Stormwater runoff is considered to be an integral part of the surface and groundwater resources and its potential for other uses should be recognized.

### **2.26 Groundwater Mitigation.**

Groundwater or sub-surface water can adversely impact the construction, capacity, long-term function, and maintainability of stormwater management facilities. It is the *Applicant's* responsibility to perform investigations and analyses to quantify potential impacts and to develop designs, which mitigate potential impacts. Those potential impacts shall be quantified by approved methodology and avoided or mitigated during the design and construction of stormwater management facilities.

There are also cases where groundwater or sub-surface flows seem to increase with development and urbanization. Foundation drains and sump pumps collect and discharge these flows to the surface. If quantities are excessive, icing and algae nuisances can result, which affect the quality of life for residents. Mitigation of these problems typically requires an additional collection system, which may ultimately discharge into the storm sewer system. The function or capacity of the storm sewer system may be compromised and stormwater runoff can surcharge the subsurface drainage collection system. There are likely many factors, including increased irrigation, introduction of non-native soils during grading



operations, varying levels of compaction adjacent to structures, etc. that lead to excessive sub-surface flows being discharged to the surface.

### 3.0 Construction of Public Improvements

When drainage reports or other applicable reports or studies identify public improvements that are necessary to properly manage stormwater runoff, mechanisms for funding the improvements are required. Funding mechanisms should equitably distribute the construction and maintenance costs in proportion to the benefits received. In accordance with the *Regulations*, subdividers or developers are required to construct, or guarantee to construct, stormwater management facilities that are necessary to serve the subdivision or development, which may include improvements to convey off-site flows through the property, and participation in the stabilization or improvement of the major drainageway system. Public improvements typically consist of the local drainage system and the major drainageway system, as described in the remainder of this section.

#### 3.1 Local Drainage System.

The local drainage system, as defined by the Phase III Drainage Report (see Chapter 4), must be designed and constructed with all new development and redevelopment. The local drainage system consists of curb and gutter, inlets and storm sewers, culverts, bridges, swales, ditches, channels, detention facilities, and water quality Best Management Practices within the subdivision or development. The local drainage system also includes facilities required to convey the minor and major storm runoff to the major drainageway system and those facilities necessary to convey off-site flows across or through the developing property. The drainageway improvements may be master planned, or may require the preparation of a detailed analysis by the *Applicant*. It is the responsibility of the *Applicant* improvements that will ensure that the site and infrastructure to be constructed will be protected from minor and major storm flows, flooding, and from channel degradation and bank erosion. Conveyance of off-site runoff is discussed in detail in Chapter 6, Hydrology.

#### 3.2 The Major Drainageway System

The major drainageway system consists of channels, storm sewers, bridges, culverts, detention facilities, and water quality Best Management Practices generally serving a tributary area of approximately 130 acres or greater and in many cases, more than one subdivision or development. The major drainageway system within the development, as defined by master plans or as required and defined in the Phase III Drainage Report, must be designed and constructed with all new development and redevelopment. Equitable participation in the design and construction of the off-site major drainageway system that serves the development may be required.

#### 3.3 Master Plan Improvements.

The drainage system and stabilization improvements, within the development, as defined by approved master plans or other studies, and as defined by the accepted Phase III Drainage Report must be designed and constructed with all new development and redevelopment. Responsibility for these improvements, that may serve multiple ownerships or projects, shall be determined through discussion and negotiation during the preparation of Phase III Drainage Reports and Plans.

### 4.0 Drainage Basin Fee Program

The planning, designing and constructing of stormwater improvements to implement the goals of these



*Criteria* and other regulatory and guidance documents requires that some development projects include facilities that provide benefits to other development projects within the same basin. To recognize these benefits and to provide for the implementation of a consistent basin plan the drainage basin fee program is administered to more equitably distribute the cost of implementation in proportion to the relative impact of developments.

The authorization and administration of this program is described in the City of Colorado Springs City Code, Chapter 7, Planning, Development and Building, Article 7, Subdivision Regulations, Part 9, Subdivision Drainage Facilities. The procedures for reimbursement of eligible costs is described in the City of Colorado Springs Engineering Criteria Manual, Chapter 13-Drainage Reimbursement.

Master Plans that identify needed improvements and the associated fees shall be completed in accordance with these *Criteria*. (need to revise wording in the ECM to be consistent with this section)

## 5.0 Operations and Maintenance

Maintenance activities, including routine maintenance, restorative maintenance, and rehabilitation are required to ensure the long-term function and effectiveness of stormwater management facilities and infrastructure. Such tasks are necessary to preclude the facility from becoming unhealthy and to avoid reduced conveyance capability, unsightliness, and malfunction. Site plans and projects must incorporate provisions for adequate access and space to perform maintenance activities for all stormwater management facilities. Routine maintenance of facilities may include removal of debris and sediment, trash rack clearing, mowing, noxious weed control, etc. Non-routine restorative maintenance activities include repairs to, or replacement of, structures and other improvements necessary to retain the effectiveness of the system. All facility designs will be held to the same standards, regardless of the organization or entity that has accepted responsibility for maintenance.

### 5.1 Operation and Maintenance Plan.

The design of all stormwater management facilities must be performed with access and short-term and long-term operation and maintenance being priority considerations. An Operation and Maintenance Plan and Manual (O&M Manual) must be developed and approved concurrent with the design and shall define those entities responsible for the maintenance and management of stormwater facilities. The purpose of the O&M Manual is to provide guidance and standard forms for those responsible for the long-term inspection and maintenance of the facilities. The standard template shall be used as the basis for the O&M Manual. See Section 4.6 of these *Criteria* for additional information. Water quality Best Management Practices require an Inspection and Maintenance Plan as described in Volume 2 of these *Criteria*.

### 5.2 Owner Responsibility.

The property owner shall be responsible for the maintenance, and rehabilitation to a fully functioning state, of all stormwater facilities located on the property unless another party accepts such responsibility in writing and responsibility is properly assigned through legal documentation. Maintenance responsibility shall be defined on final plats and final development plans or by maintenance agreement.

### 5.3 Access.

Drainage easements or tracts and access easements or public right-of-way shall be provided for all stormwater management facilities that convey public stormwater runoff or that are to be maintained by a

public entity. In general, easements are required for detention or retention ponds, water quality enhancement ponds and Best Management Practices, storm sewers, swales, channels, parking lot areas that convey runoff from adjacent properties (blanket type easements), culverts and major drainageways and floodplains. Drainage easements, shall be granted for inspection and maintenance purposes, and shall be shown on the drainage plan, Final Plat and Site Improvement Plan, as applicable. Maintenance access for all facilities must be adequate for the anticipated maintenance vehicles and equipment. Public stormwater runoff shall be defined as surface waters resulting from rainfall, snowmelt or groundwater seepage that originates on privately or publicly owned property and combines with other surface waters from other publicly owned property.

#### **5.4 Private Detention Storage.**

When detention storage facilities receive runoff only from private parcels, but release flows into a public system or onto public right-of-way, easements shall be provided for access, inspection and maintenance.

#### **5.5 Conveyance of Upstream Runoff.**

Developing properties shall convey runoff from upstream properties across their site within dedicated drainage easements or tracts in accordance with approved drainage plans. This may require the conveyance of developed runoff if the approved plan includes downstream detention storage facilities.

#### **5.6 Easements on Residential Lots.**

Drainage leaving individual residential lots can combine with other privately owned residential lots and contribute to excess runoff entering adjacent lots creating the potential for saturated ground, local flooding and a general nuisance. Subdivision plans shall limit the amount of runoff from residential lots so that runoff does not unduly impact adjacent lots. Easements shall be provided along lot lines or through tracts so that these flows can be conveyed safely. Drainage easements are allowed at a width of 10 to 20 feet along residential lot lines. Swales placed within these easements may only accept a limited amount of drainage and must remain free of obstructions. (may need to include current policy wording here.)

### **6.0 Regulatory/Legal**

#### **6.1 Local Permits.**

The construction of stormwater management facilities may require one or more of the following permits:

1. Floodplain Development Permit. Projects that include work within designated 100-year floodplain limits of drainageways require a Floodplain Development Permit. Consult Chapter 5, Floodplain Management, of these *Criteria* for additional details.
2. Right-of-Way Access Permit. Projects that include use of or construction in the public Right-of-Way must obtain a Right-of-Way Access Permit. (may need to clarify this requirement)
3. Grading and Erosion Control Plans. A plan must be submitted and approved prior to the start of land-disturbing activities.

## 6.2 Environmental Permitting.

In addition to local permitting processes, the construction of stormwater management facilities often requires permitting through the Colorado Department of Public Health and Environment with regard to the Stormwater Construction permitting requirements, and through the United States Army Corps of Engineers (USACE), relative to Section 404 of the Clean Water Act, and through the United States Fish and Wildlife Service regarding compliance with the requirements of Sections 7 and 9 of the Endangered Species Act of 1973. It is strongly recommended that initial project planning incorporate input from the appropriate agencies to determine permitting process requirements, as these processes can be complex and time consuming. It is the responsibility of the owner or developer to anticipate and comply with all permit requirements for their project.

Compliance with state or federal permitting requirements does not replace the need to fully comply with local regulations, standards, or criteria. If necessary, joint discussions between all regulatory agencies shall be initiated in project planning stages and continued as needed.

## 6.3 NPDES Permits.

Permit holders under the National Pollutant Discharge Elimination System Program requirements of the Federal Clean Water Act, and regulations promulgated by the Colorado Department of Public Health and Environment– Water Quality Control Division comply with permit requirements, which includes requiring permanent post-construction water quality enhancement Best Management Practices with development or redevelopment as described in **Volume 2** of these *Criteria*.

## 6.4 Fountain Creek Watershed.

Jurisdictions within the Fountain Creek watershed may be subject to the requirements of the Fountain Creek Watershed Flood Control and Greenway District, the Colorado Department of Public Health and Environment – Water Quality Control Commission Regulations; No. 32, Classifications and Numeric Standards for Arkansas River Basin, No. 65, Regulations Controlling Discharges to Storm Sewers or No. 93, Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List or the Southern Delivery System 1041 permit as stated in City of Colorado Springs Resolution No. 94-09 (**Appendix XXX**).

## 6.5 Floodplain Regulations.

Jurisdictions within El Paso County are participants in the National Flood Insurance Program (NFIP) and implement and enforce floodplain development regulations that meet or exceed the minimum standards provided in 44 Code of Federal Regulations, Part 60 through the Pikes Peak Regional Building Department Floodplain Administrator.

## 6.6 Water Rights.

It is the responsibility of the owner/developer to recognize that certain stormwater management facilities may impact water rights. The integrity of water rights shall be preserved in the planning, design, and construction of stormwater drainage facilities according to State law and the rules administered by the Office of the State Engineer.

## 6.7 Drainage Law.

The general principles of Colorado drainage law and specific Colorado Revised Statutes guide and affect

many aspects of stormwater management, including, but not limited to, private and municipal liability, maintenance and repair of drainage improvements, construction of drainage improvements by local governments, financing of drainage improvements, floodplain management, irrigation ditches, dams and detention facilities, water rights, and water quality. The Drainage Law Section in Volume 1 of the *UDFCD Manual* provides an outline of the general principles of Colorado drainage law and should be consulted for general reference. (Need City Attorney review of this section.)

## **7.0 Special Planning Areas and Districts**

There are Special Planning Areas or Districts where additional or unique considerations affect stormwater management planning or design. Special policies or recommendations may be implemented for these areas, as discussed in the following sections.

### **7.1 Fountain Creek Watershed Flood Control and Greenway District (FCWD).**

The FCWD has land use jurisdiction within the floodplain of Fountain Creek between Colorado Springs and Pueblo and review authority for projects within the watershed. Owners and developers must participate in the review process of the FCWD and incorporate this process into their submittal requirement and project schedules.

## **8.0 Hazard Minimization & Public Safety**

### **8.1 Public Safety.**

Public safety shall be an essential objective when planning, designing and maintaining stormwater facilities.

### **8.2 Potential Hazards.**

Stormwater facilities shall be designed with careful consideration of the potential hazards associated with the use, operation and maintenance of the facility and shall include appropriate design features to minimize these risks.

### **8.3 Development Near Dams.**

Other limitations on the location of development may need to be considered based on the Rules and Regulations for Dam Safety and Construction administered by the Office of the State Engineer.

### **8.4 Jurisdictional Dams and Reservoirs.**

There is potential for problems relative to dam safety and the hazards associated with water storage, failure, and emergency spillway locations and downstream flow paths. Jurisdictional dams are classified by the State Engineer as low, moderate, or high hazard structures when, in the event of failure, there is a potential loss of life. Dams presently rated as low or moderate hazard structures may be changed to high hazard rating if development occurs within the potential path of flooding due to a dam breach. In this case, the reservoir owners would be liable for the cost of upgrading the structure to meet the higher hazard classification.

Pursuant to Section 37-87-123, CRS, as amended, the Office of the State Engineer has prepared flood hazard maps that predict potential results of a failure of the high hazard dams within the State. These

reports have been made available to various cities, towns, and counties that may be affected by a dam breach. The following shall apply when development is proposed in the vicinity of jurisdictional dams or reservoirs:

- Development shall be allowed only in areas that would not be inundated by water rising to the level of the dam's embankment crest or by operation of the dam outlet works under design flow conditions.
- Development shall be restricted to areas outside of the high water line created by the breach of a dam (excepting high hazard classified dams which have passed inspection by the State Engineer's Office in accordance with *Sections 37-87-105, et. Seq, CRS 1973*). For more information refer to the State Engineer's Office.
- Development shall be restricted to areas outside of the existing or potential emergency spillway paths, beginning at the dam and proceeding to the point where the floodwater returns to the natural drainage course.

Due to the potential liabilities and regulatory and administrative requirements, the creation of jurisdictional dams is strongly discouraged. The creation of a jurisdictional dam shall not be allowed, unless upon special approval. Detention pond embankment heights shall be limited, and other elements of pond design shall be considered to avoid the creation of a jurisdictional dam.

## 9.0 Irrigation Canals or Ditches

Irrigation ditches and reservoirs have historically intercepted the storm runoff from rural and agricultural basins. Urbanization of the basins, however, has increased the rate, quantity and frequency of stormwater runoff, and can have negative effects on water quality. Irrigation ditches are designed with flat slopes and have limited carrying capacity, decreasing in the downstream direction. In addition, certain ditches are abandoned after urbanization and, therefore, cannot be successfully utilized for storm drainage.

Stormwater runoff shall be directed into historic and natural drainageways and avoid discharging into an irrigation canal or ditch, except as required by water rights or as permitted by canal or ditch owners and operators in writing. Where irrigation ditches cross major drainageways, it may be required to design and construct appropriate structures to separate stormwater runoff from ditch flows. The engineer or developer shall coordinate with the ditch owner to determine the design requirements for separation of irrigation and stormwater flow paths.

In certain instances, however, irrigation ditches have been successfully utilized as outfall points for the drainage system. Since the owner's liability from ditch failure increases with the acceptance of storm runoff, the responsibility must be clearly defined before a combined system is approved. Whenever new development will increase flow rates, volumes, or change the manner or points of discharge into irrigation ditches, the hydrologic and hydraulic conditions relating to the irrigation system shall be fully analyzed and written consent from the ditch owner/operator shall be submitted with the development application and included in the drainage report. It is the responsibility of the owner/developer to identify the proper representatives or operators and satisfy their requirements for impacts to their system. The discharge of runoff into the irrigation ditch shall be approved only if such discharge is consistent with an adopted drainage plan.



**Appendix 10.2 - May 7, 2009 WWE/Matrix memo**





**WWE**  
**MEMORANDUM**

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**To:** Robert Krehbiel, P.E., and Graham Thompson, P.E.  
Matrix Design Group

**From:** Wright Water Engineers, Inc.  
Andrew Earles, P.E., Ph.D., and Jane Clary

**Date:** April 10, 2009 (*revised May 7, 2009*)

**Re:** Summary of Findings and Thoughts from Stormwater Criteria Comparative Analysis

Wright Water Engineers (WWE) and Matrix Design Group (Matrix) have reviewed targeted storm drainage criteria manuals from within Colorado and other parts of the country to identify themes, criteria and approaches that the City of Colorado Springs (City) may want to consider. Attached to this memorandum are 1) an 11 x 17 spreadsheet matrix recording our notes and observations for these manuals and 2) an attachment from the Denver Water Quality Management Plan, Chapter 5 (<http://www.denvergov.org/Portals/528/documents/Chapter%2005.pdf>), which summarizes review of several national programs in a narrative format. When reviewing Attachment 1, please note that there may be some irregularities in spacing due to the constraints of working within Microsoft Excel. Some of these irregularities may be less noticeable if the document is viewed electronically. As we move ahead, we may want to consider an alternate format for this table to improve the appearance.

This memorandum identifies some common themes from national research and identifies some big picture questions that need to be addressed.

## **THEMES FROM NATIONAL RESEARCH**

In 2004, WWE conducted a review of several “cutting-edge” stormwater programs throughout the country as a part of our work on the Denver Water Quality Management Plan including:

- City of Portland, Oregon: Clean Rivers Plan
- Snohomish County, Washington: Drainage Needs Report
- City of San Diego, California: Think Blue San Diego!
- Prince George’s County, Maryland: Low Impact Development program.

Many of the big-picture themes that emerged from that review remain valid in 2009 and have been reiterated in recent national publications such as *Urban Stormwater Management in the United States* by the National Research Council (2008). Many of these themes also are reflected in the criteria that are summarized in Attachment 1. For this reason, we have provided a copy of the

review we completed in 2004 as Attachment 2. Key themes from some of this national-level research, updated with some additional themes from research in 2009, include:

- Comprehensive approaches are being used to address drainage, flooding, erosion, aquatic life, habitat, and water quality in an integrated manner. There is also a shift in philosophy from “water disposal” to “water as an overall resource.”
- Stormwater management approaches that are multi-layered, combining a variety of structural and non-structural practices, are advocated and implemented. Particularly for Low Impact Development (LID) designs, clear guidance is needed for non-structural practices such as preservation of soils with high infiltration capacity.
- Watershed-based approaches are being used for planning and problem solving. One of the primary conclusions from the NRC (2008) was that a watershed-based approach is needed to protect the nation’s waterways. This can be challenging, particularly when watersheds cross political jurisdictions. The Drainage Basin Master Plan concept used in Colorado Springs agrees well with the watershed approach.
- GIS tools are being used effectively to prioritize stormwater improvements and to more effectively communicate to citizens, staff and developers. GIS is particularly useful when a watershed-based approach is used.
- Storm runoff volume reduction practices are being used in the majority of these communities. These practices include a variety of LID techniques such as bioretention, permeable pavement, etc.
- Long-term maintenance of BMPs is recognized as being critical to the success of BMPs. Recognition of whole life-cycle costs incorporating long-term maintenance requirements and costs should be a key aspect of BMP selection. (Also, both local and national BMP life cycle cost tools have recently been developed for the Water Environmental Research Foundation (WERF), United States Environmental Protection Agency (USEPA) and Urban Drainage and Flood Control District (UDFCD) that may be useful.)
- Demonstration projects for innovative or potentially promising technology are a good tool to encourage advances in community stormwater practices. Benefits of this approach include increasing developers’ comfort with new practices and providing time to “work out the kinks” in practices that may not have been widely used in some climates or land uses. This is true both nationally and in Colorado.
- Strong public education campaigns in combination with extensive web sites are substantive components of many programs. Education is not an “afterthought”— it is being aggressively used in several of these communities as a key strategy to improve runoff quality. If Colorado Springs wanted to expand its public education program, there are many excellent examples from which to choose.

- Significant financial investments, spanning from several hundred thousand to several million dollars, have been required for these communities to complete their planning processes. Most of the communities also recognize that significant future expenditures from tens to hundreds of million dollars will be required to meet their future goals and are planning accordingly.

## **THEMES FROM STORM DRAINAGE CRITERIA MANUALS**

WWE and Matrix reviewed numerous criteria manuals from Colorado and around the country to evaluate the state of the practice for drainage and water quality criteria. Colorado manuals reviewed included the City of Colorado Springs, the UDFCD Criteria Manual, Arapahoe County, Douglas County, Boulder, Fort Collins, Pueblo and Fort Carson. Additional manuals from around the country included the Mid America Regional Council (MARC), Kansas City American Public Works Association (APWA) stormwater guidance, San Diego, Portland, Prince George's County and Brunswick County (North Carolina). We also reviewed information and guidance from organizations and agencies including the USEPA, United States Army Corps of Engineers (USACE) the Center for Watershed Protection, the LID Center and others. The following sections summarize specific topics investigated and identify common themes, as well as unique practices from the manuals that were reviewed.

### **Design Events**

Most of the manuals distinguished between a minor (2- to 10-year) and major (100-year) storm drainage system and have criteria related to storm sewers, streets, channels, detention, etc., for both minor and major events. Most of the manuals reviewed also included a water quality design event, typically ranging from an 80<sup>th</sup> to 90<sup>th</sup> percentile storm. An emerging practice on the Front Range and elsewhere around the country is Full Spectrum Detention (similar to multi-frequency control which is being used increasingly in other parts of the country). Full Spectrum Detention provides a controlled release of runoff over a wide range of events rather than just for several design events. Research has shown that it is beneficial to stream stability as well as water quality treatment of runoff.

### **Runoff Methods**

Many manuals specify use of the Rational Method for small watersheds, in some cases up to 160 acres. Beyond 100 to 160 acres, most manuals require hydrograph-based methods, typically using computer models. Many of the manuals in Colorado use the EPA Stormwater Management Model (SWMM) or a version of SWMM. TR-55 (i.e., Soil Conservation Service (SCS) method) and HEC-HMS are also commonly referenced methods. Pueblo has a unique criterion where SCS is used for non-urban watersheds (imperviousness less than 25%) and the Colorado Urban Hydrograph Procedure (CUHP) is used for urban watersheds. The MARC manual has a unique approach to characterizing hydrology of BMPs according to a "Level of Service (LS)" method.

## **LID**

Many of the manuals included some discussion of LID. Commonly referenced practices included disconnecting impervious area, bioretention, swales, buffers, curbless streets, stream setbacks and pervious pavements. The Arapahoe County and Douglas County manuals actually specify a minimum criterion for disconnected impervious area and receiving pervious area. Some municipalities have developed separate criteria and guidance manuals, in addition to their drainage criteria manuals, that specifically address LID.

## **Stable Channel Design**

Nearly all of the manuals reviewed have a stated preference for stabilized natural channels versus hard-lined conveyances. When engineered channels are used, most manuals state a preference for soft lining (i.e., grass or wetland vegetation) rather than concrete or riprap. Most of the manuals that advocate stabilization of natural channels recognize that grade control structures are necessary for stability. Relative to the Colorado manuals that were reviewed, the Arapahoe County and Douglas County manuals do a good job of taking bioengineering concepts from the UDFCD manual and developing additional details. The APWA guidance used in the Kansas City area has particularly good guidance for stable channel design, and the San Diego manual provides a lot of criteria related to hydromodification. USACE references reviewed are very contemporary and have excellent information.

## **Detention Requirements**

There are typically two approaches to detention in manuals that were reviewed: 1) detaining to allowable release rates--typically stated on a unit runoff basis in the manual and related to the hydrologic soil group or 2) detaining not to exceed pre-development peak flow rates for specific design storms. Common detention requirements are to design for a water quality event, a minor event, and a major event; however, as noted above, the concept of full spectrum or multi-frequency detention is gaining traction. Many manuals differentiate between on-site and regional detention (some even include "sub-regional" detention). In a number of manuals, on-site detention is discouraged, and regional facilities are preferred. For small watersheds, many of the manuals offer simplified methods for detention sizing. For larger watersheds, hydrograph routing using a computer model is typically required. For BMPs that are based on storage and controlled release of runoff such as extended detention basins, constructed wetland basins and others, manuals typically specify a water quality capture volume or storm depth defining storage requirements. This is typically coupled with a release rate or residence time as the fundamental water quality criteria for design.

## **Buffers for Setbacks**

Many of the manuals reviewed do not directly refer to setbacks or buffers (perhaps this is handled by ordinance rather than in the criteria manual?). Floodplain preservation is a common theme, and floodplain regulations create buffers by restricting development in the floodplain in many of the

manuals. The most extensive information on buffers in the manuals reviewed comes from the Kansas City APWA guidance and the MARC manual, both of which establish tiered buffer systems.

### **Maintenance Policies**

Several of the manuals reviewed address maintenance responsibility, easements and the ability of municipalities to perform maintenance if it not performed by another responsible party. Several manuals require operation and maintenance manuals for drainage and water quality facilities and provide guidance on content of such manuals.

### **Other**

Some of the manuals have criteria or practices that do not fall directly into one of the above categories. Other observations include:

1. A number of manuals reference a regional criteria manual (such as UDFCD or the MARC manual) but then contain criteria/provisions for following alternate criteria if they are superior to the regional criteria. These alternate criteria are often the subject of the municipal manuals. The regional manual is incorporated by reference.
2. Many of the manuals included very good checklists for design, submittals, etc.
3. Nonstructural BMPs and source controls were topics that were also addressed in many of the manuals. Many of these BMPs go hand-in-hand with LID.

Additional comments are provided in the attached table.

## **BIG PICTURE QUESTIONS REGARDING APPROACH TO A COLORADO SPRINGS STORM DRAINAGE CRITERIA MANUAL UPDATE**

As we have conducted this research, several fundamental conceptual approaches become apparent regarding the types of end products that Colorado Springs desires. An initial list is briefly provided below, but should be discussed further relatively early in the next steps of this process.

1. **Detailed or streamlined manual:** For example, in the case of the City and County of Denver Storm Drainage Criteria Manual, the directive was to keep the manual as slim as possible, whereas for the Arapahoe and Douglas County Manuals, multiple drawings/figures and design applications are included. For example, the Arapahoe County Manual provides dozens of figures related to inlet design and street capacity charts. A decision would need to be made regarding the balance between having engineers do their own calculations/spreadsheets versus how much is pre-calculated in the manual. An alternative way to think about this issue is whether your objective is primarily “facts and formulas” or whether you want to provide a more guidance-oriented manual. There are strengths and weaknesses to both approaches. Streamlined manuals are more likely to be fully read and may be easier to find the “facts”, whereas large, guidance-oriented manuals may present such a large quantity of information that it becomes overwhelming to users, with information being harder to locate and less likely to be read

comprehensively. A middle alternative would be spreadsheet tools that generate charts/figures based on inputs from the designer.

2. **If UDFCD Vol. 1-3 is generally adopted, a determination will be needed regarding the extent to which requirements are repeated in the DCM or incorporated by reference:** This issue is closely related to #1. If Colorado Springs wanted to adopt UDFCD Vols. 1-3, a determination should be made regarding the extent to which Colorado Springs would want a streamlined manual that incorporates UDFCD criteria by reference, or the extent to which it would want to reproduce these criteria in its own manual. An advantage to referencing the UDFCD manual is that updates to the UDFCD manual would be automatically incorporated, as opposed to Colorado Springs needing to continually update its manual to stay current. A disadvantage is that cross-referencing another manual may be cumbersome, particularly if Colorado Springs makes significant changes to some chapters (e.g., rainfall, runoff, open channels), but not others.
3. **Degree of narrative versus quantitative requirements for concepts such as water quality, volume reduction and LID:** All manuals reviewed provide a minimum quantitative water quality capture or treatment volume; however, there is variation regarding what is required or encouraged beyond the minimum volume. Approaches range from a primarily narrative/optional approach such as that included in UDFCD Volume 3 to a highly quantitative approach such as the level of service (LS) method used by the MARC Manual. A mid-range approach would be an approach like the “20-10 rule” used by Arapahoe and Douglas Counties for minimizing directly connected impervious area. There are strengths and weaknesses to both approaches. For example, there are technical compromises that are sometimes made in quantitative water quality approaches, whereas solely narrative approaches may not be adequately stringent to improve the quality of practices implemented on development projects, where economic drivers often result in implementation of the “bare minimum” if there is no quantitative driver. An additional constraint with requirements is that best decisions for the environment are made when site-specific characteristics are taken into consideration as opposed to a one-size-fits-all, cookie-cutter approach. However, site-specific approaches must be balanced with administrative realities facing local governments and a clear, understandable and reliable working framework for developers and engineers.
4. **Policies/requirements related to stream stability:** This relates to how far the City wants to go beyond the basic principle of “do no more harm than formerly.” For example, what will be mandated downstream, as opposed to improvements only on the property itself? Arapahoe and Douglas Counties go beyond UDFCD requirements for off-site major drainageway improvements.

We look forward to meeting with you to review this memorandum and attachments. There is a lot of information in the manuals reviewed that could be potentially useful for Colorado Springs, given appropriate adjustments for your local conditions. This review has also given us a good sense that the direction Colorado Springs is heading is consistent with the leading edge of the state of the practice in Colorado and the U.S.

Memorandum to R. Krehbiel and G. Thompson  
April 10, 2009 (*revised May 7, 2009*)  
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Attachment 1 Stormwater Criteria Comparative Matrix

Attachment 2 Denver Water Quality Management Plan, Chapter 5 Case Studies

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**Appendix 10.3 - District Goals & Recommendations Matrix**



**Responsible Entities for Achieving FCVTF Strategic Plan Goals and Army Corps Recommendations**

Fountain Creek Watershed Strategic Plan Goals		Responsible for Reaching Goal					Comments
		TAC	CAG	Local Gov.	Drainage Criteria*	Other	
<b>Water Quality and Sedimentation</b>							
1	Assess potential water quality problems in the watershed	x		x		X	CDPHE leads this effort. Local governments, dischargers & USGS play a secondary role. TAC may get involved in some cases.
2	Mitigate adverse stream impacts.	x	x	x	x	X	CDPHE leads this effort. Local governments, dischargers & USGS play a secondary role. FC Corridor Master Plan (FCCMP) is addressing as well thus the TAC & CAG will get involved in this related work.
3	Reduce selenium to levels that are at or below State water quality standards and/or background conditions or recommend that the Colorado Water Quality Control Commission (CWQCC) establish appropriate site-specific standards.			x		X	CDPHE leads this effort. Local governments, dischargers & USGS play a secondary role.
4	Reduce E. Coli to levels that are at or below State water quality standards or recommend that the CWQCC establish appropriate site-specific standards.			x		X	CDPHE leads this effort. Local governments, dischargers & USGS play a secondary role.
5	Improve watershed function to manage sediment transport patterns and reduce erosion and sedimentation.	x		x	X	x	New Drainage Criteria will help in this area as will the FCCMP work - thus the TAC will be involved.
6	Improve stormwater runoff conditions at the source to improve water quality.	x		x	X	x	New Drainage Criteria will help in this area as will the FCCMP work - thus the TAC will be involved.
<b>Flooding and Stormwater Management</b>							
1	Recognize that stormwater is a resource and manage it for the benefit of the watershed and entities downstream.	DC		x	X		New Drainage Criteria will help in this area as will changes to land use ordinances.
2	Preserve natural channel capacity through floodplain preservation and sedimentation controls.	DC		x	X		New Drainage Criteria will help in this areas as will steamside setback requirements.
3	Preserve the natural drainage way through conservation easements and streamside setbacks.	x		x	X	x	New Drainage Criteria will help in this areas as will steamside setback requirements. Also, conservation easement work must be encouraged (Co Open Lands & others)

\* Drainage Criteria (DC) Note: the TAC should be involved in reviewing the new DC and will be sponsoring/supporting the FCW Policy Evaluation & Workshop and associated follow-up efforts.

**Responsible Entities for Achieving FCVTF Strategic Plan Goals and Army Corps Recommendations**

Fountain Creek Watershed Strategic Plan Goals		Responsible for Reaching Goal					Comments
		TAC	CAG	Local Gov.	Drainage Criteria*	Other	
<b>Flooding and Stormwater Management (cont.)</b>							
4	Improve channel stability and flow stability by formulating a watershed development policy that promotes matching the post-development hydrographs[1] and the pre-development hydrographs for peak, volume, and timing to the extent practicable.	DC		x	<b>X</b>		New Drainage Criteria will help in this area.
5	Promote efficient stormwater management so that runoff will not exceed downstream conveyance capacity in order to minimize adverse impacts downstream.	DC		x	<b>X</b>		New Drainage Criteria will help in this area.
6	Promote stable base flows and stabilize the stream system by retrofitting, to the extent practicable and in accordance with applicable Municipal Stormwater Discharge Permits (MSDPs), existing drainage systems to provide runoff reduction, water quality treatment, and improved stormwater management practices.	DC		x	<b>X</b>		New Drainage Criteria will help in this area.
7	Improve stormwater runoff conditions at the source, with respect to quality, quantity, and rate/duration of flow to better mitigate development impacts.	DC		x	<b>X</b>		New Drainage Criteria will help in this area.
<b>Municipal Water Supplies and Return Flows</b>							
1	Develop and enhance region-wide conservation efforts	?	?	x		<b>X</b>	To be done by local water providers and through landscape ordinances and new building codes. District may get involved by sponsoring a workshop to educate and encourage providers?
2	Develop and enhance region-wide reuse programs	?	?			<b>X</b>	To be done by local water providers and through landscape ordinances and new building codes. District may get involved by sponsoring a workshop to educate and encourage providers?
3	Minimize region-wide water system losses	?	?			<b>X</b>	To be done by local water providers and through landscape ordinances and new building codes. District may get involved by sponsoring a workshop to educate and encourage providers?
4	Initiate regional discussions for addressing the long-term water supply gap					<b>X</b>	To be done by local water providers.

**Responsible Entities for Achieving FCVTF Strategic Plan Goals and Army Corps Recommendations**

Fountain Creek Watershed Strategic Plan Goals		Responsible for Reaching Goal					Comments
		TAC	CAG	Local Gov.	Drainage Criteria*	Other	
<b>Land Use Planning and Development</b>							
1	Establish and implement land use policies that preserve, maintain, and enhance ecosystem health (including flood control, wildlife habitat and water quality).	DC	DC	X	x		Drainage criteria can include elements of this. Land use policies need to be updated for this.
<b>Recreation</b>							
1	Create a common vision for recreational uses within the Fountain Creek Corridor between the various municipalities/counties.		X	x			FCCMP will do this for a large section of FC, can be continued for the rest of the Watershed as lead by the CAG.
2	Expand the types of recreational opportunities within the Fountain Creek Watershed and Corridor.		X	x			FCCMP will do this for a large section of FC, can be continued for the rest of the Watershed as lead by the CAG.
3	Preserve, maintain, and enhance the Fountain Creek Watershed and Corridor through environmentally sensitive and sustainable recreational design. Restore ecological systems that have been lost or are struggling.		X	x			FCCMP will do this for a large section of FC, can be continued for the rest of the Watershed as lead by the CAG.
<b>Wetlands</b>							
1	Mitigation banks are a form of “third-party” compensatory mitigation, in which a party other than a Clean Water Act permittee assumes the responsibility for compensatory mitigation implementation and success. This transfer of liability has been a very attractive feature for Section 404 permit holders, who would otherwise be responsible for the design, construction, monitoring, and ecological success of a compensatory mitigation site for a minimum of five years in addition to ensuring the site’s long-term protection. water quality, water quantity, wildlife habitats, recreation and tourism, erosion and sedimentation, and public education.						NOT A GOAL - Suggest removing
3	Create additional wetlands and riparian areas that help to accomplish the goals of the wetland and riparian management plan.	X	X	x			FCCMP will do this for a large section of FC, can be continued for the rest of the Watershed as lead by the District. Local governments also critical to this effort.
4	Practice adaptive management to improve wetland protection, enhancement, and creation.	X	X	x			FCCMP will do this for a large section of FC, can be continued for the rest of the Watershed as lead by the District. Local governments also critical to this effort.

**Responsible Entities for Achieving FCVTF Strategic Plan Goals and Army Corps Recommendations**

Fountain Creek Watershed Strategic Plan Goals		Responsible for Reaching Goal					Comments
		TAC	CAG	Local Gov.	Drainage Criteria*	Other	
<b>Wildlife</b>							
1	Preserve, protect, and enhance the biodiversity, health, and long-term sustainability of wildlife within the Fountain Creek Watershed.	<b>X</b>	<b>X</b>	x			FCCMP will do this for a large section of FC, can be continued for the rest of the Watershed as lead by the District. Local governments also critical to this effort.
2	Preserve, protect, and enhance the functionality, biodiversity, health, and long-term sustainability of the habitats that local wildlife require, while maintaining access to the resources upon which wildlife depend, within the Fountain Creek Watershed.	<b>X</b>	<b>X</b>	x			FCCMP will do this for a large section of FC, can be continued for the rest of the Watershed as lead by the District. Local governments also critical to this effort.
<b>Agriculture</b>							
1	Preserve and protect agricultural land		x			<b>X</b>	Local agricultural producers and landowners will determine what is best for their land, the CAG can assist, as requested & appropriate.
2	Preserve agricultural water		x			<b>X</b>	Local agricultural producers and landowners will determine what is best for their land, the CAG can assist, as requested & appropriate.
3	Promote agricultural viability		x			<b>X</b>	Local agricultural producers and landowners will determine what is best for their land, the CAG can assist, as requested & appropriate.
4	Protect ecosystems	<b>X</b>	<b>X</b>	x			FCCMP will do this for a large section of FC, can be continued for the rest of the Watershed as lead by the District.
<b>Outreach</b>							
1	Establish appreciation, understanding, and connection with the waterway corridors in the Fountain Creek Watershed		<b>X</b>	x		<b>X</b>	The CAG & FC Foundation should collaborate to achieve this goal, in connection with existing programs (parks, schools...) throughout the watershed.
2	Create public stewardship to increase watershed health/runoff water quality, to help assure waterway safety, and to instill water conservation practices		<b>X</b>	x		<b>X</b>	The CAG & FC Foundation should collaborate to achieve this goal, in connection with existing programs (parks, schools, water providers...) throughout the watershed.

***Responsible Entities for Achieving FCVTF Strategic Plan Goals and Army Corps Recommendations***

Fountain Creek Watershed Strategic Plan Goals		Responsible for Reaching Goal					Comments
		TAC	CAG	Local Gov.	Drainage Criteria*	Other	
<b>Outreach</b>							
3	Facilitate enjoyment of healthy waterways that support diverse environmental, economic, wildlife, and recreational opportunities		<b>X</b>	x		<b>X</b>	The CAG & FC Foundation should collaborate to achieve this goal, in connection with existing programs (parks, schools...) throughout the watershed.
4	Preserve and protect agricultural viability		x			<b>X</b>	Local agricultural producers and landowners will determine what is best for their land, the CAG can assist, as requested & appropriate.

**Responsible Entities for Achieving FCVTF Strategic Plan Goals and Army Corps Recommendations**

Fountain Creek Watershed Strategic Plan Goals		Responsible for Reaching Goal					Comments
		TAC	CAG	Local Gov.	Drainage Criteria*	Other	
<b>Army Corps of Engineers FC Watershed Study Recommendations</b>							
<b>Development</b>							
1	Review and modify development policies as necessary to include appropriate consideration of open space needs in development (focus on more habitat development within traditional parks).	DC		x	<b>X</b>		New Drainage Criteria will help in this area as will changes to land use ordinances.
2	Limit sediment sources during construction by minimizing overlot grading.	DC		x	<b>X</b>		New Drainage Criteria will help in this area.
3	Review and modify development policies and landscape ordinances as necessary to include appropriate low impact development techniques (lowimpactdevelopment.org) such as those put forth by organizations such as the Center for Watershed Protection (cwp.org).	DC		x	<b>X</b>		New Drainage Criteria will help in this area as will changes to land use ordinances.
4	Review and modify development policies as necessary to require post development hydrographs match predevelopment hydrographs for peak, volume, and timing to the extent practicable.	DC		x	<b>X</b>		New Drainage Criteria will help in this area.
5	Review and modify development policies as necessary to require post-development sediment transport matches pre-development sediment transport to the extent practicable.	DC		x	<b>X</b>		New Drainage Criteria will help in this area.
6	Review and modify development policies as necessary to require assessment of upstream/downstream impacts (particularly the impacts due to small frequently occurring storm events such as the 2-yr event).	DC		x	<b>X</b>		New Drainage Criteria will help in this area.
7	Review and modify development policies as necessary to ensure involvement by regulatory agencies and stakeholders as soon as possible in the development process.	DC		x	<b>X</b>		New Drainage Criteria will help in this area.
8	Entities must follow through with review of development plans, adherence to approved plans through the construction process, and inspection/maintenance of completed projects.	DC		X	<b>x</b>		New Drainage Criteria will help in this area.



**Responsible Entities for Achieving FCVTF Strategic Plan Goals and Army Corps Recommendations**

Fountain Creek Watershed Strategic Plan Goals		Responsible for Reaching Goal					Comments
		TAC	CAG	Local Gov.	Drainage Criteria*	Other	
<b>Army Corps of Engineers FC Watershed Study Recommendations</b>							
<b>Rehabilitation/Preservation</b>							
1	Rehabilitate riparian areas to a healthy, functioning condition where opportunities exist to the extent practicable.	<b>X</b>	<b>X</b>	x			FCCMP will do this for a large section of FC, can be continued for the rest of the Watershed as lead by the District. Local governments also critical to this effort.
2	Preserve existing wetlands and create additional wetlands where opportunities exist to the extent practicable.	<b>X</b>	<b>X</b>	x			FCCMP will do this for a large section of FC, can be continued for the rest of the Watershed as lead by the District. Local governments also critical to this effort.
3	Entities constructing remedial projects in the watershed should develop a consistent approach and methodology for project design and construction while considering site-specific conditions and latest design methodologies.	<b>X</b>	<b>X</b>	x			FCCMP will do this for a large section of FC, can be continued for the rest of the Watershed as lead by the District. Local governments also critical to this effort.
<b>Modeling/Project Design</b>							
1	Collect sediment load data for the Fountain Creek Watershed so that appropriate sediment transport modeling can be calibrated for all future development in the watershed.						
2	Entities should use the hydrologic and hydraulic models developed as a part of the Fountain Creek Watershed Study as a basis for updating FEMA floodplains on the mainstems of Fountain Creek and Monument Creek.			<b>X</b>			
3	Entities should use the models developed as a part of the Fountain Creek Watershed Study as a basis for certifying their levees on the mainstem of Fountain Creek.			<b>X</b>			
4	Remedial projects that affect Fountain Creek or its tributaries should utilize stable channel design principles.	<b>x</b>		<b>X</b>			

**Responsible Entities for Achieving FCVTF Strategic Plan Goals and Army Corps Recommendations**

Fountain Creek Watershed Strategic Plan Goals		Responsible for Reaching Goal					Comments
		TAC	CAG	Local Gov.	Drainage Criteria*	Other	
<b>Army Corps of Engineers FC Watershed Study Recommendations</b>							
<b>Administration</b>							
1	Designers and reviewers should be educated/trained in the principles of geomorphology and sediment transport to support the design and review process for new development.	X		X	X		Work with new Drainage Criteria to do this?
2	Create a Fountain Creek Watershed Entity to promote cooperation and partnerships, to establish a set of watershed standards, to serve as a funding source for the construction and maintenance of large scale projects, and to assist entities with training and review.	X	X				Entity formed :) Working on the rest!

**Appendix 10.4 - Better Site Design Community Codes and Ordinances Worksheet**



# CHAPTER 3

## CODE AND ORDINANCE WORKSHEET

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The Code and Ordinance Worksheet allows an in-depth review of the standards, ordinances, and codes (i.e., the development rules) that shape how development occurs in your community. You are guided through a systematic comparison of your local development rules against the model development principles. Institutional frameworks, regulatory structures and incentive programs are included in this review. The worksheet consists of a series of questions that correspond to each of the model development principles. Points are assigned based on how well the current development rules agree with the site planning benchmarks derived from the model development principles.

The worksheet is intended to guide you through the first two steps of a local site planning roundtable.

Step 1: Find out what the Development Rules are in your community.

Step 2: See how your rules stack up to the Model Development Principles.

The homework done in these first two steps helps to identify which development rules are potential candidates for change.

### PREPARING TO COMPLETE THE CODE AND ORDINANCE WORKSHEET

Two tasks need to be performed before you begin in the worksheet. First, you must identify all the development rules that apply in your community. Second, you must identify the local, state, and federal authorities that actually administer or enforce the development rules within your community. Both tasks require a large investment of time. The development process is usually shaped by a complex labyrinth of regulations, criteria, and authorities. A team approach may be helpful. You may wish to enlist the help of a local plan reviewer, land planner, land use attorney, or civil engineer. Their real-world experience with the development process is often very useful in completing the worksheet.

#### Identify the Development Rules

Gather the key documents that contain the development rules in your community. A list of potential documents to look for is provided in Table 4. Keep in mind that the information you may want on a particular development rule is not always found in code or regulation, and may be hidden in supporting design manuals, review checklists, guidance document or construction specifications. In most cases, this will require an extensive search. Few communities include all of their

**Table 4: Key Local Documents that will be Needed to Complete the COW**

Zoning Ordinance
Subdivision Codes
Street Standards or Road Design Manual
Parking Requirements
Building and Fire Regulations/Standards
Stormwater Management or Drainage Criteria
Buffer or Floodplain Regulations
Environmental Regulations
Tree Protection or Landscaping Ordinance
Erosion and Sediment Control Ordinances
Public Fire Defense Masterplans
Grading Ordinance

rules in a single document. Be prepared to contact state and federal, as well as local agencies to obtain copies of the needed documents.

### **Identify Development Authorities**

Once the development rules are located, it is relatively easy to determine which local agencies or authorities are actually responsible for administering and enforcing the rules. Completing this step will provide you with a better understanding of the intricacies of the development review process and helps identify key members of a future local roundtable.

Table 5 provides a simple framework for identifying the agencies that influence development in your community. As you will see, space is provided not only for local agencies, but for state and federal agencies as well. In some cases, state and federal agencies may also exercise some authority over the local development process (e.g., wetlands, some road design, and stormwater).

## **USING THE WORKSHEET: HOW DO YOUR RULES STACK UP TO THE MODEL DEVELOPMENT PRINCIPLES?**

### **Completing the Worksheet**

Once you have located the documents that outline your development rules and identified the authorities responsible for development in your community, you are ready for the next step. You can now use the worksheet to compare your development rules to the model development principles.

The worksheet is presented at the end of this chapter. The worksheet presents seventy-seven site planning benchmarks. The benchmarks are posed as questions. Each benchmark focuses on a specific site design practice, such as the minimum diameter of cul-de-sacs, the minimum width of streets, or the minimum parking ratio for a certain land use. You should refer to the codes, ordinances, and plans identified in the first step to determine the appropriate development rule.

The questions require either a yes or no response or a specific numeric criteria. If your development rule agrees with the site planning benchmark, you are awarded points.

### **Calculating Your Score**

A place is provided on each page of the worksheet to keep track of your running score. In addition, the worksheet is subdivided into three categories:

- # Residential Streets and Parking Lots (Principles No. 1 - 10)
- # Lot Development (Principles No. 11 - 16)
- # Conservation of Natural Areas (Principles No. 17 - 22).

For each category, you are asked to subtotal your score. This **“Time to Assess”** allows you to consider which development rules are most in line with the site planning benchmarks and what rules are potential candidates for change.

The total number of points possible for all of the site planning benchmarks is 100. Your overall score provides a general indication of your community's ability to support environmentally sensitive development. As a general rule, if your overall score is lower than 80, then it may be advisable to systematically reform your local development rules. A score sheet is provided at end of the Code and Ordinance Worksheet to assist you in determining where your community's score places in respect to the Model Development Principles.

Once you have completed the worksheet, go back and review your responses. Determine if there are specific areas that need improvement (e.g., development rules that govern road design) or if your development rules are generally pretty good. This review is key to implementation of better development: assessment of your current development rules and identification of impediments to innovative site design. This review also directly leads into the next step: a site planning roundtable process conducted at the local government level. The primary tasks of a local roundtable are to systematically review existing development rules and then determine if changes can or should be made. By providing a much-needed framework for overcoming barriers to better development, the site planning roundtable can serve as an important tool for local change.

**Table 5: Local, State, and Federal Authorities Responsible for Development in Your Community**

Development Responsibility	State/Federal	County	Town
Sets road standards	Agency: _____ Contact Name: _____ Phone No.: _____	_____	_____
Review/approves subdivision plans	Agency: _____ Contact Name: _____ Phone No.: _____	_____	_____
Establishes zoning ordinances	Agency: _____ Contact Name: _____ Phone No.: _____	_____	_____
Establishes subdivision ordinances	Agency: _____ Contact Name: _____ Phone No.: _____	_____	_____

**Table 5: Local, State, and Federal Authorities Responsible for Development in Your Community (Continued)**

Development Responsibility	State/Federal	County	Town
Reviews/establishes stormwater management or drainage criteria	Agency: _____ Contact Name: _____ Phone No.: _____	_____	_____
Provides fire protection and fire protection code enforcement	Agency: _____ Contact Name: _____ Phone No.: _____	_____	_____
Oversees buffer ordinance	Agency: _____ Contact Name: _____ Phone No.: _____	_____	_____
Oversees wetland protection	Agency: _____ Contact Name: _____ Phone No.: _____	_____	_____
Establishes grading requirements or oversees erosion and sediment control program	Agency: _____ Contact Name: _____ Phone No.: _____	_____	_____
Reviews/approves septic systems	Agency: _____ Contact Name: _____ Phone No.: _____	_____	_____
Reviews/approves utility plans (e.g., water and sewer)	Agency: _____ Contact Name: _____ Phone No.: _____	_____	_____
Reviews/approves forest conservation/ tree protection plans?	Agency: _____ Contact Name: _____ Phone No.: _____	_____	_____



1. Street Width

What is the minimum pavement width allowed for streets in low density residential developments that have less than 500 average daily trips (ADT)?

\_\_\_\_\_ feet

*If your answer is between 18-22 feet, give yourself 4 points L*

At higher densities are parking lanes allowed to also serve as traffic lanes (i.e., queuing streets)?

YES/NO

*If your answer is YES, give yourself 3 points L*

2. Street Length

Do street standards promote the most efficient street layouts that reduce overall street length?

YES / NO

*If your answer is YES, give yourself 1 point L*

3. Right-of-Way Width

What is the minimum right of way (ROW) width for a residential street?

\_\_\_\_\_ feet

*If your answer is less than 45 feet, give yourself 3 points L*

Does the code allow utilities to be placed under the paved section of the ROW?

YES / NO

*If your answer is YES, give yourself 1 point L*

4. Cul-de-Sacs

What is the minimum radius allowed for cul-de-sacs?

\_\_\_\_\_ feet

*If your answer is less than 35 feet, give yourself 3 points L*

*If your answer is 36 feet to 45 feet, give yourself 1 point L*

Can a landscaped island be created within the cul-de-sac?

YES / NO

*If your answer is YES, give yourself 1 point L*

Are alternative turn arounds such as "hammerheads" allowed on short streets in low density residential developments?

YES / NO

*If your answer is YES, give yourself 1 point L*

## 5. Vegetated Open Channels

Are curb and gutters required for most residential street sections?

YES / NO

*If your answer is **NO**, give yourself 2 points L*

Are there established design criteria for swales that can provide stormwater quality treatment (i.e., dry swales, biofilters, or grass swales)?

YES / NO

*If your answer is **YES**, give yourself 2 points L*

## 6. Parking Ratios

What is the minimum parking ratio for a professional office building (per 1000 ft<sup>2</sup> of gross floor area)?

\_\_\_\_\_ spaces

*If your answer is **less than 3.0 spaces**, give yourself 1 point L*

What is the minimum required parking ratio for shopping centers (per 1,000 ft<sup>2</sup> gross floor area)?

*If your answer is **4.5 spaces or less**, give yourself 1 point L*

What is the minimum required parking ratio for single family homes (per home)?

\_\_\_\_\_ spaces

*If your answer is **less than or equal to 2.0 spaces**, give yourself 1 point L*

Are your parking requirements set as maximum or median (rather than minimum) requirements?

YES / NO

*If your answer is **YES**, give yourself 2 points L*

## 7. Parking Codes

Is the use of shared parking arrangements promoted?

YES / NO

*If your answer is **YES**, give yourself 1 point L*

Are model shared parking agreements provided?

YES / NO

*If your answer is **YES**, give yourself 1 point L*

Are parking ratios reduced if shared parking arrangements are in place?

YES / NO

If your answer is **YES**, give yourself **1 point L**

If mass transit is provided nearby, is the parking ratio reduced?

YES / NO

If your answer is **YES**, give yourself **1 point L**

8. Parking Lots

What is the minimum stall width for a standard parking space?

\_\_\_\_\_ feet

If your answer is **9 feet or less**, give yourself **1 point L**

What is the minimum stall length for a standard parking space?

\_\_\_\_\_ feet

If your answer is **18 feet or less**, give yourself **1 point L**

Are at least 30% of the spaces at larger commercial parking lots required to have smaller dimensions for compact cars?

YES / NO

If your answer is **YES**, give yourself **1 point L**

Can pervious materials be used for spillover parking areas?

YES / NO

If your answer is **YES**, give yourself **2 points L**

9. Structured Parking

Are there any incentives to developers to provide parking within garages rather than surface parking lots?

YES / NO

If your answer is **YES**, give yourself **1 point L**

10. Parking Lot Runoff

Is a minimum percentage of a parking lot required to be landscaped?

YES / NO

If your answer is **YES**, give yourself **2 points L**

Is the use of bioretention islands and other stormwater practices within landscaped areas or setbacks allowed?

YES / NO

If your answer is **YES**, give yourself **2 points L**

**@ Time to Assess:** Principles 1 - 10 focused on the codes, ordinances, and standards that determine the size, shape, and construction of parking lots, roadways, and driveways in the suburban landscape. There were a total of **40** points available for Principles 1 - 10. What was your total score?

Subtotal Page 15 \_\_\_\_\_ +Subtotal Page 16 \_\_\_\_\_ +Subtotal Page 17 \_\_\_\_\_ =

Where were your codes and ordinances most in line with the principles? What codes and ordinances are potential impediments to better development?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

11. Open Space Design

Are open space or cluster development designs allowed in the community?

YES / NO

*If your answer is YES, give yourself 3 points L*

*If your answer is NO, skip to question No. 12*

Is land conservation or impervious cover reduction a major goal or objective of the open space design ordinance?

YES / NO

*If your answer is YES, give yourself 1 point L*

Are the submittal or review requirements for open space design greater than those for conventional development?

YES / NO

*If your answer is NO, give yourself 1 point L*

Is open space or cluster design a by-right form of development?

YES / NO

*If your answer is YES, give yourself 1 point L*

Are flexible site design criteria available for developers that utilize open space or cluster design options (e.g, setbacks, road widths, lot sizes)

YES / NO

*If your answer is YES, give yourself 2 points L*

12. Setbacks and Frontages

Are irregular lot shapes (e.g., pie-shaped, flag lots) allowed in the community?

YES / NO

*If your answer is YES, give yourself 1 point L*

What is the minimum requirement for front setbacks for a **one half (1/2) acre** residential lot?

\_\_\_\_\_ feet

*If your answer is 20 feet or less, give yourself 1 point L*

What is the minimum requirement for rear setbacks for a **one half (1/2) acre** residential lot?

\_\_\_\_\_ feet

*If your answer is 25 feet or less, give yourself 1 point L*

What is the minimum requirement for side setbacks for a **one half (1/2) acre** residential lot?

\_\_\_\_\_ feet

*If your answer is 8 feet or less, give yourself 1 points L*

What is the minimum frontage distance for a **one half (1/2) acre** residential lot?

\_\_\_\_\_ feet

*If your answer is less than 80 feet, give yourself 2 points L*

13. Sidewalks

What is the minimum sidewalk width allowed in the community?

\_\_\_\_\_ feet

*If your answer is 4 feet or less, give yourself 2 points L*

Are sidewalks always required on both sides of residential streets?

YES / NO

*If your answer is NO, give yourself 2 points L*

Are sidewalks generally sloped so they drain to the front yard rather than the street?

YES / NO

*If your answer is YES, give yourself 1 point L*

Can alternate pedestrian networks be substituted for sidewalks (e.g., trails through common areas)?

YES / NO

*If your answer is YES, give yourself 1 point L*

## 14. Driveways

What is the minimum driveway width specified in the community?

*If your answer is 9 feet or less (one lane) or 18 feet (two lanes), give yourself 2 points*

**L**

Can pervious materials be used for single family home driveways (e.g., grass, gravel, porous pavers, etc)?

YES / NO

*If your answer is YES, give yourself 2 points*

YES / NO

Can a "two track" design be used at single family driveways?

*If your answer is YES, give yourself 1 point*

YES / NO

Are shared driveways permitted in residential developments?

*If your answer is YES, give yourself 1 point*

## 15. Open Space Management

***Skip to question 16 if open space, cluster, or conservation developments are not allowed in your community.***

Does the community have enforceable requirements to establish associations that can effectively manage open space?

YES/NO

*If your answer is YES, give yourself 2 points*

YES / NO

Are open space areas required to be consolidated into larger units?

*If your answer is YES, give yourself 1 point*

YES / NO

Does a minimum percentage of open space have to be managed in a natural condition?

*If your answer is YES, give yourself 1 point*

YES / NO

Are allowable and unallowable uses for open space in residential developments defined?

*If your answer is YES, give yourself 1 point*

Can open space be managed by a third party using land trusts or conservation easements?

YES / NO

*If your answer is YES, give yourself 1 point*

16. Rooftop Runoff

Can rooftop runoff be discharged to yard areas?

YES / NO

If your answer is **YES**, give yourself 2 points **L**

Do current grading or drainage requirements allow for temporary ponding of stormwater on front yards or rooftops?

YES / NO

If your answer is **YES**, give yourself 2 points **L**

**@ Time to Assess:** Principles 11 through 16 focused on the regulations which determine lot size, lot shape, housing density, and the overall design and appearance of our neighborhoods. There were a total of **36** points available for Principles 11 - 16. What was your total score?

Subtotal Page 18 \_\_\_\_\_ +Subtotal Page 19 \_\_\_\_\_ +Subtotal Page 20 \_\_\_\_\_ =

Where were your codes and ordinances most in line with the principles? What codes and ordinances are potential impediments to better development?

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17. Buffer Systems

Is there a stream buffer ordinance in the community?

YES / NO

If your answer is **YES**, give yourself 2 point **L**

If so, what is the minimum buffer width?

\_\_\_\_\_ feet

If your answer is **75 feet or more**, give yourself 1 point **L**

Is expansion of the buffer to include freshwater wetlands, steep slopes or the 100-year floodplain required?

YES / NO

If your answer is **YES**, give yourself 1 point **L**

## 18. Buffer Maintenance

***If you do not have stream buffer requirements in your community, skip to question No. 19***

Does the stream buffer ordinance specify that at least part of the stream buffer be maintained with native vegetation?

YES / NO

*If your answer is YES, give yourself 2 points L*

Does the stream buffer ordinance outline allowable uses?

YES / NO

*If your answer is YES, give yourself 1 point L*

Does the ordinance specify enforcement and education mechanisms?

YES / NO

*If your answer is YES, give yourself 1 point L*

## 19. Clearing and Grading

Is there any ordinance that requires or encourages the preservation of natural vegetation at residential development sites?

YES / NO

*If your answer is YES, give yourself 2 points L*

Do reserve septic field areas need to be cleared of trees at the time of development?

YES / NO

*If your answer is NO, give yourself 1 point L*

## 20. Tree Conservation

If forests or specimen trees are present at residential development sites, does some of the stand have to be preserved?

YES / NO

*If your answer is YES, give yourself 2 points L*

Are the limits of disturbance shown on construction plans adequate for preventing clearing of natural vegetative cover during construction?

YES / NO

*If your answer is YES, give yourself 1 point L*

## 21. Land Conservation Incentives

Are there any incentives to developers or landowners to conserve non-regulated land (open space design, density bonuses, stormwater credits or lower property tax rates)?

YES / NO

*If your answer is YES, give yourself 2 points L*



Is flexibility to meet regulatory or conservation restrictions (density compensation, buffer averaging, transferable development rights, off-site mitigation) offered to developers?

YES / NO

If your answer is **YES**, give yourself 2 points **L**

22. Stormwater Outfalls

Is stormwater required to be treated for quality before it is discharged?

YES / NO

If your answer is **YES**, give yourself 2 points **L**

Are there effective design criteria for stormwater best management practices (BMPs)?

YES / NO

If your answer is **YES**, give yourself 1 point **L**

Can stormwater be directly discharged into a jurisdictional wetland without pretreatment?

YES / NO

If your answer is **NO**, give yourself 1 point **L**

Does a floodplain management ordinance that restricts or prohibits development within the 100 year floodplain exist?

YES / NO

If your answer is **YES**, give yourself 2 points **L**

**@ Time to Assess:** Principles 17 through 22 addressed the codes and ordinances that promote (or impede) protection of existing natural areas and incorporation of open spaces into new development. There were a total of **24** points available for Principles 17 - 22. What was your total score?

Subtotal Page 21 \_\_\_\_\_ +Subtotal Page 22 \_\_\_\_\_ +Subtotal Page 23 \_\_\_\_\_ =

Where were your codes and ordinances most in line with the principles? What codes and ordinances are potential impediments to better development?

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To determine final score, add up subtotal from each **@ Time to Assess**

Principles 1 - 10 (Page 18)	_____
Principles 11 - 16 (Page 21)	_____
Principles 17 - 22 (Page 23)	_____
<b>TOTAL</b>	<b>▭</b>

**SCORING** (A total of **100 points** are available):

See Page 10 to determine where your community's score places in respect to the site planning roundtable Model Development Principles:

Your Community's Score		
90- 100	└	Congratulations! Your community is a real leader in protecting streams, lakes, and estuaries. Keep up the good work.
80 - 89	└	Your local development rules are pretty good, but could use some tweaking in some areas.
79 - 70	└	Significant opportunities exist to improve your development rules. Consider creating a site planning roundtable.
60 - 69	└	Development rules are inadequate to protect your local aquatic resources. A site planning roundtable would be very useful.
less than 60	└	Your development rules definitely are not environmentally friendly. Serious reform of the development rules is needed.

**Appendix 10.5 - Better Site Design Worksheet - 2008 Summary of Local Results**



# Better Site Design: A Handbook for Changing Development Rules in Your Community

- <http://www.cwp.org/PublicationStore/bsd.htm>

## Local Criteria Codes, Ordinances & Standards

City or County	Residential Streets and Parking Lots	Lot Development Lot Size Lot Shape Housing Density	Conservation of Natural Area	Total Score
Colorado Springs	25	27	19	71
El Paso County	18	17	7	42
Fountain	18	31	8	57
City of Pueblo	22	22	11	55
Pueblo county	15	27	7	49
Woodland Park	24	23	6	53
<b>Average Score</b>	<b>20.33</b>	<b>24.50</b>	<b>9.67</b>	
<b>% Total</b>	<b>50.8%</b>	<b>68.1%</b>	<b>40.3%</b>	
<b>Model Development Principles</b>	<b>40</b>	<b>36</b>	<b>24</b>	<b>100</b>
<b>Opportunity for Improvement</b>	<b>2</b>	<b>3</b>	<b>1</b>	

## LOACL CRITERIA CODE, ORDINANCES & STANDARDS

Summary Question	Max Score	Average Score	Difference	Ranking
1	7	2.8	4.2	1
2	1	0.7	0.3	22
3	4	1.5	2.5	10
4	5	2.8	2.2	11
5	4	1.8	2.2	12
6	5	2.0	3.0	6
7	4	0.8	3.2	5
8	5	3.8	1.2	16
9	1	0.0	1.0	19
10	4	3.3	0.7	20
11	8	6.5	1.5	14
12	6	3.3	2.7	8
13	6	3.5	2.5	9
14	6	4.8	1.2	15
15	6	2.8	3.2	4
16	4	3.5	0.5	21
17	4	1.0	3.0	7
18	4	0.5	3.5	2
19	3	1.8	1.2	17
20	3	1.0	2.0	13
21	4	0.7	3.3	3
22	6	5.0	1.0	18

# BENCHMARK OPPORTUNITY RANKING

## OPPORTUNITIES FOR ORDINANCE

<u>RANKING</u>	<u>DEVELOPMENT FEATURE</u>	<u>QUESTION #</u>
1	STREET WIDTHS	1
2	BUFFER MAINTENANCE	18
3	LAND CONSERVATION INCENTIVES	21
4	OPEN SPACE MANAGEMENT	15
5	PARKING CODES	7
6	PARKING RATIOS	6
7	BUFFER SYSTEMS	17
8	SETBACKS & FRONTAGES	12
9	SIDEWALKS	13
10	RIGHT-OF-WAY WIDTHS	3



**Appendix 10.6 - June 20, 2012 Policy Workshop Agenda, Attendee List, & Slides**





# Fountain Creek Watershed Policy Evaluation Workshop

June 20, 2012

2:00-4:30PM

Location: PPACG, 15 S. 7<sup>th</sup> Street, Large (Downstairs) Conference Room

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- |  |             |
|--|-------------|
| 1. Welcome & Introductions   | 2:00 – 2:10 |
| <i>Larry Small, Fountain Creek Watershed Flood Control &amp; Greenway District</i> |             |
| 2. Policy Evaluation Summary Presentation  | 2:10 – 2:50 |
| <i>Graham Thompson, Matrix Design Group</i>  |             |
| 3. Colorado Springs Drainage Criteria Manual Update                                | 2:50 – 3:10 |
| <i>Dan Bare, City of Colorado Springs</i>  |             |
| 4. Recommendations   | 3:10 – 3:30 |
| <i>Group Discussion</i>  |             |
| 5. Barriers/Issues   | 3:30 – 3:50 |
| <i>Group Discussion</i>  |             |
| 6. Implementation  | 3:50 – 4:20 |
| <i>Group Discussion</i>  |             |
| 7. Next Steps  | 4:20 – 4:30 |
| <i>Larry Small</i>   |             |

Policy Evaluation Report Final Draft available on the District's website at:

<http://www.fountain-crk.org/>



# Fountain Creek Watershed Policy Evaluation Workshop

June 20, 2012  
2:00-4:30PM

Location: PPACG, 15 S. 7th Street, Large (Downstairs) Conference Room

Name	Representing	Phone	e-mail
KEVIN WALTER	WALTER STEINBERG	719 559 4096	KWalter@waltersteinberg.com
JIM HECKMATH	FYN SMT DIST / AFMSD	719 382-5303	fshmanager@fspdfl.org
Mauree Greenwood	City of Fountain	719 322-2036	agreenwood@fountaincreek.org
Lonna Thelen	City of Colo Spgs	719 386-5383	lthelen@spingsgov.com
Lisa Ross	City of Colo Spgs	719-385-5004	lross@spingsgov.com
VAN TRUAN	CORPS OF ENGINEERS	719-543-6915	van.a.truan@usace.army.mil
RICHARD MULLENDY	CITY OF PUEBLO	719-569-0404	R.MULLENDY@PUEBLO.US
JENNIFER IRVINE	EL PASO COUNTY	(719) 520-6890	jenniferirvine@elpasoco.com
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TIM MITROS	City of Colo Spgs	719-385-5061	Tmitros@spingsgov.com
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Ilona Skalsky	Colo Spgs Utilities	719-665-8028	mskalsky@cskk.org
Rich Muzzy	PPACG	719-471-7000	rmuzzy@ppacg.org
Mary Barber	Fort Carson	719-526-4648	mary.i.barber@af.mil
Ross Kincaid	Sierra Club	719-561-3117	ross.kincaid@sierraclub.org
Emily Skalsky	Norte / Drainage Board	719-260-8544	emily.skalsky@nys.com
Cathy Page	Recreation Division of Lake Park	719-636-6075	cpage@lakepark.com
Jeff Holste	Wilson + Company	719-590-5800	jeffrey.holste@wilsonco.com
Bob Schmidt	PUEBLO COUNTY, PN	719-320-7014	schmidtr@co.pueblo.co.us
JULIE ANN WOODS	PUEBLO CITY PLAN & DEV	719 583-6100	woodsja@co.pueblo.co.us
Shirley Lecker	El Paso County	719-590-6997	elainelecker@elpasoco.com
HARRY SMALL	Fountain Creek District	719-447-5012	hsmall@fcdmcast.net



# Fountain Creek Watershed Policy Evaluation Workshop

June 20, 2012  
2:00-4:30PM

Location: PPACG, 15 S. 7th Street, Large (Downstairs) Conference Room

Name	Representing	Phone	e-mail
Jim Hark	TAC / Thomas / Thomas	719-579-8777	jhark@tplan.net
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David Longric	Colorado Springs Utilities	719-668-8776	dlongric@csu.org
Bruce Zook	Colorado Springs Utilities	719-668-8250	b.zook@csu.org
Judith Rice-Jones	UCCO Geography	478-2167	jricejones@ucco.edu
Janine Hegeman	Fort Carson Stormwater	524-4925	janine.a.hegeman.ctr@mcsl.mil
ALLISON PLUTE	CITY OF CS	719-650-7474	aplute@springgou.com
SCOT SCHNAKE	Colorado Springs Utilities	719-668-4184	SSCHNAKE@CSU.ORG
Sarah Hunkle	"	468-8672	SHUNKLE@CSU.ORG
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Tasha Breakin	El Paso County - CSID	520-6984	tashabreakin@elpaso.co.gov
André Breakin	EPC	339-3841	andreb@elpaso.co.gov
Rich Wray	Kiowa Engineering	630-7342	rswray@kiowaengineering.com
William Moran	HBA	592-180 #16	William@csHBA.com
Jesse	City of CS	385-5556	jesse@springgou.com





# Policy Evaluation Project

*Policy Workshop*

*June 20<sup>th</sup>, 2012*

*Graham Thompson*

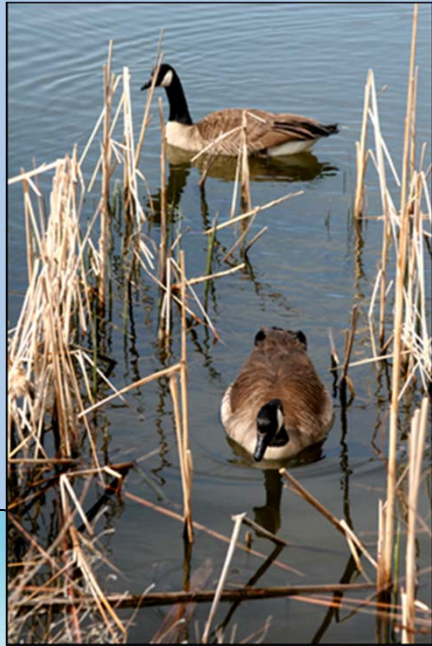
**\*\*Note: Red text on slides indicates questions asked and comments and changes captured on recommendations/ barriers/implementation during the workshop\*\***







# Policy Evaluation Project



- \$25,000 Grant from CWCB
- Grant Prepared by PPACG
- District Managed Grant
- TAC Subcommittee Oversight
- Consultant – Matrix Design Group







# Policy Evaluation Project

## PURPOSE

- Promote Watershed Health
- Identify Policies and Practices
- Encourage Implementation of Recommendations from FCVTF Strategic Plan & Corps Study
- Move Toward Development of Common, Consistent Criteria Addressing Land Use & Stormwater Management

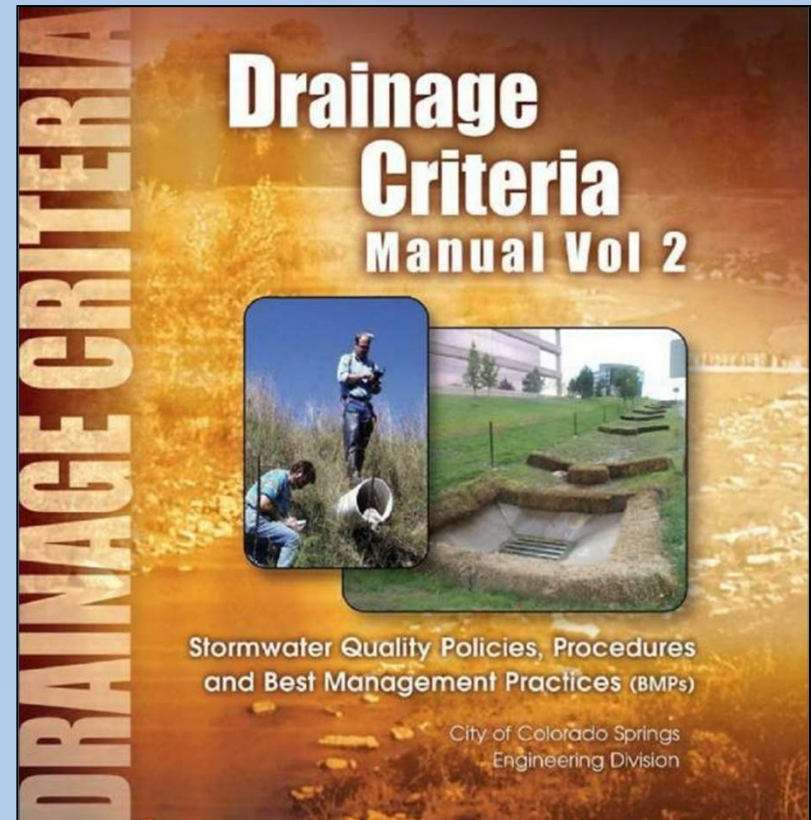




# Policy Evaluation Project

## PROJECT TASKS

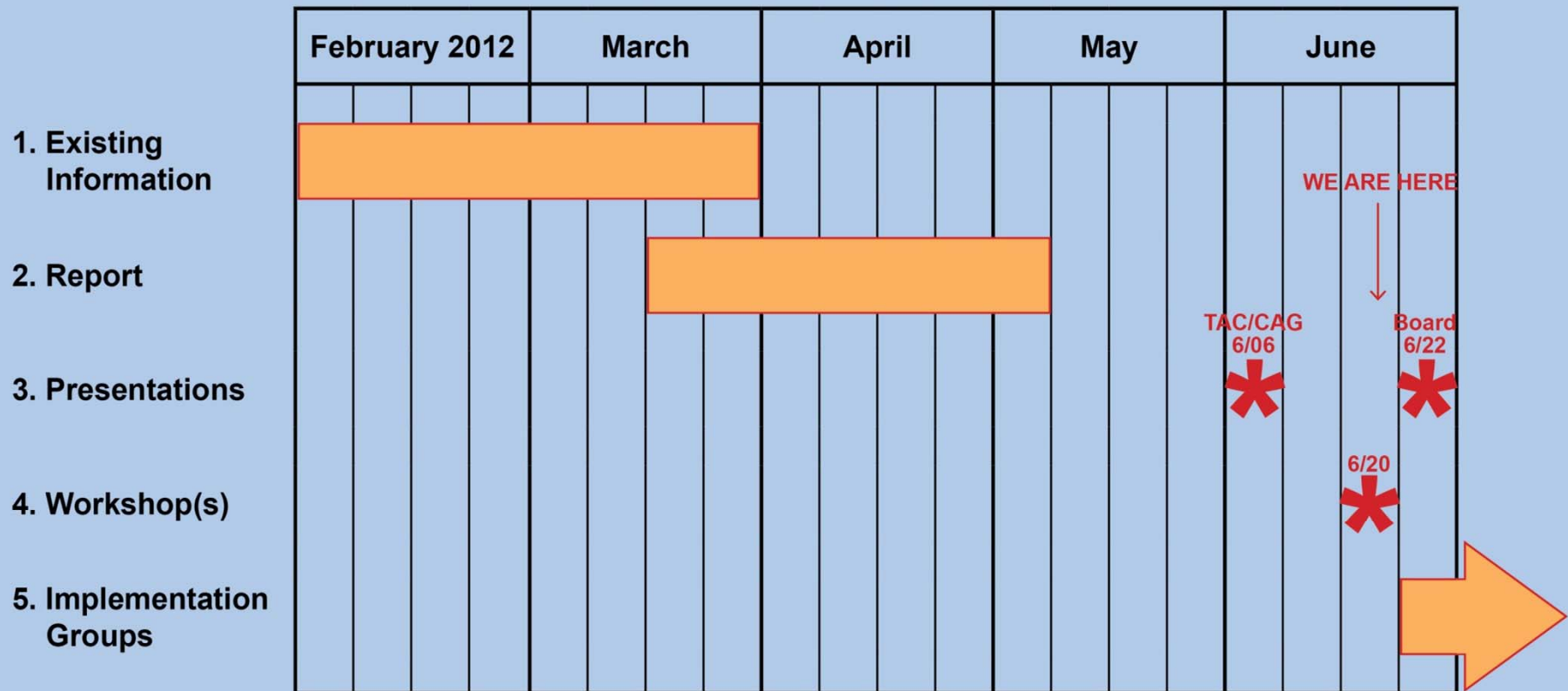
1. Synthesis of Existing Information
2. Policy Evaluation Report
3. Report Presentation to the TAC, CAC, and Board
4. Workshop(s)
5. Form Implementation Group(s)





# Policy Evaluation Project

## PROJECT SCHEDULE

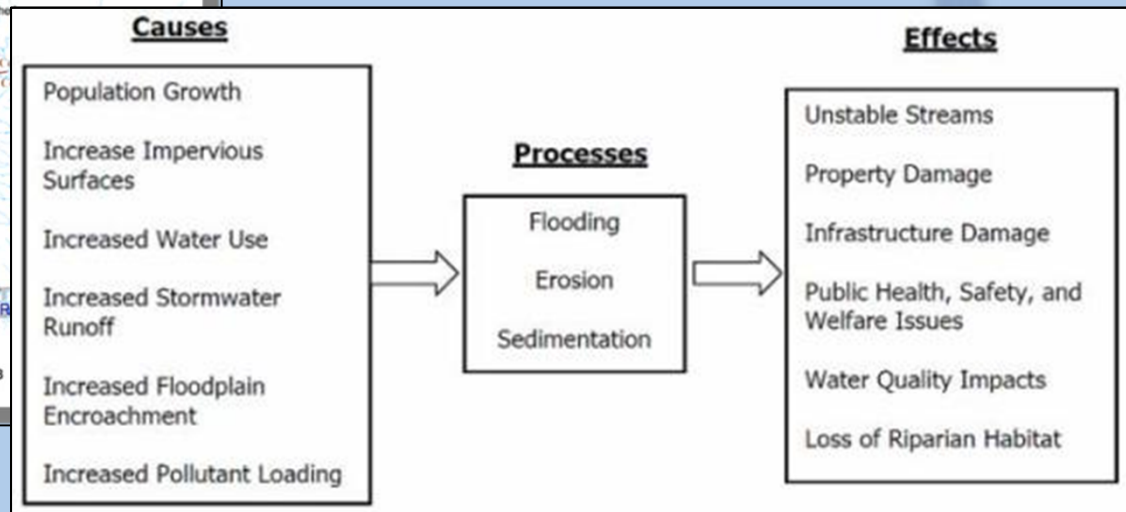
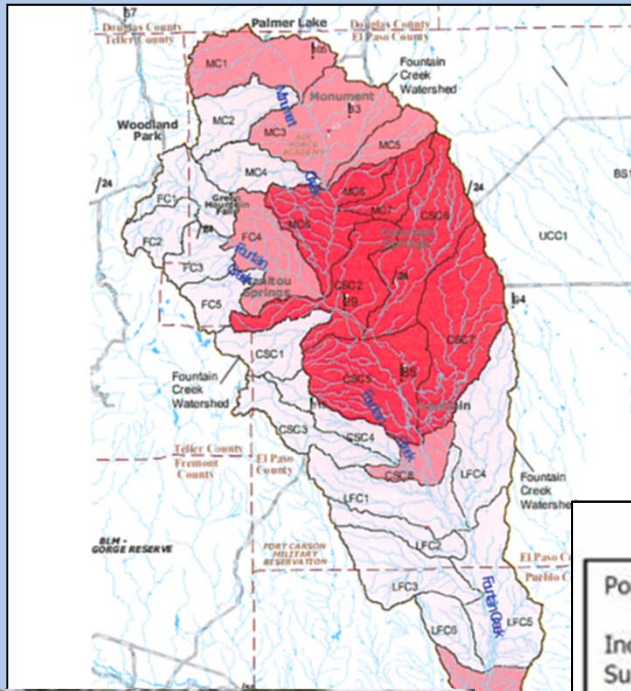






# Policy Evaluation Project

## BACKGROUND

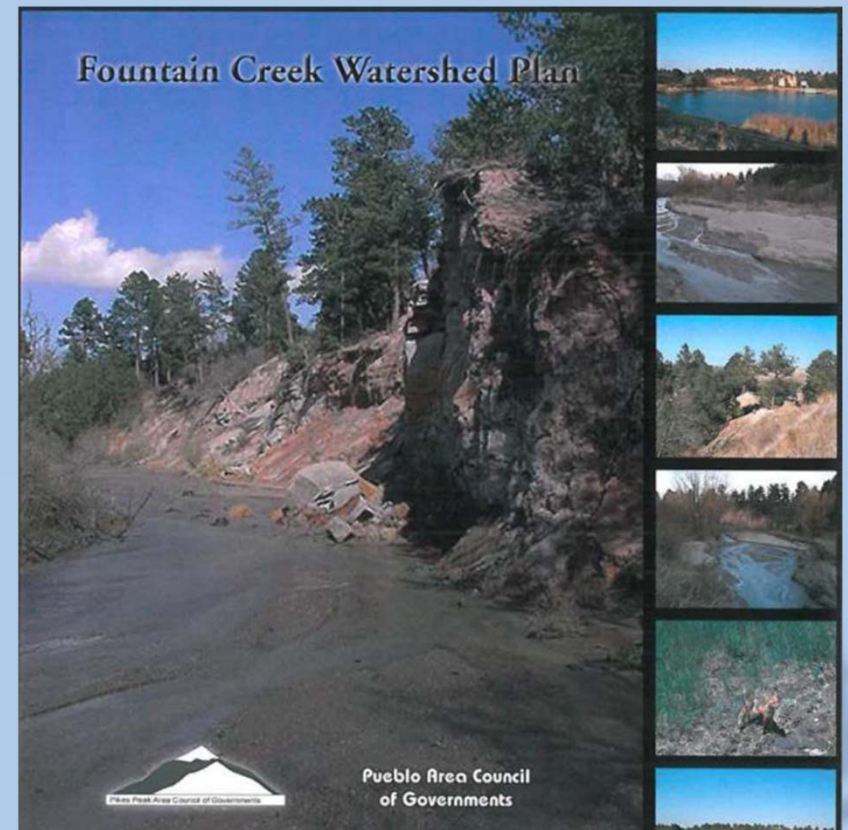




# Policy Evaluation Project

## START WITH FOUNTAIN CREEK WATERSHED PLAN SECTION 6

- Federal & State Regulatory Programs
- Local Programs – Appendix F
- Technical Strategies
- Policy Issues Identified:
  - Volume
  - Water/Sediment Balance
  - Enforcement & Maintenance
  - Funding Mechanism



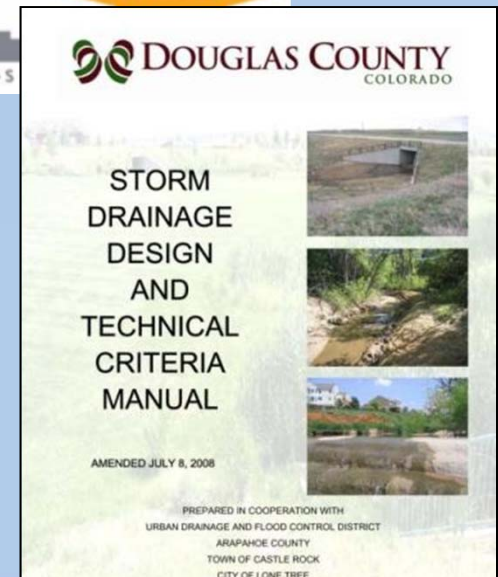
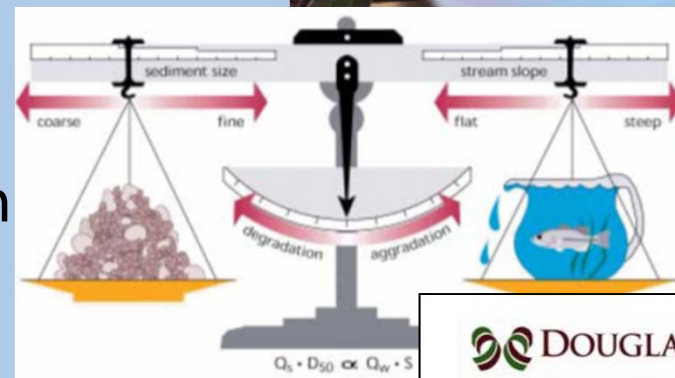
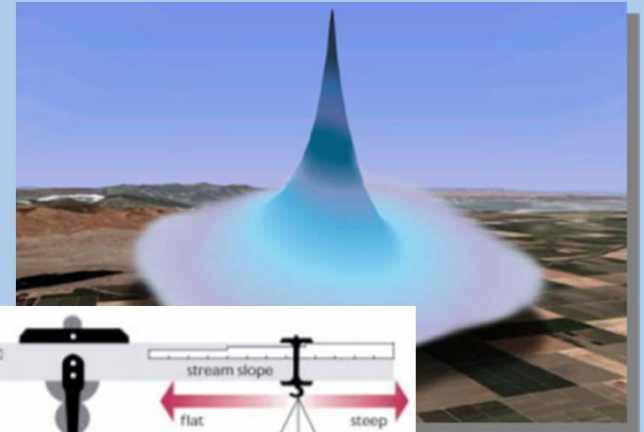


# Policy Evaluation Project

## BUILD ON COLORADO SPRINGS MANUAL UPDATE

### •Policy Issues Identified in this Process

- Riparian Preservation
- Sub-Regional, Full Spectrum Detention
- Hydrology Methods
- Jurisdictionally Unified Approach
- Douglas County Manual as a Starting Point







# Policy Evaluation Project

## LOCAL SURVEY

- Focus on COS DCM
- 11 Jurisdictions
- Planning & Engineering
- Two Runs
- 9 of 11 responded

The screenshot shows a web browser window with the address bar displaying 'http://www.zo...' and a tab titled 'Fountain Creek Watershed ...'. The main content area is titled 'Fountain Creek Watershed Policy Evaluation Survey' and contains six numbered questions, each followed by a text input field.

1. Has your jurisdiction established any new policies, regulations, or criteria for stormwater, floodplain management, drainage, detention, water quality, grading, erosion control or related development, land use, subdivision, or streets criteria or comprehensive plan since 2003, when the summary of local policies was completed for the PPACG Fountain Creek Watershed Plan? If so, please inform us of what's new and how we can obtain a copy?
2. Is there anything in the draft proposed Chapters 1, 2, & 3 of the City of Colorado Springs Stormwater Management Manual that you find inconsistent with your jurisdictions policies?
3. Should the stormwater policies proposed in Chapters 1, 2, & 3 of the City of Colorado Springs be proposed for watershed-wide adoption, what are the policy issues/barriers/impediments that may exist for your jurisdiction to adopt?
4. Do you plan on implementing the new City of Colorado Springs Stormwater Management Manual in your jurisdiction once it is completed?
5. What unique technical or policy problems exist in your jurisdiction that aren't addressed by the Colorado Springs manual (e.g. steep slopes, vegetation, climate, etc.)?
6. Is there any other information or feedback that you would like to provide us for this effort?



# Policy Evaluation Project

- 1. Has your jurisdiction established any new policies, regulations, or criteria for stormwater, floodplain management, drainage, detention, water quality, grading, erosion control or related development, land use, subdivision, or streets criteria or comprehensive plan since 2003, when the summary of local policies was completed for the PPACG Fountain Creek Watershed Plan? If so, please inform us of what's new and how we can obtain a copy?*





# Policy Evaluation Project

- 2. Is there anything in the draft proposed Chapters 1, 2, & 3 of the City of Colorado Springs Stormwater Management Manual that you find inconsistent with your jurisdictions policies?*





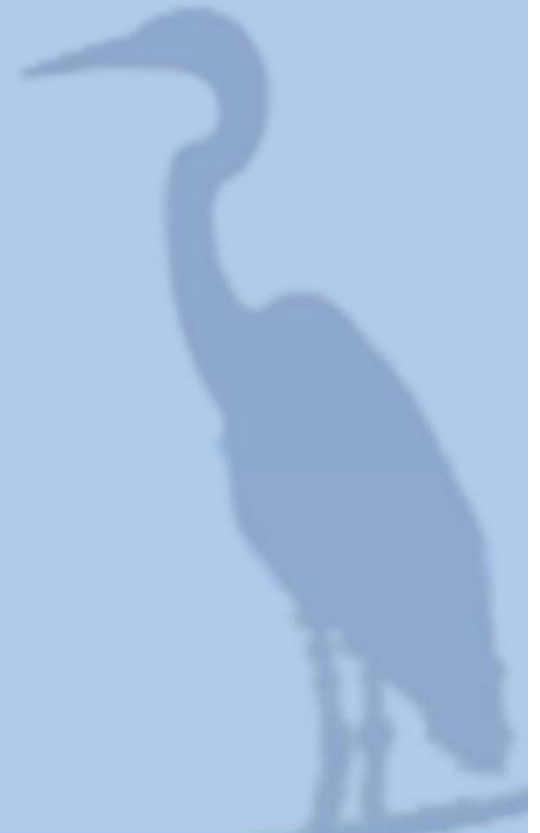
# Policy Evaluation Project

- 3. Should the stormwater policies proposed in Chapters 1, 2, & 3 of the City of Colorado Springs manual be proposed for watershed-wide adoption, what are the policy issues/barriers/impediments that may exist for your jurisdiction to adopt?*



# Policy Evaluation Project

- 4. Do you plan on implementing the new City of Colorado Springs Stormwater Management Manual in your jurisdiction once it is completed?*





# Policy Evaluation Project

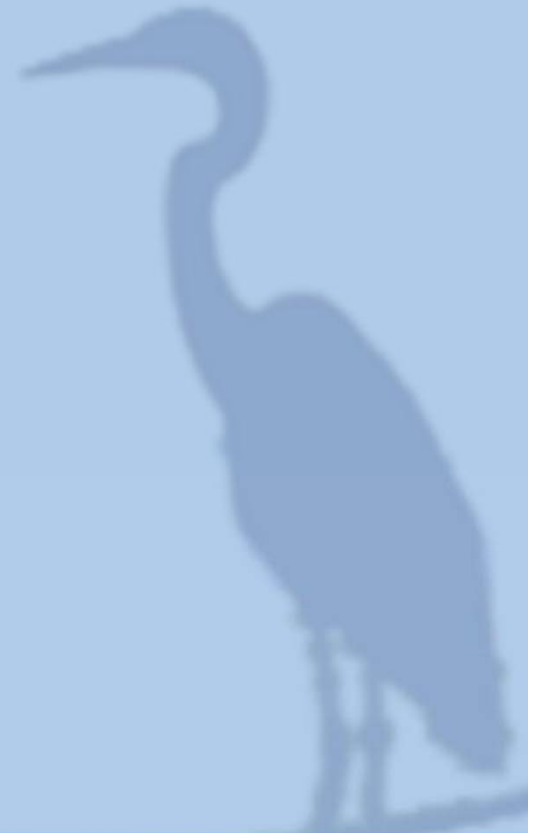
5. *What unique technical or policy problems exist in your jurisdiction that aren't addressed by the Colorado Springs manual (e.g. steep slopes, vegetation, climate, etc.)?*





# Policy Evaluation Project

6. *Is there any other information or feedback that you would like to provide us for this effort?*





# Policy Evaluation Project

## BETTER SITE DESIGN

- Center for Watershed Protection
- Codes & Ordinances Worksheet
- 2008 VTF Exercise
- “Inadequate” Level

### BENCHMARK OPPORTUNITY RANKING

OPPORTUNITIES FOR ORDINANCE

<u>RANKING</u>	<u>DEVELOPMENT FEATURE</u>	<u>QUESTION #</u>
1	STREET WIDTHS	1
2	BUFFER MAINTENANCE	18
3	LAND CONSERVATION INCENTIVES	21
4	OPEN SPACE MANAGEMENT	15
5	PARKING CODES	7
6	PARKING RATIOS	6
7	BUFFER SYSTEMS	17
8	SETBACKS & FRONTAGES	12
9	SIDEWALKS	13
10	RIGHT-OF-WAY WIDTHS	3



# Policy Evaluation Project

## **AWARE, RMLUI, et. al.**

- Water as a Resource
- Integrated, Watershed Approach
- Mimic Hydrology
- Land Use Planning
- Source Control
- LID, LID, LID
- Incentives

## **Water Protection Toolkit**

*for Local Officials*



**Connecting  
Land Use  
With  
Water Quality**

AWARE Colorado

<http://www.awarecolorado.org>

303-861-5195

Revised February 2007



# Policy Evaluation Project

## FCVTF & USACE MATRIX

### Responsible Entities for Achieving FCVTF Strategic Plan Goals and Army Corps Recommendations

Fountain Creek Watershed Strategic Plan Goals		Responsible for Reaching Goal					Comments
		TAC	CAG	Local Gov.	Drainage Criteria*	Other	
<b>Water Quality and Sedimentation</b>							
1	Assess potential water quality problems in the watershed	x		x		X	CDPHE leads this effort. Local governments, dischargers & USGS play a secondary role. TAC may get involved in some cases.
2	Mitigate adverse stream impacts.	x	x	x	x	X	CDPHE leads this effort. Local governments, dischargers & USGS play a secondary role. FC Corridor Master Plan (FCCMP) is addressing as well thus the TAC & CAG will get involved in this related work.
3	Reduce selenium to levels that are at or below State water quality standards and/or background conditions or recommend that the Colorado Water Quality Control Commission (CWQCC) establish appropriate site-specific standards.			x		X	CDPHE leads this effort. Local governments, dischargers & USGS play a secondary role.
4	Reduce E. Coli to levels that are at or below State water quality standards or recommend that the CWQCC establish appropriate site-specific standards.			x		X	CDPHE leads this effort. Local governments, dischargers & USGS play a secondary role.
5	Improve watershed function to manage sediment transport patterns and reduce erosion and sedimentation.	x		x	X	x	New Drainage Criteria will help in this area as will the FCCMP work - thus the TAC will be involved.
6	Improve stormwater runoff conditions at the source to improve water quality.	x		x	X	x	New Drainage Criteria will help in this area as will the FCCMP work - thus the TAC will be involved.
<b>Flooding and Stormwater Management</b>							
1	Recognize that stormwater is a resource and manage it for the benefit of the watershed and entities downstream.	DC		x	X		New Drainage Criteria will help in this area as will changes to land use ordinances.
2	Preserve natural channel capacity through floodplain preservation and sedimentation controls.	DC		x	X		New Drainage Criteria will help in this areas as will steamside setback requirements.
3	Preserve the natural drainage way through conservation easements and streamside setbacks.	x		x	X	x	New Drainage Criteria will help in this areas as will steamside setback requirements. Also, conservation easement work must be encouraged (Co Open Lands & others)

\* Drainage Criteria (DC) Note: the TAC should be involved in reviewing the new DC and will be sponsoring/supporting the FCW Policy Evaluation & Workshop and associated follow-up efforts.

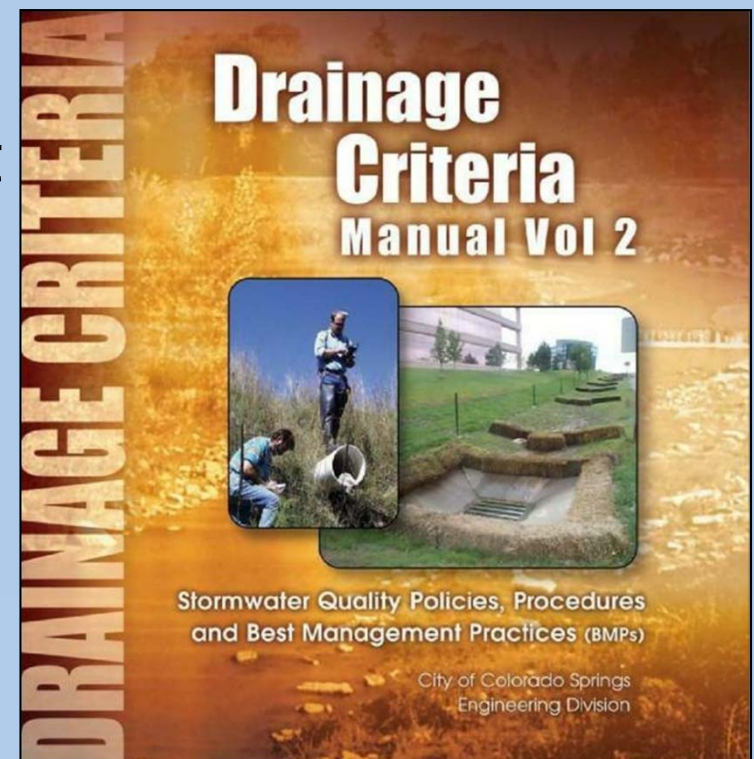




# Policy Evaluation Project

## COLORADO SPRINGS MANUAL UPDATE

- Natural Channel Preservation AND the Means to Accomplish It
- Sub-Regional, Full-Spectrum Detention
- Run-off Reduction Methods
- Identified Spin-off Projects

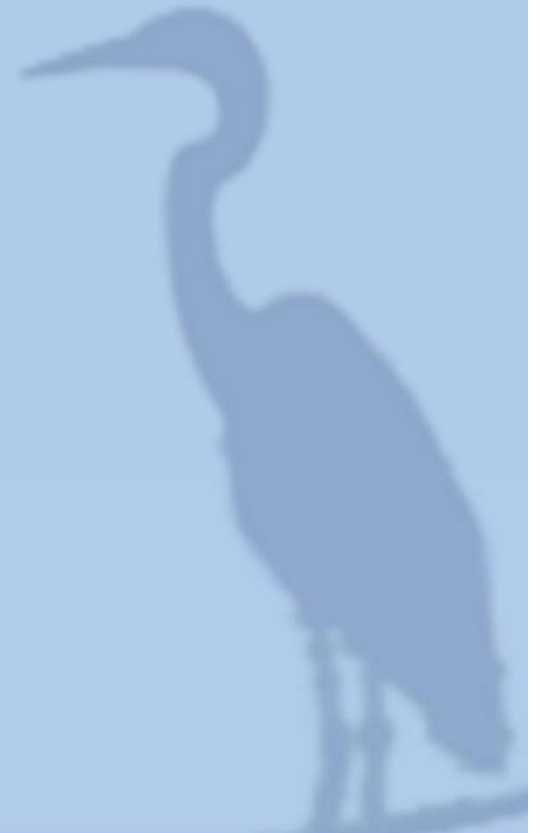




# Policy Evaluation Project

## **WHAT ARE WE TRYING TO ACCOMPLISH?**

- Recommendations
- Barriers
- Implementation





# Policy Evaluation Project

## RECOMMENDATIONS

- Adoption of the new COS DCM manual
  - District adopt DCM
    - ✓ "Institutionalize" and update
- Advancement of the "spin-off" projects proposed by the City of Colorado Springs through IGA
  - Integration of site planning with stormwater
    - ✓ Consider recreation and habitat
  - Addition of watershed-wide considerations
  - Improved definition of floodplain policy & criteria
  - Consideration of improvements phasing and financing
    - ✓ Consider reimbursement for existing facilities; new developers, old problems



# Policy Evaluation Project

## **RECOMMENDATIONS** (cont.)

- Evaluation and incorporation of financial or other incentives to encourage the application of LID
- Integration of site planning and plan approval with an efficient and effective enforcement program
- Section 404 and 401 permits reviewed by District
  - Corps will notify, District can comment
  - District will consider process and board approval
- Develop/Finalize District Submittal Guidelines



# Policy Evaluation Project

## **BARRIERS**

- Approval by respective council or board
- Existing time demands on personnel
- Limited budget/personnel resources
- Perception that there is no direct benefit to citizens
- Perception that the proposed policies do not allow enough flexibility
- Perception that enforcement of approved plans allows too much flexibility



# Policy Evaluation Project

## **BARRIERS**

- Evaluate ordinances for barriers to stormwater policies
- How do we address existing issues?
- How do we address existing quality?
- Are the methods in DCM appropriate for rural area?
- Assessment of water rights relationship
- Flexibility allows for least environmental damage (Corps)
- Common vocabulary in report



# Policy Evaluation Project

## IMPLEMENTATION

- Decide How to Move Forward
- Responsibility/Accountability/Support
- Implementation Group(s)
- TAC Recommendation
- District Role vs. Local Role
- Continued education/outreach of elected officials, senior leadership, planners, engineers, and stakeholders



# Policy Evaluation Project

## IMPLEMENTATION

- Advise local governments on where water quality and erosion/sedimentation issues exist
  - Peak sensitive or volume sensitive (also load or concentration)
  - Consider green infrastructure plan
- Comments on City of Colorado Springs Drainage Criteria Manual Draft
- Existing TAC Subcommittee evaluate these findings for TAC recommendation to District Board

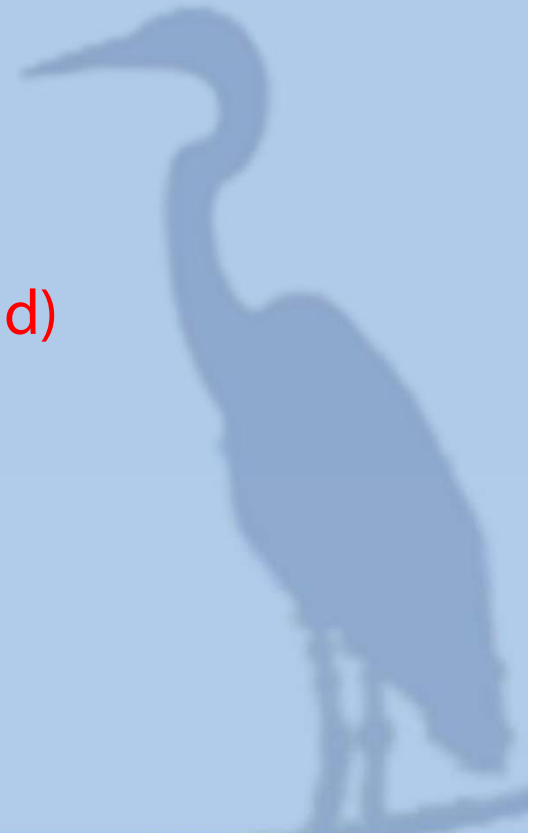




# Policy Evaluation Project

## IMPLEMENTATION

- Establish TAC subcommittee
  - To promote jurisdiction adoption
  - Recommend spin-off projects
  - Establish metrics for success
- Invite other landowners
  - Military Installations (15% of watershed land)
    - ✓ Fort Carson
    - ✓ USAFA
    - ✓ Peterson
  - USFS

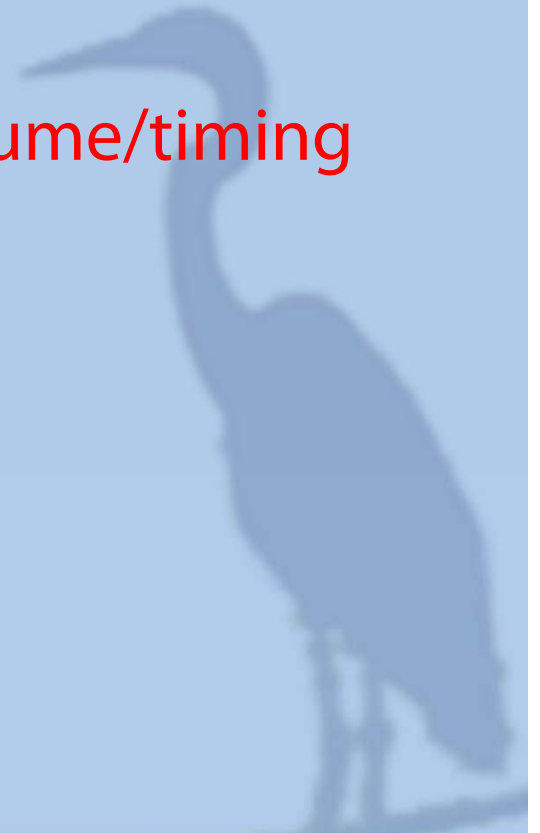




# Policy Evaluation Project

## QUESTIONS

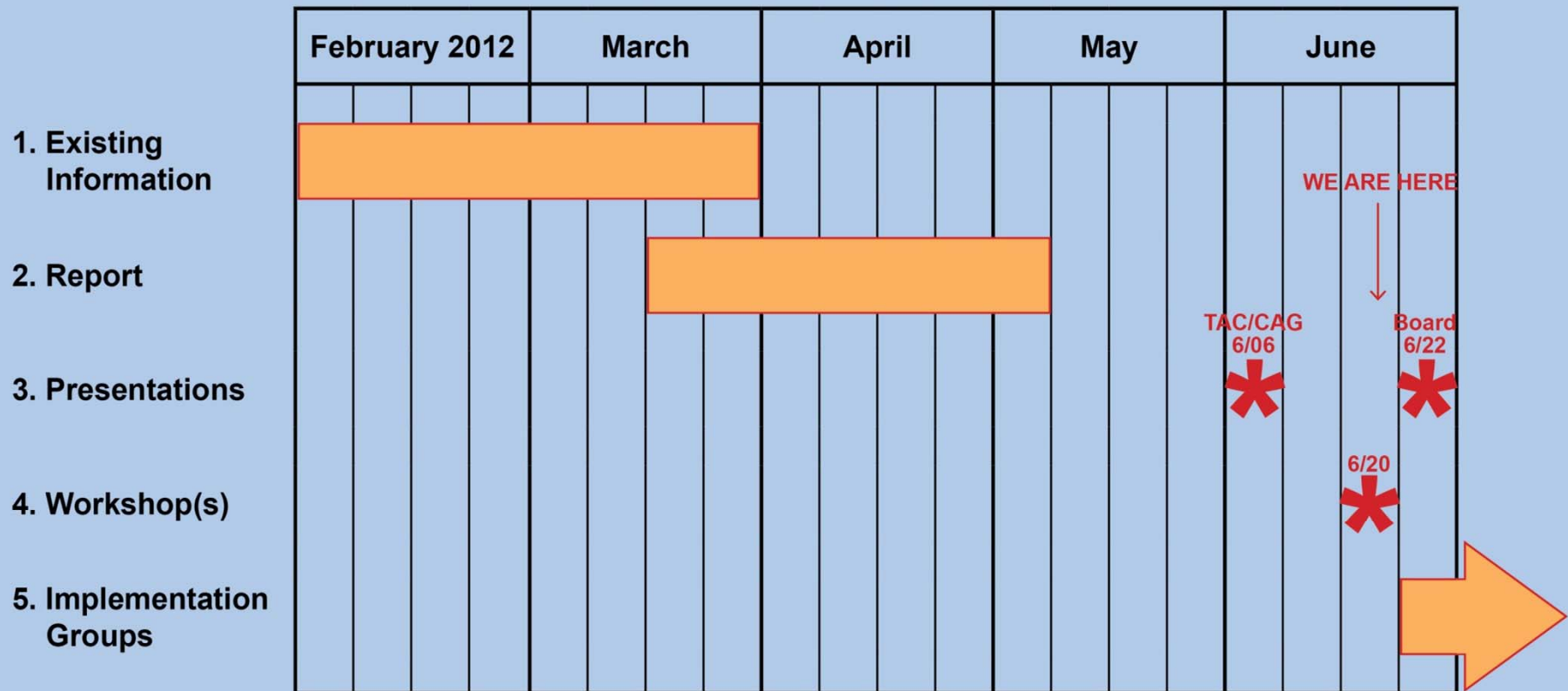
- Modeling to quantify improvements impact?
- Does the district have a role in a regional “enterprise”?
- Does USGS modeling address peak/volume/timing at junctions (overlap)?





# Policy Evaluation Project

## NEXT STEPS





# THANK YOU!

