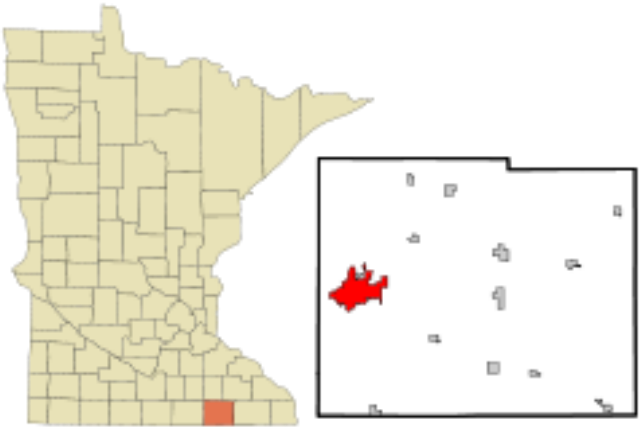
Loss Avoidance Study

Austin, Minnesota, 163 Building Acquisitions
Update of March 2001 Study
October 2013

Federal Emergency Management Agency
U.S. Department of Homeland Security
500 C Street, Southwest
Washington, DC 20472



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(Cover Photograph – Aerial view of July-2004 flooding in Austin, MN.)
(Courtesy: Star Tribune)

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Introduction

Following the severe storms and floods of 2004 (DR-1569-MN), 2008 (DR-1772-MN), and 2010 (DR-1941-MN) that led to Major Disaster Declarations in areas of Minnesota, the Department of Homeland Security's Federal Emergency Management Agency (FEMA) initiated a Loss Avoidance Study (LAS) to assess the effectiveness of acquisition/demolition projects in the affected areas of Austin, Minnesota, Mower County along the Cedar River and its tributaries, Dobbins and Turtle Creeks. The actual flood events were analyzed to determine the Losses Avoided Ratio or percentage of savings by estimating the losses that were avoided and comparing them to the costs of the resources that were invested.

The first LAS (http://www.fema.gov/media-library/assets/documents/16518?id=3710) on this area was completed on 163 residential properties in March 2001. This study updates the original 163 properties as they relate to the 2004, 2008 and 2010 events.

Background

Mitigation is defined by FEMA as any sustained action taken to reduce or eliminate long-term risk to people and property from hazards and their effects. Every year, FEMA provides States and communities with substantial financial assistance for projects that will reduce or eliminate risks from natural hazards through Hazard Mitigation Assistance (HMA) grants, which include post-disaster grants under the Hazard Mitigation Grant Program (HMGP) and pre-disaster grants under the Pre-Disaster Mitigation Program (PDM), the Flood Mitigation Assistance Program (FMA), the Repetitive Flood Claims Program (RFC), and the Severe Repetitive Loss Program (SRL).

In 1987 the Minnesota Legislature created The Flood Damage Reduction Grant Assistance Program (FDR), which is a State program providing technical and financial assistance to local governments to reduce damage from flooding. Under this program the State can make cost-share grants for up to 50 percent of the total cost of a project.

FEMA makes the acquisition and demolition or relocation of flood prone structures, particularly those in mapped special flood hazard areas, priority mitigation projects. An acquisition/demolition project entails the purchase of land and structure, demolition or relocation of the structure, removal of utilities, and deed restriction of the land as green space for perpetuity. The green space is returned to the natural floodplain and may be used with limitations for community recreational purposes if so desired by the local government. FEMA considers this type of mitigation to be 100 percent effective against future property damages.

The mission of the flood buyouts in the City of Austin was to permanently mitigate the repetitive flooding of homes along the Cedar River through acquisition and relocation. The implementation of the buyout program had the following key objectives:

1. Voluntary buyout of homes with the most severe and repetitive flooding problems,
2. Offer pre-flood fair market value to homeowners who experienced severe flooding,
3. Auction the acquired sound structures for relocation outside the flood plains and use the proceeds to acquire more flood damaged homes,
4. Improve floodwater discharges by removing structures from the floodway,

5. Convert such land into permanent open space, thereby reducing flood levels and the consequential threats to remaining residents of the floodplain.

With significant investment being made in mitigation, demonstrating cost-effectiveness is crucial for continued support. In order to evaluate the cost-effectiveness of mitigation projects, FEMA has developed a methodology for a Loss Avoidance Study (LAS). The methodology is based on the analysis of actual natural hazard events that have occurred in the project study area since the completion of the mitigation activity. The methodology provides a way to assess the benefits of a mitigation activity in terms of its actual performance.

Loss avoidance methodology can be applied to the mitigation of any type of natural hazard (e.g., flood, wildfire, seismic, wind). Flood hazard mitigation is divided into building modification and flood control projects. Building modification projects mitigate damages by modifying a building to reduce its risk of flooding through acquisition/demolition, acquisition/relocation, elevation, and flood proofing. Acquisition/demolition projects are referred to as "acquisition projects," and acquisition/relocation projects are referred to as "relocation" projects. Flood control projects mitigate damages by reducing the hazard itself and include storm water drainage system improvements, channel modifications, flood walls/barriers, and other projects that reduce the severity of flooding.

The LAS methodology used for this study is consistent with the methodology described in *Loss Avoidance: Riverine Flood Methodology Report* (FEMA, in press[b]). This study focuses on the performance of residential acquisition projects.

History

The Cedar River flows across the flat lands of the Minnesota prairie and is joined by Turtle Creek and Dobbins Creek where the City of Austin now lies. Founded on the old Territorial Trail, Austin is the county seat of Mower County. The first cabin was built along the river in 1853 and Austin grew up along the river. According to the latest 2010 census, Austin has a population of around 24,800 people. The city has a total area of 11.90 square miles (7,616 acres) located at an elevation of approximately 1,200 feet.

Figure 1 shows the two creeks joining the Cedar River as they flow south through the City. Dobbins Creek joins the Cedar River from the east, downstream from Oakland Avenue. Turtle Creek joins the Cedar River from the west downstream from the community wastewater treatment facility, near the Calvary Cemetery. Austin is the confluence of these three water sources that make up the Upper Cedar River Watershed. Turtle Creek Watershed, Roberts Creek Watershed and Middle Fork Watershed also feed into Austin. Industrial, commercial, and residential developments are located the floodplain areas of the three water sources in the City of Austin.

Austin has implemented a flood warning policy that establishes steps and procedures that are to be followed when high water in the Cedar River, Dobbins Creek or Turtle Creek poses a threat to the people of Austin. Based on river gauge readings from gauges throughout Mower and Freeborn County, there are three stages of actions: flood alert, flood watch, and flood warning.

On December 23, 1971, the City of Austin adopted Flood Plain Zoning Ordinance No. 1213 *[4]*. This ordinance is designed to minimize losses in the flood hazard areas, by regulating the use of land, location, construction, and use of buildings and other structures in the flood plains of Austin.

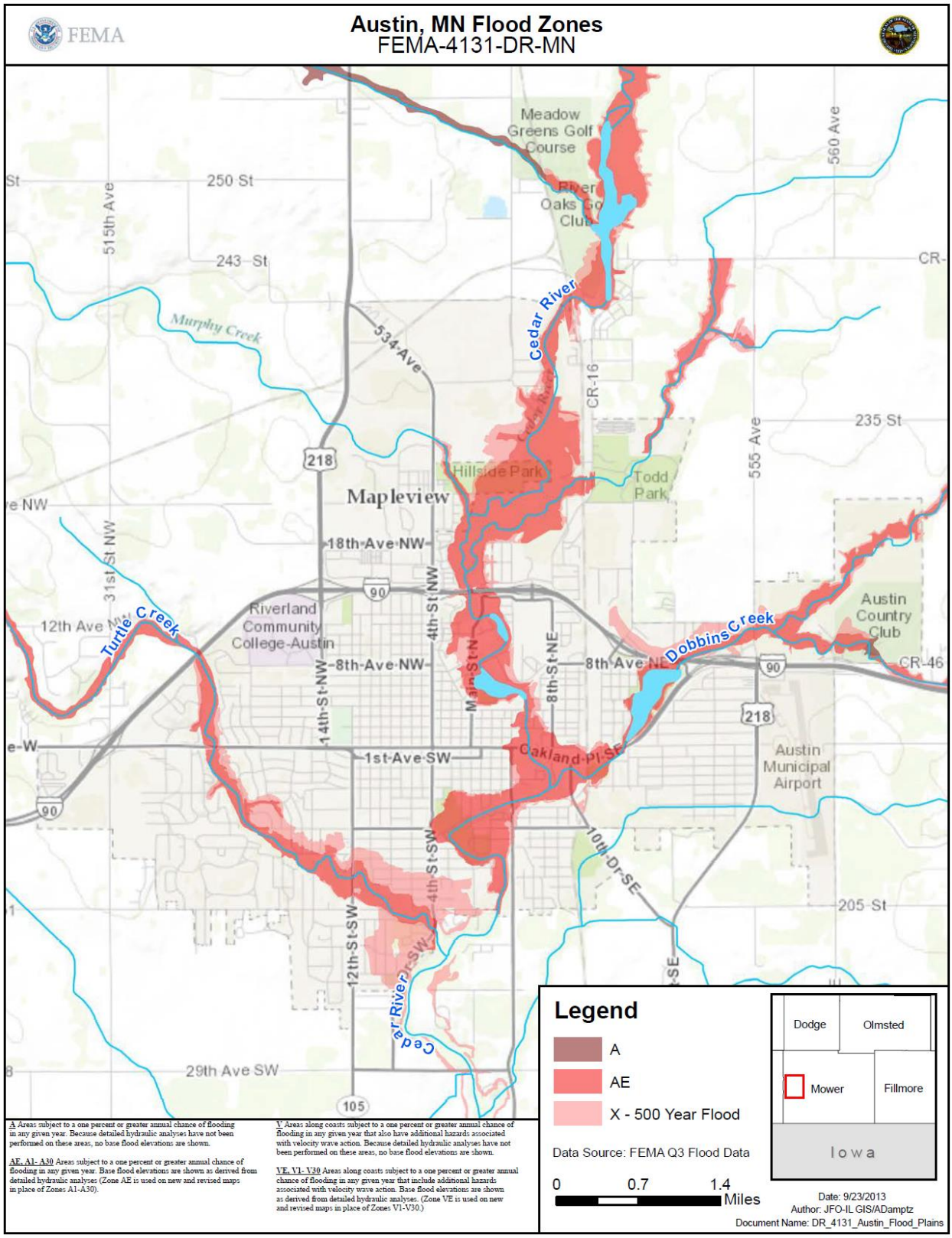

Figure 1 – City of Austin with Cedar River, Dobbins Creek and Turtle Creek flood zone identification

The City of Austin has been a participant in the National Flood Insurance Program (NFIP) since 1971 and its Community Rating (CRS) has improved significantly over time. As part of the 2009 *Mower County All Hazard Mitigation Plan* (www.co.mower.mn.us/emergency-management-all-hazard-plan-2009.htm), Austin's hazard mitigation project descriptions, schedule and funding sources are described in Part 1, Section 2 (1.13.6 – Flooding). On September 4, 013, FEMA updated its Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM) of the City of Austin. This study and map provides updated information useful in conducting the benefit cost analysis (BCA) required to approve acquisition projects.

The ultimate goal of the city's flood plain management strategy in the special flood hazard area (SFHA) of Austin include the removal of structures in the flood prone areas and to prohibit any future structures in the flood plain. These areas are also important because they provide storm water runoff areas as well as valuable open space and wildlife management.

The city recognizes the importance of the open spaces adjacent to the various waterways and is working toward enhancing the park system. This includes expanding the existing trail system that will interconnect park and recreation areas to each other, both within the city and regionally.

The City has approximately 200 acres of controlled open space and has established a shore land management ordinance that controls erosion and an annual stream maintenance program. This land is being developed as part of the City of Austin Linear Park System, directly impacting how the city plans for growth while reducing the impact of flooding. For more information refer to: http://www.ci.austin.mn.us/Econdev/Austin%20MN%20Comprehensive%20Plan%20August%202000.pdf.

Figure 2 – Open green space in Central Park, Austin, MN
(Photograph courtesy: City of Austin Park, Recreation & Forestry Dept.)

On December 4, 2012, the Cedar River Watershed District (CRWD), which includes the City of Austin, was named Minnesota's top watershed program for their work to reduce flooding and improve water quality in the Austin area. Formed in 2007, state and local officials formed the CRWD in response to the Cedar River Watershed's worst-known floods that occured in 2000 and 2004. This watershed district covers 45 miles of the river's course. The Cedar River Watershed District has a 434.7-square-mile

drainage basin of mostly fertile farmland. For more details on the program refer to CRWD Goals and Objectives: http://www.cedarriverwd.org/documents/CedarRiverWMPCover-Signedpage-Tble-of-Contents_reducedfilesize.pdf

History of Post 2000 Flood Events

Table 1: Major MN Flood Events 2001-2013 Involving a Presidential Disaster Declaration

Year	Counties and Other Areas Declared	Declaration Number and Type of Event
2010	Counties: Blue Earth, Brown, Carver, Cottonwood, Dodge, Faribault, Freeborn, Goodhue, Jackson, Le Sueur, Lincoln, Lyon , Martin, Mower, Murray, Nicollet, Nobles, Olmsted, Pipestone, Redwood, Rice, Rock, Sibley, Steele, Wabasha, Waseca, Watonwan, Winona, and Yellow Medicine	Presidential Disaster Declaration DR-1941-MN was Declared for Public Assistance (PA) due to severe rain storms and flooding beginning on September 22 through October 14, 2010.
2008	Counties: Fillmore, Freeborn, Houston, Mower, Nobles and Cook	DR-1772-MN was declared for PA due to severe rainfall and flash flooding June 6 through June 12, 2008 and amended through 8-5-08.
2004	Counties: Becker, Beltrami, Clay, Clearwater, Dodge, Faribault, Freeborn, Itasca, Kittson, McLeod, Mower, Pennington, Polk, Roseau and Steele	DR-1569-MN was declared for Individual Assistance (IA) and PA on October 7, 2004 for five southern Minnesota counties due to severe rain storms and flooding September 14 through September 27, 2004. Other northwest
2001	Counties: Aitkin, Anoka, Beltrami, Becker, Benton, Big Stone, Brown, Carlton, Carver, Chippewa, Chisago, Clay, Clearwater, Crow Wing, Dodge, Dakota, Douglas, Faribault, Freeborn, Goodhue, Grant, Hennepin, Houston, Kanabec, Kandiyohi, Kittson, Koochiching, La Sueur, Lac qui Parle, Lake of the Woods, McLeod, Meeker, Mille Lacs , Morrison, Mower, Nicollet, Nobles, Norman, Olmsted, Otter Tail, Pine, Polk, Pope, Ramsey, Red Lake, Redwood, Renville, Rice, Roseau, Saint Louis, Scott, Sibley, Stearns, Stevens, Swift, Todd, Traverse, Wabasha, Washington, Wilkin, Winona, Wright and Yellow Medicine	DR-1370-MN was declared for IA and PA on May 16, 2001 that resulted from flooding due to snow melt and heavy rainfall from March 23 through July 3, 2001

2001: DR-1370-MN

Incident Period: 03/23/2001 – 07/03/2001

Major Disaster Declaration declared on 05/16/2001 – See Table 1.

Flooding from snowmelt and very heavy April rainfall (2nd wettest April in MN) produced the second or third highest crests along the Mississippi River**.** With seasonal snowfall well above average, the months of February and March were both colder than normal allowing for very little snowmelt entering April.

Extremely heavy April precipitation (both snow and rain), especially over the upper Mississippi River basin combined with the melting snow to produce the high crests along the main stem river.

2004: DR-1569-MN

Incident Period: 09/14/2004 – 09/27/2004

Major Disaster Declaration declared on 10/07/2004 - See Table 1.

A series of disturbances moving along a stalled frontal boundary resulted in extremely heavy rainfall over much of southern Minnesota on September 14th and 15th. Nearly all of south central and southeast Minnesota received over four inches of rain. Six-inch totals were common in the region, and a large section of south central Minnesota was inundated by more than eight inches of precipitation. The heaviest Minnesota rainfall reports were from Faribault and Freeborn counties, where more than 10 inches of rain fell in a 36-hour period.

The rain began falling during the early morning hours of September 14th. It tapered off by mid-day on the 14th, and then intensified again in the early evening. Heavy rains continued through the night, finally ending during the morning of the 15th. The Austin area saw very high to record crest levels on the Cedar River and creeks leading into it. Hardest hit was the Austin area where flooding affected parts of the city and widespread sand-bagging efforts took place. Turtle Creek rose to a record crest of 14.8 ft., and Dobbins Creek reached 14.5 ft. (4th highest). The Cedar River at the water treatment facility in Austin recorded a peak of 25.0 ft. which remains a record to this day.

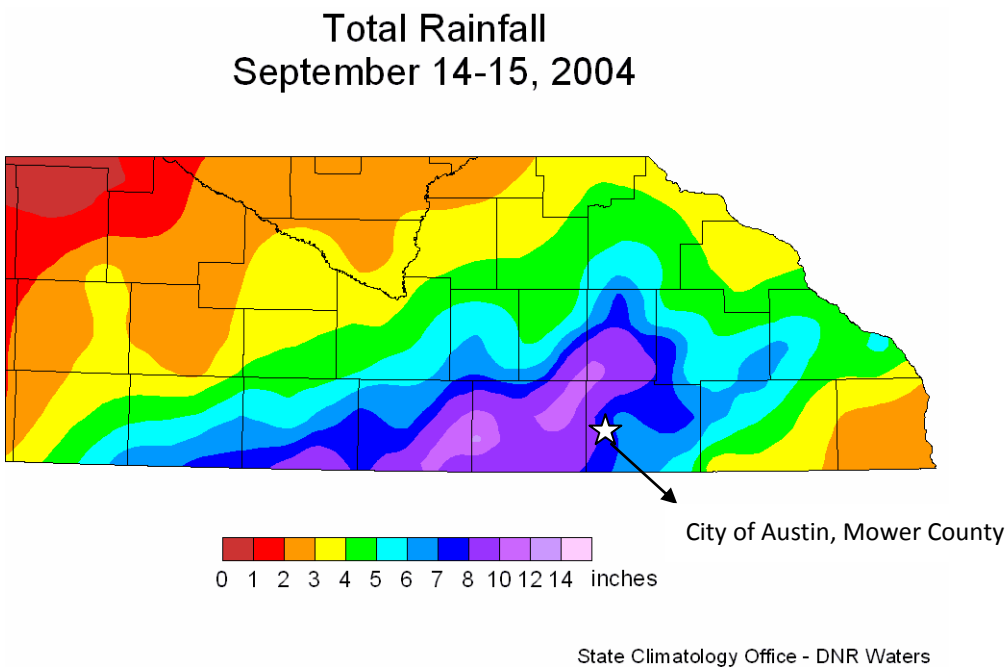

Figure 3 – Rainfall Totals impacting Upper Cedar River Watershed and Mower County for June 14 & 15, 2004

The deluge led to numerous reports of stream flooding, urban flooding, mudslides, and road closures. The National Weather Service issued flash flood warnings and flood warnings for 13 Minnesota counties during the episode, including Mower County.

On September 29, 2004, the Governor requested a federal declaration and it was signed by the President on October 7, 2004 for Individual Assistance (IA) and Public Assistance (PA) as well as Hazard Mitigation for all counties within the State.

The flood of 2004 was the highest flood of record. It crested 1.60 feet higher than the flood of the summer of 2000 (the former record height in the City of Austin) and 2.60 feet higher than the flood of June 2008, which is the third highest on record.

2008: DR-1772-MN

Incident Period: 06/6/2008 – 06/12/2008

Major Disaster Declaration declared on 06/25/2008 - See Table 1.

The first half of June produced numerous rounds of severe weather and heavy rainfall in Minnesota. Three particularly heavy rainfall events led to notable urban flooding and damage to agriculture and infrastructure on the rural landscape:

- June 5 and 6 - roughly five inches of rain fell in a short period of time in Cook County. Urban flooding occurred in downtown Grand Marais.
- June 7 and 8 - two-day rainfall totals topped five inches in portions of Mower County.
- June 11 and 12 - for the second time in a week, heavy rains fell on portions of southeastern Minnesota. The cumulative impact of the two events led to significant urban flooding in Austin. The heavy rains fell over already saturated ground in southeast Minnesota. Water was over many roads and cars were submerged in Austin. By the wee hours of the morning on June 12, Interstate 90 was closed in Austin due to floodwaters covering the interstate. Later that same day, residents of Austin were sandbagging to protect parts of the town due to rising creeks.

On June 17, 2008, the Governor requested a major disaster declaration for Public Assistance (PA) due to severe flooding. On June 25, 2008, the President declared that a major disaster existed in the State of Minnesota. This declaration made Public Assistance (PA) available for the repair or replacement of facilities damaged by the severe storms and flooding in Fillmore, Freeborn, Houston, and Mower Counties. This declaration also made The Hazard Mitigation Grant Program assistance available for hazard mitigation measures statewide.

2010: DR-1941-MN

Incident Period: 09/22/2010 – 10/14/2010

Major Disaster Declaration declared on 10/13/2010 - See Table 1.

During September 22–24, 2010, heavy rainfall ranging from 3 inches to more than 10 inches caused severe flooding across southern Minnesota. The floods were exacerbated by wet antecedent conditions, where summer rainfall totals were as high as 20 inches, exceeding the historical average by more than 4 inches. Widespread flooding that occurred as a result of the heavy rainfall caused evacuations of hundreds

of residents, and damages in excess of 64 million dollars to residences, businesses, and infrastructure. In all, 21 counties in southern Minnesota were declared Federal disaster areas. See table 1.

Damage estimates in the Austin area topped $250,000, but it was reported that without past mitigation efforts the damage costs could have been in the millions.

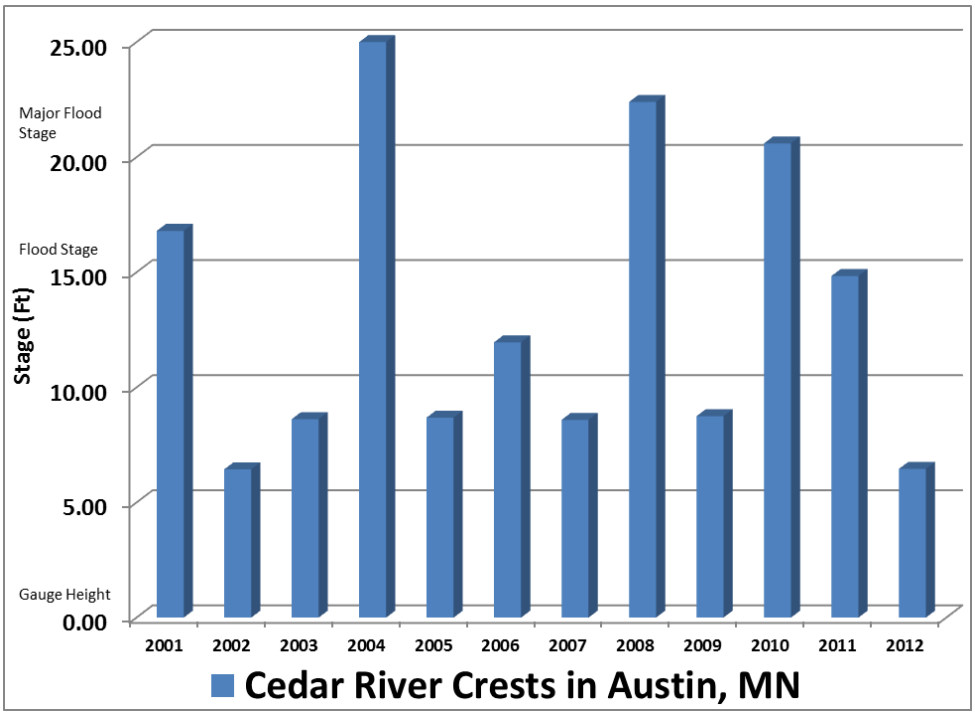

Figure 4 – Highest Yearly Crests of Cedar River Gauge (ASNM5 "Gauge 0" Datum: 1167.79') in Austin, MN since 2001

History of Acquisition Projects

Documented flood events for the Austin area exist from the early 1900's with the first Mitigation Projects initiated after the flood of 1978. This resulted from citizens of Austin forming the Floodway Action Citizens Task Source (FACTS) to investigate methods to solve the flooding problems. The group of about 450 met with the Austin City Council, Turtle Creek Watershed Board, the MN Department of Natural Resources, the Governor's office and other state and local agencies to gather information.

The City of Austin realized the repetitive flooding needed to be addressed and requested the United States Army Corps of Engineers (USACE) study the issues. USACE concluded that various structural flood control projects and dredging solutions were not cost effective.

The City forged ahead and using federal funds acquired properties in the flood plain. The first 58 residential properties were part of the "Homes Acquisition Project" funded by the Community Development Block Grant Program of the U. S. Department of Housing and Urban Development (HUD).

The Housing and Redevelopment Authority (HRA) of Austin was created in 1972 and administered the acquisition of the homes funded by $1.7 million from HUD. As the primary agency for Austin to buy property, the HRA coordinated all acquisitions through the assistance of the Minnesota Division of Emergency Management (DEM). Homeowners were given the option to relocate their structures outside the flood plain while other structurally sound structures were auctioned off with the condition that they

also be moved out of the flood plain. The money raised by the auction was reinvested to fund more acquisitions. FEMA considers this type of mitigation to be 100 percent effective against future property damages.

The flooding of October 1988 was declared a Federal Disaster. The acquisition of 4 homes was directly administered by FEMA, under Section 1362 of FEMA regulations. The NFIP had a program, known as "Section 1362", under which funds were made available to buy insured properties that repetitively flooded and transfer the land to communities. "Section 1362" was repealed and replaced by the Flood Mitigation Assistance (FMA) program in 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the NFIP. FMA is a pre-disaster grant program.

Figure 5 – The City of Austin bought a cleared city block and sold five lots to homeowners that were moved out of the floodplain after the 1993 flood

Following the floods of 1993, FEMA, through DEM, funded the acquisition of 101 homes in the City of Austin. HMGP funds were used for these projects in accordance with priorities identified in State and local hazard mitigation plans, which enabled mitigation measures to be implemented during the recovery from this disaster. The local match of 25 percent was contributed by grants from the Minnesota Department of Natural Resources (DNR) and the Department of Trade and Economic Development (DTED). The DEM guided Austin in following federal requirements and administering the grant.

At the same time, citizens who were living just outside the city limit wanted Mower County officials to follow the City's initiative and participate in their own acquisition project. Eventually fifteen structures were included in a buyout project coordinated by the Mower County Planning Department; a grant from the Minnesota DTED helped Mower County with the 25 percent local share in the HMGP acquisition project. Eventually these fifteen properties were turned over to the City of Austin for supervision and as part of their green open space.

Several acquisition projects were also completed using the State FDR program funds after the implementation in 1987. Those projects were not included in this study due to lack of available data.

Figure 6 – Green space at Wolf Creek in Todd Park, Austin, MN

For continuity purposes, homes were acquired, when possible, in blocks, along the Cedar River, Turtle Creek and Dobbins Creek in the 100-year flood plain. The cleared lots are deeded back to the City and are to be incorporated into the City's Linear Park System. The Comprehensive Linear Park System was developed to manage the acquired flood-prone properties so the open space can be enjoyed by all its citizens: http://www.ci.austin.mn.us/Econdev/Austin%20MN%20Comprehensive%20Plan%20August%202000.pdf.

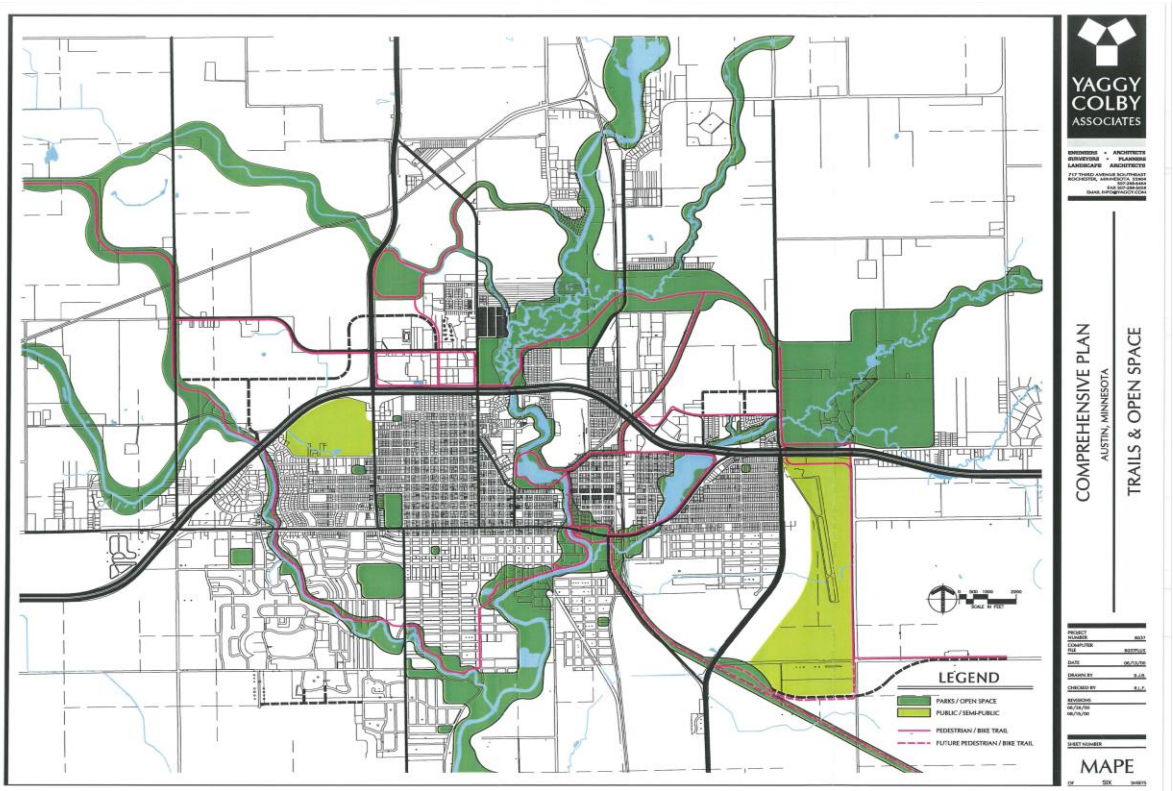

Figure 7 – City of Austin Comprehensive Plan trails and open space

Methodology

A LAS is used to assess the effectiveness of a completed hazard mitigation project. The result is a losses avoided ratio which compares the damages prevented from recent disasters after the mitigation project completion to the project's costs. According to Federal regulation, a Benefit-Cost Analysis (BCA) must be completed when assessing any mitigation project. A BCA is used to predict the probable cost-effectiveness of a proposed project, while a LAS looks back at a completed project and estimates how much damage was prevented from an actual event.

Every LAS has two requirements:

1. A mitigation project must have been "tested," meaning that a hazard event like a flood, tornado or hurricane must have directly impacted the completed project. The flood acquisition projects in this study were tested by one or more flood events prompting an evaluation of what losses were avoided.
2. Complete mitigation project files containing the data needed for calculation must be available. Record keeping is the most critical activity in loss avoidance assessment. This is because an assessment cannot be performed without project data. It is possible to perform record-keeping and project data gathering post-event, but this process can be tedious and may result in certain applicable projects in the flooded area being missed. As a result, record-keeping and project data gathering are treated as a preparatory process and should ideally be integrated into regular project management activities. For this LAS on acquisition projects, the initial project application, BCA report and final inspection documents are critical to an accurate assessment.
   Detailed data was collected from the original LAS (http://www.fema.gov/media-library/assets/documents/16518?id=3710), the Austin City Engineer's office and the Mower County Public Works Office.

Phase 1: Initial Project Selection

Phase 1 of the LAS methodology requires initial project selection. The 2001 LAS selected properties that were the first properties acquired through federally funded grant monies up until the time of the original study in Austin, MN. As stated in the Introduction, this study updates the original 163 properties of acquisition projects as they were tested by storm events severe enough to have caused damage. These storms occurred in the 2004, 2008 and 2010 events.

"Acquisition projects" are flood-prone buildings acquired and demolished or relocated by the project sponsor. For FEMA funded mitigation projects, the project sponsor must agree to keep the land the building occupied as open space in perpetuity to prevent future floods from causing additional damage at the site.

Phase II: Project Effectiveness Analysis

Phase 2 is used to determine the effectiveness of a mitigation project relative to a hazard and to quantify the savings resulting from undertaking and completing a mitigation project. An LAS for any flood-related

project is dependent on the occurrence of at least one storm event after the project has been completed that is severe enough to have caused damage in the MPA (Mitigation Project Absence) scenario or if the buyout projects had not been undertaken.

To perform the losses avoided calculations, detailed data was originally collected from the City of Austin's HRA office and the City Engineer. The multiple flood-related losses avoided were calculated for actual events in 2004, 2008 and 2010, in addition to the events covered in the original 2001 LAS. Each flood is considered as an independent event for calculating the losses avoided. The cost savings are significant and illustrate the financial benefits of these acquisition projects.

Applicable data was gathered from various stream gauges showing "peak" flood events for the three designated years in the City of Austin. These events were the most severe in Austin with the highest "peak" values since the original LAS was completed in 2001.

The total acquisition cost for each property was determined using formulas presented in Table - 2. The losses avoided calculations were performed using the formula in Table-3.

Table 2: Formulas for determination of total acquisition costs

Type of Property	Formula – Total acquisition cost
Homes with Tenants	Purchase price + Demolition cost + Appraisal fee + Title/Legal fee + Project management fee + Relocation cost
Owner Occupied Homes or Vacant Homes	Purchase price + Demolition cost + Appraisal fee + Title/Legal fee + Project management fee
Vacant Lots	Purchase price + Title/Legal fee + Project management fee

Table 3: Formula for determination of losses avoided

Losses Avoided Determination	Usage of Depth – Damage Function (see Appendix A) and previous experience in disaster costs in Austin, MN
Damage to structure	(Bldg. DDF) X (Property value)
+ Damage to contents	(Content DDF) X (Content value)
+ Displacement cost	(Number of days displaced) X (cost)
+ Avoided individual assistance cost	DR-993-MN-1993 Austin experience
+ Avoided infrastructure cost	DR-993-MN-1993 Austin experience
+ Savings in (pre-FIRM) insurance premium	Homeowner premium + FIA subsidy

Phase III: Loss Estimation Analysis

In Phase 3, the economic value of a mitigation project is quantified in terms of the losses that were avoided by the implementation of the project. By using the data collected and the analysis results from Phases I and II, the Loss Estimation Analysis culminates in calculating Losses Avoided.

After the project costs are determined and the Losses Avoided is determined, the percentage or ratio of Losses Avoided is calculated:

$$L_R = L_A \div P_C$$

Where: L_R = Losses Avoided Ratio or Percentage
L_A = Losses Avoided for the mitigation project evaluated – in dollars
P_C = Project Costs for the mitigation project evaluated – in dollars

The resulting ratio is an indicator of the Return On Investment (ROI) and long term cost effectiveness of the mitigation effort. An ROI greater than 1 indicates that project benefits have already exceeded project costs – therefore a good project. As a percentage, the result indicates return on investment. A 100 percent return means that, for each dollar invested, one dollar in savings is generated for each subsequent flood event.

The analysis of Austin's buyout projects shows an average ROI to be 2.65 or 265 percent. This means that an estimated savings of $2.65 in property damages for each dollar invested has been realized since the project's implementation. See Table 4.

Results

Analysis of the data in this report shows that the 58 buy-outs after the 1978 floods have avoided losses of 286.1% (savings of almost $20.35 million on an investment of $7.1 million in 2001 dollars). The actual investment after the 1978 floods was $1.7 million funded by HUD through a Block Grant to the City of Austin. These estimates are normalized to the year-2001 for the acquisitions after 1978 floods. These savings are determined due to losses avoided following the floods of 1983, 1993, 2000, 2004, 2008 and 2010.

The acquisition of 4 homes after the flooding of 1988 was directly administered by FEMA, under Section 1362 of FEMA regulations. This program was replaced by the FMA program in 1994. The cost of this acquisition was $270,797 and the losses avoided are $1.52 million, with avoided losses of 561.9%. These savings are determined due to losses avoided following the floods of 1993, 2000, 2004, 2008 and 2010.

Later in the aftermath of the 1993 floods, 101 acquisitions avoided losses of almost $16.4 million on a total investment of almost $7.1 million. This return on investment is 232.9%. These savings are determined due to losses avoided following the floods of 2000, 2004, 2008 and 2010.

Table 4: Summary of losses avoided due to acquisitions in Austin, MN

Funding Sources	Total Acquisition Cost	Total Losses Avoided	% of Losses Avoided to Acquisition Cost	Return On Investment (ROI)
58 bldgs. - HUD (after 1978)	$7,112,759	$20,351,726	286.10%	2.86
4 bldgs. - sec. 1362 FEMA (after 1988)	$270,797	$1,521,651	561.90%	5.62
101 bldgs. – HMGP FEMA (after 1993)	$7,042,430	$16,400,693	232.90%	2.33
Totals and total averages	**$14,425,986**	**$38,274,070**	265.30%	2.65

(**Note**: Dollars normalized to the year 2001 for all acquisition projects. The discount rate used for this normalization is 7 %.)

Conclusion

This report documents some of the direct savings resulting from the Federal and State funded acquisition projects. Numerous floods have occurred since the implementation of these projects, and the resulting losses avoided for the multiple flooding events are presented.

The calculation of losses avoided is a detailed quantitative method used to perform a post-mitigation, Hazard Mitigation Grant project review. Numerous floods have occurred since these acquisition projects were completed, and the losses avoided as calculated in this study quantify the savings. Compared to the pre-project benefit-cost analysis, it identifies some of the actual losses avoided. Thus, measuring losses avoided is a methodology for calculating the financial savings realized by the community as a direct result of the mitigation project.

The facts surrounding the initial proposal to implement an acquisition/demolition project point to a sound decision. Given the damages and local ordinances which would prevent new construction in the area, the likelihood of selling the properties at a reasonable market value was low.

All buyouts funded by FEMA mitigation grants are voluntarily transacted by the homeowners. No use of eminent domain authority is permitted. Local governments and emergency management agencies have a responsibility to protect the citizens from harm. Thus, the mitigation project proposed by the City of Austin at the owners' requests was an opportunity for the residents to start over in a safer location.
The NFIP provides federally-subsidized flood insurance for properties in the special flood hazard area. This subsidy is funded by taxpayer dollars, so repetitive flood claims can add up to substantial costs over the years. Removing the structures from an area of high risk for flooding also eliminated the recurring NFIP claims, thereby creating NFIP savings at the federal level.
The project is deemed cost effective by FEMA standards, making the buyout a win/win situation for all stakeholders from the federal level down to each individual citizen.

The above result, from the *losses avoided* analysis has demonstrated the economic viability of 163 acquisition projects implemented in Austin, Minnesota from 1978 to 2001.

Limitations

The methodology for determining the long term cost effectiveness of these particular projects was based upon the data as described. The related costs not reflected in this LAS are outlined in Table 5.

The economic impact or costs related to these listed items were not calculated because of incomplete data, unavailable data or the difficulty to quantify. Many of the Community/County listings cover problems that have not received extensive research reflected by the economic impact. Lack of documentation and financial measurables should not minimize the impact that emotional and physical problems have on flood victims and the community.

Expenditures on mental health after disasters are often documented in studies of larger disasters, like Hurricane Floyd, 9/11 in New York and Hurricane Katrina, but often are not tabulated in lesser disasters. Cost data for crisis counseling can be obtained from FEMA Crisis Counseling program data, local governments, community-based organizations, faith-based organizations and other private non-governmental medical and counseling services.

Table 5: Disaster related repetitive costs not reflected in LAS

Community/County	Response and Recovery
- Disruption of daily life - Pain and suffering - Human stress - Impact on mental health - Impact on physical health - Irreplaceable heirlooms - Environmental Impact - Physical impact on business - Disruption of economic base - Impact on education	- Evacuation - Immediate food/shelter - Temporary housing - Debris removal and clean-up - Public health issues - Activation and deployment - Administrative costs

References and Resources

1. *Loss Avoidance Study, Condensed, Prescriptive Riverine Flood Methodology,* Contract # HSFEHQ-10-D-0806, Task Order # HSFEHQ-10-J-1405, Final Report June 22, 2011

2. *Losses Avoided Due to Home Acquisitions in Austin, Minnesota,* Analysis of 163 Acquisitions on Cedar Creek, Post-Disaster Economic Evaluation of Hazard Mitigation, March 2001

3. *Mower County All Hazard Mitigation Plan,* 2009

4. *Cedar River Watershed District, Watershed Management Plan,* October 2009

5. *City of Austin Flood Mitigation Program,* 2002

6. *LAS Worksheet – Final,* Created 2007 & Modified 2013

7. *Austin Comprehensive Plan,* 2000