

NANIA
“All Together”

**Comprehensive Watershed
Management**

Proceedings of the
Eighteenth Annual Conference
of the
Association of State Floodplain Managers

May 8-13, 1994
Tulsa, Oklahoma

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PREFACE

These proceedings record the technical presentations made at the eighteenth annual meeting of the Association of State Floodplain Managers, held in Tulsa, Oklahoma, May 8-13, 1994. The Tulsa conference will long be remembered as an historic meeting for floodplain management: it was the first time floodplain managers from all parts of the country gathered following the 1993 Midwest floods.

The meeting was opened by Native Americans, who, through a traditional dance, delivered a respectful address about values for Mother Earth. Top Washington officials discussed the importance of floodplain management and the need for their agencies to learn from the Midwest floods. The executive director for the White House Review Committee on Floodplain Management described a vision of future floodplain management that was strongly supportive of and in line with the lessons learned and directional changes promoted by floodplain management professionals. Clear credit was given by many speakers to the Association for its participation in shaping current policy debates.

James E. Goddard, who died in March 1994, was remembered, along with his contributions to national flood policy. Gilbert White offered a perspective on the historical significance of this period for national floodplain management policy. We came to terms with the fact that, although Gilbert, Jim, and other pioneers have provided a vision and direction, it is time for younger floodplain managers to become leaders, visionaries, and mentors in their own right.

A sense of energy grew rather than diminished during the week; even this report does not capture the mood and energy of Tulsa. For those in attendance, perhaps these proceedings will bring back memories. For those not in attendance, be assured this was an important gathering for the nation's floodplain managers, and its technical essence, at least, is reflected in this volume.

The Association is indebted to the conference team, our host city Tulsa, the record number of exhibitors, the enthusiasm of the participants, and a conference theme that—with great foresight—expressed the spirit of future floodplain management: "*Nania—All Together.*"

Doug Plasencia
Chair
Association of State Floodplain Managers

ACKNOWLEDGMENTS

The great Mississippi flood of 1993 set the stage for the eighteenth annual Association of State Floodplain Managers conference in Tulsa, Oklahoma. The cast prepared their lines, and opening night began. Three of the biggest concerns of all conference directors played upon our minds. Will they come? Will they have a good time? and How will we ever thank all those people? We now know that, yes, they did come; most had a good time; and there is no way to truly thank all those who gave of themselves and their time.

The Tulsa conference was unique in several respects. Tulsa was the first site to be chosen by the Association of State Floodplain Managers board and affirmed by the membership, rather than through a selection process. It was the first to be hosted by a local government agency. It was the first to be videotaped in its entirety. Finally, it was the first to have all the conference signs taken as souvenirs. All these "firsts" were made possible by the efforts of many sincere people.

Among those who should be thanked are the board members who supported these changes. Chair Doug Plasencia and Executive Director Larry Larson provided us with support and leadership, despite excessive demands on their time due to the great Mississippi flood. Both Doug and Larry supported new ideas while maintaining the time-tested agenda of past conferences. Tim Keptner, past Standing Conference Committee chair, deserves special thanks for his support and encouragement during the development phase of the conference; Tim's encouragement was instrumental in allowing us to take the risk. Then there was the person who *is* the Association—Diane Watson. She was always there—from start to finish—giving us her talents, advice, knowledge, and heart. Without Diane, the show would not have gone on.

On the home front, personal thanks go out from Jack Page to three very special people. "I thank Frank Spring, my assistant, for his many talents and support. Frank was always willing and capable. No job was too big or too small. The other two people who deserve special thanks are Becky Giangreco, my secretary, and MaryCarol, my wife. They became friends and neither actually tried to kill me, although I'm sure they both had that idea. Becky guided my work and MaryCarol guided my heart. I owe a great deal to you both."

Then there are those who took leadership roles in the conference committee. Pat Hoggard took on the monumental task of providing audio/visual equipment and videotaping the conference. (Poor Pat will never be the same.) Pat was assisted by a small army of people, mostly members of the Oklahoma Floodplain Management Association. They included Bob Bigham, Donetta Blanlot, Gavin Brady, Hank Elling, Tyler Gammon, Ken Morris, Allison Nicholson, Carolyn Schultz, and Harold Springer. Kim Meloy did all the

desktop publishing. Dale Reynolds and his crew—Ruben Haye, Dave Spear, John Herbert, and Cheryl Cheadle—organized the technical tours. Sharlet Ball coordinated the Thursday dinner. Becky Giangreco oversaw the conference notebook and registration while taking care of her newborn son. Frank Spring coordinated security and ground transportation, Ruben Haye arranged the golf tournament, and Maggie Mathis and crew at Dewberry & Davis developed the conference signage. They all managed to see that the show went on.

What is a show without a script? Karen Kabbes' Program Committee, Dave Carlton and Ann Patton, did an excellent job of planning and pulling together an exciting program. Thanks go to Carl Cook who provided the "Floodplain Management 101" training. Carl, you were the right man for the job! Thanks also go to Michael Baker and Associates and Dewberry & Davis for coordinating the post-conference training on "How to Get a FEMA Map Revision." Both were excellent courses that we hope become standard.

Finally, a big thanks goes to the multitude of speakers, moderators, corporate sponsors, and attendees who were the conference itself. You are the "Nania" of floodplain management; for you truly bring it "All Together." Thank you all.

Jack L. Page, Conference Director
Karen Kabbes, Program Chair
Dante C. Accurti, Exhibits Chair

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PART ONE

**LOCAL AND REGIONAL APPROACHES
TO FLOODPLAIN MANAGEMENT**

ALL TOGETHER IN NORTHBROOK, ILLINOIS

Carl F. Peter
Village of Northbrook, Illinois

Introduction

The Village of Northbrook is a community of 34,000 located north of Chicago. We have two forks of the North Branch of the Chicago River running through the village and two tributaries within our boundaries. For many years, Northbrook was in the Catch-22 mode of having a heavy rain occur that created flooding, which then led to a study for possible solutions, followed by intense public discussion and the determination that the funds were lacking and the rain had stopped. The resulting studies were placed "on the shelf" until the next big rain. Then they were dusted off, reworked, and reconsidered in the same circle of events. The 1989-90 Federal Emergency Management Agency (FEMA) requirements for the village's floodplain ordinance opened the door for the Village of Northbrook to break this cycle and begin the path to a comprehensive stormwater management plan.

Identifying the Need for a Comprehensive Plan

During neighborhood floodplain information meetings prior to consideration of the changes in the village's floodplain ordinance, it became very apparent that the village's 500 floodplain residents had little or no idea what the Special Flood Hazard Area was and what the floodplain designation meant to them. Many of these homes had been built before the village joined the flood insurance program in 1973. The owners of these pre-FIRM homes were seeing an adverse impact on their salability due to the new flood insurance mandate and a state rule that banned construction, or even reconstruction, of an existing home if it was located in the designated floodway. Key village staff, including the Village Manager, John M. Novinson, made presentations at these information meetings. We were also very fortunate to have the voluntary assistance of the Illinois Department of Transportation Division of Water Resources personnel, in our case Karen Kabbes, assist in these presentations. One of the issues that emerged was the village's lack of tight controls on development in nonfloodplain areas. It was also clear that there were a number of major flood control projects that had been studied, sometimes more than once, but had never been constructed. The number of individual studies had increased to a point where there was a real concern that this piecemeal approach could create new flooding problems if any individual project was constructed.

In addition, the inaccuracy of the FEMA floodplain maps for Northbrook was a constant issue. Many residents in mapped areas reported that they did not have flooding or they knew of properties that had flooding but were not shown as being in the floodplain. The inability to show accurately who was and was not actually in the floodplain and subject to a 100-year flood also created many hard feelings.

Developing a Plan of Attack

The village staff developed a two phase plan of attack that was then presented to the Village Board. The first phase of the proposal to develop a village-wide comprehensive stormwater management plan was to develop a geographic information system (GIS) using aerial photography. This yielded topographic maps with contours accurate to plus or minus six inches. Flyover data were then digitized and used not only for more accurate floodplain maps but also for infrastructure management and planning. Detailed specifications for this project were developed jointly with an adjacent community.

At the same time the aerial photography and GIS work was being pursued, a detailed request for proposal was developed to select a consulting engineer to review the village's records, previous studies, and floodplain issues and develop a strategy for completing a stormwater management plan. We took extra time in developing our scope of services in an effort to identify as many of the areas of concern as possible. We also determined that a village-wide survey would be done to solicit additional public input from residents and businesses on flooding problems. Review and tabulation of these surveys became a part of the scope of services.

While a great amount of time and effort went into developing the scope of services, we did ask that the proposals provide a written approach to the project and what additional steps or studies should be added to the scope of services. This was done to provide the most comprehensive stormwater management plan possible and to insure that both the village and the consultant had a firm handle on project costs. Following review of the written proposals by a team consisting of the Village Engineer, Village Planner, and Director of Public Works, the proposals were narrowed down to two firms that were, in our judgement, far above the others. These two firms were then invited to a final interview with the committee and Village Manager. The final interview was based on a revised scope of services and each firm was asked to bring a detailed cost break-down with a not-to-exceed dollar amount for the project.

While the selection process was underway, the Village Board continued to receive a great number of phone calls from upset floodplain residents. The Plan Commission had also begun public hearings on floodplain ordinance amendments that would continue for 12 months. This created the atmosphere for

the Village Board to take the major step to budget and award contracts for the aerial photography/GIS work as well as for the consulting engineer. Both these projects were budgeted for initiation in our 1991/92 budget year with carry-over into 1992/93. This approach allowed the \$400,000 cost to be spread out. Aerial photography was awarded to Ayres Associates of Madison, Wisconsin. The GIS system is by GDS of St. Louis, Missouri. Our engineering consultant is T.Y. Lin International BASCOR of Chicago.

Community Involvement

Although the Village Board was enthusiastic in its support of this effort, the complexity of the issues and the demands of other village business resulted in delegation of project oversight to an ad hoc stormwater management committee. This was a nine-member group with two people appointed from each quarter of the village and one at-large representative of the business community. The Village President issued the call for resident volunteers. From the group, Edward Need was selected Chairman. Mr. Need has a master's degree in geology and water resources management along with 11 years of environmental engineering consulting. Although he was not the only member with engineering background, the understanding he brought to the chairmanship, along with his patient ability to handle untrained lay people, was a great benefit.

The lead engineer for BASCOR was their Executive Vice President Richard L. Thompson, a professional engineer, who also has a degree in psychology, which was evident in his people skills. The ultimate success of the project was largely due to these two people. In addition to the ad hoc committee, the village used its monthly newsletter to provide progress reports and educational information on stormwater or floodplain issues. Our agreement with the consultant had anticipated plan development within 12 months. The process actually took 18 months (30 meetings) with much of the time in the beginning devoted to educating the committee members on the complexities of stormwater and floodplain management.

The Village Board received regular status reports. When the committee could not agree on exactly how to prioritize projects within the stormwater management plan, the board was presented with alternatives. The board narrowed the discussion to two alternatives and then sent the matter back to the committee for a firm recommendation. Final project ranking became a hybrid of these two approaches with half of the priority score based on the rank a project had on a strict benefit-cost approach. That score was then combined with the ranking the project had based on the number of structures (not properties) benefitted. Once the draft plan was developed and unanimously accepted by the stormwater management committee, it was presented to the Village Board.

The Village Board scheduled a public hearing and the committee, with staff, initiated additional public educational efforts. We used brief commercial ads about the public hearing on our local cable television station. The committee and staff also worked a booth at the village's annual Northbrook Days festival in August. Information packets on floodproofing homes, maps of the floodplains, handouts on the public hearing, and general information on stormwater issues were made available during Saturday of the four-day event. Notices of the public hearing were also sent to each property in the floodplain and to all the homeowners association groups throughout the village. Following the overwhelming community endorsement of the plan at the public hearing, the Village Board adopted the stormwater management plan with some modification in October 1993, and issued bonds for the first \$1.5 million in projects in March.

The Plan

The Village of Northbrook Stormwater Management Plan is intended to be a benchmark for measuring progress on stormwater issues. However, it is not just a plan of capital improvement projects, but also a guide for managing a dynamic process. It includes programs for residents to help themselves and it establishes a group to advise, administer, and revise the plan. The ad hoc committee is now a permanent Stormwater Management Commission. As the document indicates, the plan is just the initial step; it represents the "framework and road map" for stormwater management planning activities within the village. The plan contains both prioritized and non-prioritized but always specific projects. Lack of prioritization does not mean less important status, but rather acknowledges our inability to quantify the costs and benefits of certain specific improvements. Programs for residents to help themselves actually help the largest number of residents at the least cost. The controversy on these programs was, "Should the village tax base as a whole help residents to do things such as install reserve power for sump pumps, upgrade sump pumps, put in overhead sewers, or floodproof their homes? Or should property owners do those things on their own to protect themselves?"

The "Key"

Working with an ad hoc committee of residents added some time to the process. Basic education on stormwater issues for them and the public was time consuming, yet vital to the ultimate success of the plan. One can hire the best consulting firm that does a fabulous study and provides a document filled with the best engineering solutions. Yet if residents cannot understand it and more importantly do not buy in, it will be in trouble. Frequent meetings between the

committee, village staff, and the consulting firm work to educate the members of the committee and establish a strong foundation for the acceptance of the overall plan. Frequent communication with the public builds support and community-wide ownership.

The plan is only the beginning. It is a document to guide future decisions as the village seeks better stormwater and floodplain management. It provides a Stormwater Management Commission to monitor, review, amend, and develop the various aspects of the plan. As a result, my job will be easier.

Still, on the night of the public hearing, the realization hit that we were not reaching a conclusion, but only about to embark on the first step of a long journey. It was only the end of the beginning. That journey will be taken knowing we are all together—the Board, residents, and staff—and heading in the right direction.

BOULDER CREEK JOINT USE AREA MULTI-PURPOSE FLOOD MITIGATION PROJECT

Nancy Boudreau Love
Love & Associates, Inc.

Alan R. Taylor
City of Boulder, Colorado

Background

In 1989, the City of Boulder adopted revised floodplain regulations that established the High Hazard Flood Zone (HHZ). The HHZ is defined as that area within the 100-year floodplain where the product of the depth and velocity exceeds the number four (4). In the HHZ, construction of new structures intended for human occupancy is prohibited. As a condition of adoption of these regulations, the City Council directed its staff and consultant to develop and implement mitigation plans that would reduce the HHZ. Additionally, the Comprehensive Drainage Utility Master Plan was adopted by the City in 1989 and although monies were provided to study high hazard reduction along Boulder Creek, the plan did not address the funding needed to implement improvements along Boulder Creek.

Before adoption of the HHZ, the Boulder Valley School District (BVSD) held a successful bond election to fund school improvements to Boulder High School, among other activities. BVSD's plans included the addition of a new west wing and improved parking for staff and students. Cooperation between the City and the BVSD was essential for the overall success of the project. If the Boulder Creek improvement plan was implemented, the high school would ultimately be removed from the HHZ, along with 227 additional residential units.

Alternative Project Approaches

Master planning efforts that were undertaken for the Boulder Creek hazard reduction improvements indicated that this reach of the creek (between 6th and 17th Streets) constituted the most promising area for HHZ reduction, where greater than 95% of the residential units could be removed from the HHZ. Improvements along other reaches of Boulder Creek would have minimal benefits and may have actually increased the hazard.

Alternative approaches were evaluated for this reach of Boulder Creek, considering the benefits and predicted costs associated with each approach. The following alternatives were considered.

No Action

This approach maintained the status quo. Financially, this approach would be the most attractive but would shift the focus to post-flood land acquisition and mitigation. The no-action alternative would not reduce the HHZ. This reach of Boulder Creek is critical and represented the City's greatest exposure to life-threatening floods. This approach offered the high school no help in removing the HHZ at a time when the school needed to expand.

Creek Channelization

This approach would contain floodwaters by modifying or channelizing Boulder Creek. Flood water containment through channelization would effectively reduce the HHZ by creating a structured corridor for containing high hazard flows. Boulder Creek channelization would violate the Boulder Valley Comprehensive Plan and City Council's direction for a non-containment approach to Boulder Creek floodplain improvements. The benefits and costs for channelization could be shown to be very high from a financial perspective. However, the adverse environmental impacts and destruction of the naturalized creek corridor rendered this alternative unacceptable.

HHZ Recontouring

This approach proposed overbank sculpting to allow for greater flow capacities and to force water flowing in a broad front across the land to move back into the creek bed. Naturalized creek characteristics would be preserved, and the overbank grading would create naturalized conditions without drastically altering the creek's appearance. Given available land for improvements, the benefit and cost for this alternative could be greater than that for channelization. Additionally, there would be no adverse impact on the existing creek watercourse since the actual stream bank and stream, as well as the trees along the stream, would not be impacted.

HHZ Property Acquisition

This approach proposed to acquire HHZ properties, remove existing structures, and retain the existing conditions of the creek corridor. The HHZ and creek environment would remain unchanged, but the elimination of buildings and occupied uses would reduce the flood hazard. The remaining open corridor would then be preserved for the passage of hazardous waters. Property acquisition is often a key component in flood mitigation projects, especially

when right-of-way for improvements is required. The HHZ for this reach of Boulder Creek is extensive, and the expense of acquisition of all the HHZ properties would prevent the realization of all of the benefits. Additionally, Boulder High School would not be removed from the HHZ unless the school were moved to another location, which was not an option for the BVSD. Benefits and costs for this alternative were unattractive based on financial expenditures. However, the reduced flood hazard improved the benefits.

Combined Property Acquisition and HHZ Recontouring

A final approach to HHZ reduction along this reach of Boulder Creek was to combine property acquisition with structure removal and HHZ recontouring improvements. This would effectively reduce the HHZ by providing the right-of-way necessary for HHZ recontouring, and by creating a preserved corridor for directing hazardous flood waters. The costs for extensive property acquisition would be minimized because only those properties needed to provide for improvements to reduce the HHZ would be acquired. Benefits and costs for this alternative were very attractive. The combined property acquisition and HHZ recontouring approach was the most effective and beneficial alternative from a benefit-cost analysis, preserving Boulder Creek by maintaining a non-containment approach.

Boulder Creek Hazard Reduction Improvements

The Boulder Creek Project proposed an acquisition program for properties located north of Boulder Creek and south of Arapahoe Avenue, from 13th Street to Boulder High School, and along the north side of Arapahoe Avenue from 13th Street to 14th Street. Acquired structures would be removed to eliminate hazardous uses, and to provide available lands for HHZ recontouring to increase flood water conveyance through an area with no structures. The HHZ recontouring was to be performed primarily from Arapahoe Avenue to 17th Street along the north side of Boulder Creek, but the creek itself would not be affected. This could remove from the HHZ nearly 31 acres of land north of Arapahoe Avenue, Boulder High School, and all City buildings but the original library. Property acquisition was required to perform recommended improvements, and resulted in property available for recreation space for Boulder High School and the community.

Block 1 improvements for HHZ reduction included the purchase and removal of all block 1 structures to allow for improvements associated with the Boulder High School west campus project. This allowed HHZ recontouring along the creek to pass high hazard flood flows back to the main channel of the creek. Block 1 also provided for the relocation of the parking lot away from the creek. Additional improvements included the elimination of a large 18-foot-wide

concrete bridge over Boulder Creek, which had served the high school's football field and track facilities and reusing an existing "breakaway" path bridge. Block 1 improvements also provided for the removal of Boulder High School and a major portion of a residential and commercial area north of Arapahoe Avenue from the HHZ. City costs associated with block 1 were \$1.6 million and included the \$1,255,000 cost of acquisition, \$55,000 for demolition, and \$295,000 for Boulder High School and Central Park HHZ recontouring improvements.

Block 2 improvements included the purchase and removal of all block 2 structures, which allowed for HHZ recontouring south of Arapahoe Avenue to Boulder Creek. This purchase and recontouring allowed for elimination of 44 existing residential units that were subject to the most extreme hazard. Block 2 combined with block 1 improvements provided for additional HHZ reduction benefits north and east of Boulder High School near 17th Street and would remove the Municipal and Park Central buildings from the HHZ. Total City costs associated with block 2 were estimated at \$2.4 million and included the \$2,175,000 cost of acquisition, \$225,000 for demolition and HHZ recontouring improvements. Additionally, implementation of the Boulder Creek project will include preparation of new delineations of the Boulder Creek floodplain through this reach.

Boulder High School West Campus Improvements

BVSD concerns for life safety during flooding at Boulder High School were a major factor in the design of the west campus improvement project. The recently constructed west wing at the northwest corner of the school was sited away from Boulder Creek and was floodproofed to minimize flood hazard and damage since it will remain in the floodplain. HHZ recontouring south of the high school, along with erosion protection and berming around the school building, were performed to provide increased conveyance of floodwaters, which removed the school from the HHZ. The existing school building would then be in the floodplain and would be retrofitted with flood protection measures to reduce hazard and damages. The west campus improvement project provided for increased space at Boulder High, where site acreage is a problem. (The high school previously had 17 acres of campus whereas 40 acres is the normal BVSD standard.) The campus was increased by two additional acres of playing fields by the inclusion of the joint use area.

The Boulder Creek Joint Use Project has provided the City of Boulder with a unique opportunity for realizing multiple benefits under one major project. It provided the opportunity for multiple City departments to work towards a common goal as well as the opportunity for the City to work cooper-

Table 1. Boulder Creek project property benefits.

		Alternative 1	Alternative 2	Alternative 3
	Currently in HHZ	Remaining in HHZ	Remaining in HHZ	Remaining in HHZ
Area in HHZ (acres)	63	45	31	31
Structures in HHZ				
Total	93	40	12	5
Residential	61	27	5	3
Non- residential	21	7	4	1
City	8	5	3	1
School	3	1	0	0
Units in HHZ				
Total	289	197	14	5
Residential	230	183	6	3
Non- residential	48	8	5	1
City	8	5	3	1
School	3	1	0	0

actively with the BVSD. A project of this nature represents a milestone in community development, resulting in improved life safety through the reduction of the HHZ, providing for future safe use of Boulder High School, and an open greenway in the heart of the city.

Conclusion

The City of Boulder's residents, visitors, students, and businesses greatly benefitted from the expenditures of funds for the completion of the Boulder Joint Use Multi-Objective Corridor Project. Some of the resultant benefits were:

- Reduction of the HHZ along Boulder Creek;
- Elimination of residential use in the HHZ;
- Elimination of structures for human occupancy from the HHZ;
- Removal of Boulder High School from the HHZ;
- Long-term safe use of Boulder High School;
- Reduction in flood damage potential along Boulder Creek;
- Naturalized creek corridor;
- Recreational space for Boulder High and the community;
- Enhancement of the Boulder Creek environment;
- Complementarity of the Municipal Campus and Boulder High;
- Opportunity for private property revitalization;
- Educational opportunities for flood safety and the impacts of floods on the environment.