Evaluating Losses Avoided Through Acquisition Projects

Wisconsin Property Acquisitions

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FEMA

WEM

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Executive Summary

The Federal Emergency Management Agency (FEMA) awards mitigation grants to reduce the negative impact of natural hazards on property, people, and the environment. FEMA funds projects based on numerous factors, including a cost-effectiveness analysis of a range of hazard events. Presidential-declared disasters provide considerable funds to States and communities via the Hazard Mitigation Grant Program (HMGP). The HMGP assists States and local communities in implementing long-term hazard mitigation measures. It can be used to fund projects that protect public or private property. Under the HMGP, FEMA may contribute up to 75 percent of project costs. The community must formally agree to provide a local match in the amount of the remaining project costs (at least 25 percent). After significant funds are distributed on mitigation projects, the questions arise: Was the project cost effective? How effective was the project during ensuing disasters or hazard events?

The Loss Avoidance Study (LAS) methodology was developed by FEMA to provide a quantitative approach to assess performance of mitigation measures. This report, Evaluating Losses Avoided through Acquisition Projects, evaluates the effectiveness of property acquisitions as a mitigation measure.

In response to the flooding in Milwaukee County, local governments (with Federal and State assistance) acquired a total of 54 repetitive-loss properties. FEMA partnered with the State of Wisconsin and used the quantitative approach to complete a loss avoidance study for the acquisition projects.

A total of five projects, located in Milwaukee County, were chosen during the data collection phase.

Project #1:	City of Wauwatosa (23 properties)
Projects #2 & 3:	City of Milwaukee – two projects (19 and 2 properties in the Lincoln Creek neighborhood)
Project #4:	Village of Brown Deer (9 properties)
Project #5:	Village of Oak Creek (1 property).

For the five projects, this report contains project descriptive information and the impacts of those projects. All of the acquisition projects were funded from the Disaster Declarations (#1180 & #1238) resulting from two flood events in 1997 and 1998. Phase Two involved analysis. Damage analysis was collected for these projects, resulting in an estimate in damages that would have occurred had these projects not been executed. Two separate methodologies were used to determine potential losses avoided. For the first project (Wauwatosa) information was available from Benefit Cost Analysis (BCA) reports. These provided more in-depth information than was available for the other four projects. Damage estimates were based on actual storm events and the potential losses that may have occurred had the mitigation project not taken place. For projects #2-5, FEMA's HAZUS modeling software was used to model a year-100 flood event. This modeling assumes that most properties are damaged to some degree during a 100-year flood event. Because the first project includes multiple events, the return on investment is higher than the one-time event modeled by HAZUS for projects #2-5.

The final phase involved reporting results. The cost associated with damages was estimated using a loss estimation analysis. These analyses calculated the dollar amount from physical damage and loss of function from pre and post mitigation. The total losses avoided were estimated at $2,155,513. The total project investment for the five projects (based on the original project cost) was $2,954,399. As a result, the collective return on investment for the flood events was 73 percent. If results are examined by type of methodology, the Wauwatosa project (actual events) yields a return on investment of 148 percent. For Projects # 2-5, the return on investment is 49 percent.

Using either methodology yields significant returns on investments which will only increase as more flooding events occur, making property acquisition an effective mitigation tool.

Section I: Introduction

Whether the onset of flooding is a result of torrential rainfall or floodplain development, the State of Wisconsin has a long history of flooding. Fortunately, there are tools and techniques which, when put into effect in a timely fashion, allow us to avoid serious consequences. These tools and techniques are known as mitigation. Mitigation is any sustainable activity or project that reduces losses for people, property, or possessions. This can be achieved through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk, and flood insurance that protects financial investment.

Removal of flood prone homes in Milwaukee County provides green space

There are numerous possible courses of action that can be recorded for a mitigation project as follows:

- Do nothing – with this alternative, no costs are involved but damages and emergency response costs will continue to occur in future events.
- Elevation – may be a cost-effective alternative for certain properties. Properties located in the flood fringe are elevated to the 100-year base flood elevation plus two feet of freeboard. This is not an alternative for properties located in the floodway. Future damages would be prevented to the level of protection; however, emergency response costs would continue in future events. Although property damage may be prevented, property owners most likely would not have access to their properties during flooding events.
- Acquisition/Relocation/Demolition – the preferred alternative, may be the only alternative for floodway properties. Permanently mitigates damages to the property and no emergency response is required.

Acquisition is the chosen type of mitigation for this report. In a property acquisition project, the community buys private property, acquires title to it, and removes or relocates the structures. By law, that property is now public property and must forever remain open space land. The community can use it to create public parks, wildlife refuges, etc. but it cannot sell it to private individuals and development is limited. Property acquisitions work the same way as any other real estate transaction. Property owners who want to sell their property are given fair market value. It is a good opportunity for people who live in or near hazard areas to move to safer ground.

1.1 Purpose

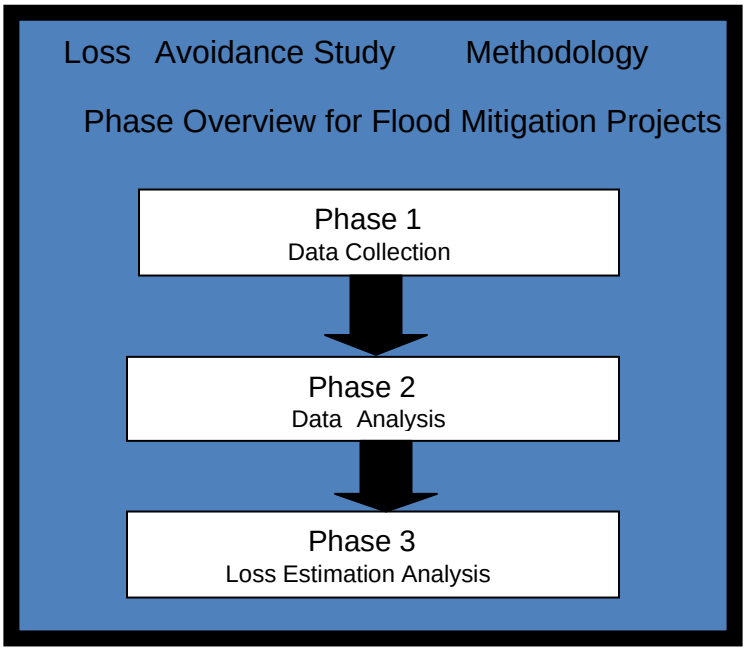
The State of Wisconsin has invested millions of dollars to acquire flood-prone properties. How well is this mitigation initiative working? Can losses avoided be quantified as a direct result of implementing acquisition projects? This study seeks to provide the answers.

The scope of this study includes five projects with 54 acquisition properties that were executed in four cities in Milwaukee County and funded through FEMA's Hazard Mitigation Grant Program (HMGP). The study provides comprehensive documentation of "losses avoided" (damages avoided or benefits) utilizing quantitative methods. It also describes a reproducible and verifiable methodology so that results are meaningful and defensible.

1.2 Methodology Overview

This study focused on the performance of acquisition projects and was divided into three phases: Phase 1 – Data Collection, Phase 2 – Data Analysis, and Phase 3 – Loss Estimation Analysis.

Figure 1.2.1



Phase 1: Data Collection includes the development of the initial project list. Projects were selected based on parameters established for the study. The selected projects were then screened based on the availability of data necessary to complete the study. The final project list then proceeded to Phase 2.

Phase 2: Data Analysis included multiple analyses to determine if there were measurable avoided losses since the projects' completion. To calculate the flood losses avoided due to acquisition projects in Milwaukee County, it was essential to obtain mitigation data on each structure to be evaluated. This data included:

- Location
- Building Value
- Contents Value

Phase 3: Loss Estimation Analysis involves analyzing each project for flood damage loss. Loss Estimation Analysis is the final phase of a loss avoidance study. It is conducted to estimate the avoided losses based on the effectiveness of the mitigation project during the selected storm

event. The Loss Estimation Analysis is accomplished by calculating the amount of damage in dollars associated with the damage analysis calculated in Phase 2 of the study.

This phase includes two major tasks:

1. Calculating Losses Avoided (LA)

   When calculating losses avoided (LA), the first step is to determine the dollar value estimate of the damage that would have occurred had the mitigation project not been executed and then the estimated damage in dollars that might occur after a flood event.

2. Calculating Return On Investment (ROI)

   In determining the Return on Investment (ROI), losses avoided (LA) to project investments (PI) or acquisition costs are used. The formula used to calculate ROI is shown below.

$$\frac{\$LA \text{ (Loss Avoided)}}{\$PI \text{ (Project Investment or Acquisition Cost)}} \times 100 = ROI$$

Section 2 Project Selection

2.1 Data Collection (Initial Project Selection)

The first step is to determine the parameters of the study. These parameters may include, but are not limited to; hazard type, area of interest and project type.

Hazard Type

Projects may be chosen and screened based on hazard type. For this study, flooding was chosen as the hazard type.

Area of Interest

Depending on the study, the area of interest could vary from a community, county, a region of a state, etc. The entity conducting the study should identify and define the area of interest prior to project selection. For this study, four communities were identified for separate projects on residential acquisitions. A listing of state projects was reviewed to determine areas where property acquisitions had occurred. The following communities in Milwaukee County, Wisconsin were chosen for this study:

- City of Wauwatosa
- City of Milwaukee (Lincoln Creek - 2 projects)
- Village of Oak Creek
- Village of Brown Deer

Project type

Project selection may be based on project type. If flooding is the chosen hazard, the project type may be acquisitions, elevations or other mitigation projects. For this project, property acquisition was chosen as the project type.

2.2 Project Screening

The initial list of projects must be evaluated to determine if enough specific data and characteristics are available for the methodology being applied. If the data is not available, the project should be removed from the list.

There are three primary considerations for the project screening process: initial site visits, local preferences, and available information.

Initial Site Visit

A site visit should be done in order to conduct a preliminary assessment of the project and meet the local officials that have worked with the project and have the most knowledge of it.

Conducting the detailed data collection for Phase 2 and 3 can also be done at this time. The visit may reveal a lack of data necessary to complete the project or other resources that may be available.

Local Preferences

State or local officials may have a preference for certain projects over others. This must be taken into consideration in selecting the projects.

Available Information

Some of the projects initially selected may not have enough information in project files to proceed. FEMA and other contracting agencies have had different long-term data storage requirements since mitigation programs began. Some of the basic information such as the original funding application and financial reports are usually kept in FEMA files. Some of the more detailed information including design drawings and as-built data are often not in the same files. Therefore, the person conducting the study may be required to use other resources such as local governments or contracting consultants to retrieve the information. If adequate information cannot be found, the list of possible projects may be reduced.

2.3 Final Project Selection

For this report, a listing of state projects was reviewed and communities were chosen that had a number of property acquisitions acquired with FEMA mitigation funds. Next, the occurrence of damaging events since the acquisitions occurred was taken into consideration. Multiple damage events increase the analysis potential of the project. How the analysis is completed on a project is affected by the available data on the project property. Next, available information on the damage events since the buyout occurred, i.e. stream data/gauge information, National Climatic Data Center (NCDC) historical data, FEMA disaster declaration information, etc. was collected.

The four communities noted in Section 2.1 were chosen based on the information that was available from local, state and FEMA offices. The final project list then proceeded to Phase 2 Data Analysis.

Section 3: Project Information

This section of the report provides background information on each of the acquisition projects and the impacts from these selected storm events (see Section 3.1). Information for this section comes from the FEMA project files, the National Weather Service and the State of Wisconsin Department of Military Affairs, Wisconsin Emergency Management Division.

This study focuses on five projects that include 54 residential properties in Milwaukee County. The acquisition projects are:

Project #1:	City of Wauwatosa (23 properties)
Projects #2 & 3:	City of Milwaukee – two projects (10 and 2 properties)
Project #4:	Village of Brown Deer (9 properties)
Project #5:	Village of Oak Creek (1 property).

The bodies of water that affect these sites include the Menomonee River (Wauwatosa), Lincoln Creek (City of Milwaukee) and the Root River (Oak Creek).

The first project (City of Wauwatosa) included information from a Benefit Cost Analysis (BCA) and actual flood events. Also included in the analysis of this project was HAZUS modeling. The remaining four projects did not have BCA data and HAZUS modeling was the only information used in the analysis of the return on investment on these projects.

3.1 History

Milwaukee County has been a part of five major disaster declarations within the past 13 years. All of the acquisition projects were funded from the Disaster Declarations resulting from the two events: July 1997 and August 1998 (See Table 3.1).

From the night of June 20 to the morning of June 21, 1997, a storm system passed through the southeastern portion of Wisconsin in the area of Milwaukee, Ozaukee, Washington and Waukesha Counties. This storm system generated torrential rains throughout this four-county area with rainfall ranging from five to nearly ten inches in a thirty-hour period. The most intense rainfall was centered in northern Milwaukee County. Areas within the county which were damaged significantly included Brown Deer, Glendale and Wauwatosa. The City of Milwaukee also received significant damages to its parks and golf courses. Initial damage assessments reported $71 million to private property and $17 million to public property for a total $87 million for this four-county area.

During the period of August 4th and 7th, 1998 a series of slow-moving thunderstorms dumped five to ten inches of rain in a three to five hour period and affected a four-county area (Milwaukee, Rock, Sheboygan and Waukesha). Milwaukee County alone had ten inches of rainfall. Some of the hardest hit areas within Milwaukee County were the same areas that had been affected by flooding the previous summer.

Table 3.1.1 Disaster Declarations for Milwaukee County (used in this report)	
Date	Disaster Number
July 7, 1997	DR-1180
August 12, 1998	DR-1238

Source: FEMA

3.2 Project #1: Wauwatosa, WI – (Menomonee River)

Historic River Crest Data and Flood Impacts

Six historic crests have occurred on the Menomonee River at Wauwatosa, WI since the June 21, 1997 storm. Flood stage levels are shown in Table 3.2.1 with the historic crests shown in Table 3.2.2. This data is from the USGS #04087120 stream gauge located near the 70th Street bridge as shown in Figure 3.2.1 (gauge height is 628.86 ft. NGVD 29). The expected local flood impacts are shown in Table 3.2.3.

Table 3.21 Flood Stages	
Major Flood Stage	18 Feet
Moderate Flood Stage	15 Feet
Flood Stage	11 Feet
Action Stage	8 Feet

Source: National Weather Service

Table 3.2.2 Historical Crests for Menomonee River at Wauwatosa			
Date	Depth	Elevation	Flood Stage
August 6, 1998	18.30 ft	647.16	Major
June 8, 2008	15.68 ft	644.54	Moderate
July 15, 2010	13.95 ft	642.81	Flood
July 21, 1999	13.00 ft	641.86	Flood
July 2, 2000	12.48 ft	641.34	Flood
July 4, 2004	11.80 ft	640.66	Flood

Source: National Weather Service

Table 32.3 Flood Impacts in Wauwatosa, WI	
Crest: (ft.) (Flood Stages)	Impact:
18.89 (Major)	The river is well out of its banks and causing some flooding of homes. A stag 18.9 feet can be considered to be about a 100- year flood.
17.89 (Moderate)	The river is well out of its banks and causing flooding to some homes. A stag 17.9 feet can be considered to be about a 50- year flood.
16.8 (Moderate)	The river is well out of its banks and causing flooding to some homes. A stage o 16.8 feet is considered to be about a 25- year flood.
14.3 (Flood Stage)	The river is well out if its banks causing some flooding to homes. A stage of 1 feet can be considered to be about a 10- year flood.
12.2 (Flood Stage)	The river is well out of its banks and flooding surrounding lowland. This level considered to be about a 5- year flood.
11 (Flood Stage)	The river is well out of its banks and flooding surrounding lowland.
10 (Action Stage)	There is minor lowland flooding. This level is considered to be between a 2 ye flood and a 5 year flood.
9.4 (Action Stage)	There is minor lowland flooding. This level is considered to be about a 2 year flood.
9 (Action Stage)	There is minor lowland flooding.
8 (Action Stage)	There is minor lowland flooding

Source: National Weather Service

A portion of the Federal disaster aid provided for this event was funding for disaster mitigation programs. These are a variety of programs all designed to reduce or eliminate the impact of future events and may include programs such as flood proofing or acquisition. The community of Wauwatosa applied for and was awarded funding for an acquisition project (project #1180.0007) in which the community proposed buying properties that had a history of receiving damage during flood events such as the June 21st, 1997 event. Figure 3.2.1 shows the location of acquisition properties within the flood plain, the flood depth, and the location of the USGS Gauge #04087120 and its proximity to the properties. The list of properties and addresses is provided in Table 3.2.4.

Figure 3.2.1 Acquisition Properties with Flood Depths and USGS Stream Gauge #04087120

The values represented in Table 3.2.4 will be used to calculate losses avoided for potential flooding events based on the historical crests as detailed in Table 3.2.2. Because this is an acquisition project, Losses Avoided will be equal to the total values calculated using the Damage Depth Function (DDF) from the Benefit Cost Analysis (BCA). As defined by the Army Corps

of Engineers, the Depth-Damage Function is a mathematical relationship between the depth of flood water above or below the first floor of a building and the amount of damage that can be attributed to that water.

Table 3.2.4 Wauwatosa Proposed Property Acquisition Addresses & Values*

Property Address:	Building Value:	Contents Value:	Total Value:
7013 W Chestnut St.	$ 70,400	$21,120	$91,520
7029 W Chestnut St.	$ 92,400	$27,720	$120,120
1195 N 71st St.	$ 88,000	$44,000	$132,000
1147 N 68th St.	$103,400	$31,000	$134,400
6817 River Parkway	$129,900	$39,000	$168,900
1183 N 71st St.	$167,200	$50,160	$217,360
7121 W Chestnut St.	$179,900	$53,970	$233,870
7005 W Chestnut St.	$ 70,400	$21,000	$91,400
7021 W Chestnut St.	$ 92,500	$27,750	$120,250
7009 W Chestnut St.	$ 57,200	$17,000	$74,200
1177 N 71st St.	$102,800	$31,000	$133,800
7025 W Chestnut St.	$172,800	$51,840	$224,640
1168 N 72nd St.	$ 91,600	$27,500	$119,100
6825 River Parkway	$179,200	$54,000	$233,200
6833 River Parkway	$140,000	$33,000	$173,000
7117 W Chestnut St.	$145,600	$43,680	$189,280
7127 W Chestnut St.	$119,900	$35,970	$155,870
7113 W Chestnut St.	$101,400	$30,420	$131,820
7037 W Chestnut St.	$151,200	$45,360	$196,560
7109 W Chestnut St.	$168,000	$50,400	$218,400
7033 W Chestnut St.	$125,400	$37,620	$163,020
1173 N 71st St.	$195,800	$59,000	$254,800
1176 N 72nd St.	$143,400	$43,020	$186,420

Source: WEM – B/C Analysis, January 1998

(*Note: Values were drawn directly from the Benefit Cost Analysis (BCA) and closing documents obtained from WEM, and represent best available values for these properties. All values have been adjusted for inflation.)

The 23 properties involved in the acquisition project were in the floodway of the Menomonee River as indicated on the Flood Insurance Rate Map #550284 0005B, dated December 1, 1978. Data necessary for the analysis of the 23 properties was obtained from the State of Wisconsin, Department of Military Affairs- Wisconsin Emergency Management – Recovery Section. The physical location of the properties is described as the area of 68th to 72nd Streets south of Chestnut Street and River Parkway near Hart Park as shown in the highlighted area of Figure 3.2.1.

Table 3.2.5 represents damage and return on investment (ROI) results by event for properties involved in the acquisition project. Additional costs such as displacement and disruption have not been calculated or applied in the analysis.

Table 3.2.5 Mitigation Investment and Loss Estimation by Event							
Analysis Information			Estimated Losses Avoided				
Event Date	Buildings Included in Analysis	Buildings With Potential Losses Avoided	Building Damage	Content Damage	Total Loss Avoided	Project Investment	Projected ROI
August 6, 1998	1	1	$ 129,900	$ 39,000	$ 168,900	$71,000	138%
July 21, 1999	22	2	$ 107,421	$ 31,398	$ 138,820	$ 250,000	-44%
July 2, 2000	23	2	$ 59,240	$ 16,916	$ 76,156	$ 250,000	-70%
July 4, 2004	23	1	$ 40,735	$ 12,221	$ 52,956	$ 90,000	-41%
June 8, 2008	23	7	$ 285,971	$ 81,281	$ 367,252	$ 649,337	-43%
July 15, 2010	23	5	$ 197,345	$ 57,671	$ 255,016	$ 460,500	-45%

Source: Wisconsin Loss Avoidance Study 2010

The following tables (Table 3.2.6 thru Table 3.2.11) show loss estimation for each historical crest represented in Table 3.2.2, beginning with the highest historical crest (647.16' on 8/6/98) to the lowest (640.66' on 7/4/04). Only the properties that had completed the acquisition process are represented for each event.

Table 3.2.6 Loss Estimation Calculations For August 6, 1998 (647.16 ft)										
Property Address	Date of Acquisition	[1]FFE	[1]BFE	[2]Flood Elevation	Flood Depth	[1]DDF	Building Value *	Contents Value *	Building Damage	Contents Damage	Losses Avoided
6817 River Parkway	19-Mar-98	644.6	644.1	647.16	2.56	100%	$129,900	$39,000	$129,900	$39,000	$168,900

[1]Source: FFE, BFE and DDF BCA analysis by WEM, January 1998
[2]Source: Flood Elevation National Weather Service Gauge Data
*All values have been adjusted for inflation.

In the following tables, note the highlighted properties as these are the properties that had a DDF from the completed BCA and therefore, ensuing damage from which Losses Avoided could be computed.

Table 3.2.7 Loss Estimation Calculations For June 8, 2008 (644.54 ft)											
Property Address	Date of Acquisition	[1]FFE	[1]BFE	[2]Flood Elevation	Flood Depth	[1]DDF	Building Value*	Contents Value*	Building Damage	Contents Damage	Losses Avoided
6817 River Parkway	19-Mar-98	644.6	644.1	644.54	-0.06	17%	$171,582	$51,514	$29,169	$8,757	$37,926
6833 River Parkway	28-Jan-99	643.5	644.3	644.54	1.04	38%	$184,923	$43,589	$70,271	$16,564	$86,834
1168 N 72nd St.	02-Feb-99	649.2	648.2	644.54	-4.66	0%	$120,992	$36,324	$0.00	$0.00	$0.00
7021 W Chestnut St.	05-Mar-99	639.3	646	644.54	5.24	100%	$122,181	$36,654	$122,181	$36,654	$158,836
7013 W Chestnut St.	09-Mar-99	647.3	645.7	644.54	-2.76	0%	$92,990	$27,897	$0.00	$0.00	$0.00
1195 N 71st St.	19-Mar-99	649	647.5	644.54	-4.46	0%	$116,237	$58,119	$0.00	$0.00	$0.00
1147 N 68th St.	19-Mar-99	644.5	644	644.54	0.04	17%	$136,579	$40,947	$23,218	$6,961	$30,179
1183 N 71st St.	19-Mar-99	648.4	647.4	644.54	-3.86	0%	$220,851	$66,255	$0.00	$0.00	$0.00
7005 W Chestnut St.	19-Mar-99	646.8	645	644.54	-2.26	9%	$92,990	$27,738	$8,369	$2,496	$10,866
1177 N 71st St.	19-Mar-99	646.8	647.3	644.54	-2.26	9%	$135,786	$40,947	$12,221	$3,685	$15,906
6825 River Parkway	19-Mar-99	644.5	644.2	644.54	0.04	0%	$236,701	$71,327	$0.00	$0.00	$0.00
7033 W Chestnut St.	19-Mar-99	647.8	646.6	644.54	-3.26	0%	$165,638	$49,691	$0.00	$0.00	$0.00
1176 N 72nd St.	19-Mar-99	650.3	648.5	644.54	-5.76	0%	$189,414	$56,824	$0.00	$0.00	$0.00
7029 W Chestnut St.	06-May-99	647.5	646.4	644.54	-2.96	0%	$122,049	$36,615	$0.00	$0.00	$0.00
7009 W Chestnut St.	06-May-99	646.9	645.5	644.54	-2.36	0%	$75,554	$22,455	$0.00	$0.00	$0.00
7025 W Chestnut St.	06-May-99	646.6	646.2	644.54	-2.06	9%	$228,248	$68,474	$20,542	$6,163	$26,705
7117 W Chestnut St.	06-May-99	649.4	648.2	644.54	-4.86	0%	$192,320	$57,696	$0.00	$0.00	$0.00
7127 W Chestnut St.	06-May-99	650.6	648.8	644.54	-6.06	0%	$158,373	$47,512	$0.00	$0.00	$0.00
7113 W Chestnut St.	06-May-99	649.6	648.1	644.54	-5.06	0%	$133,937	$40,181	$0.00	$0.00	$0.00
7037 W Chestnut St.	06-May-99	647.3	646.8	644.54	-2.76	0%	$199,717	$59,915	$0.00	$0.00	$0.00
7109 W Chestnut St.	06-May-99	649.5	647.9	644.54	-4.96	0%	$221,907	$66,572	$0.00	$0.00	$0.00
1173 N 71st St.	06-May-99	647.9	647.3	644.54	-3.36	0%	$258,628	$77,932	$0.00	$0.00	$0.00
7121 W Chestnut St.	27-Oct-99	649.9	648.6	644.54	-5.36	0%	$237,626	$71,288	$0.00	$0.00	$0.00

[1]FFE, BFE and DDF Source: WES HCA Analysis - January 1998
[2]Flood Elevation Source: National Weather Service Gauge Data
*All values have been adjusted for inflation

Table 32.8 Loss Estimation Calculations For July 15, 2010 (642.81 ft)											
Property Address	Date of Acquisition	[1]FFE	[1]BFE	[2]Flood Elevation	Flood Depth	[1]DDF	Building Value*	Contents Value*	Building Damage	Contents Damage	Losses Avoided
6817 River Parkway	19-Mar-98	644.6	644.1	642.81	-1.79	9%	$173,415	$52,065	$15,607	$4,686	$20,293
6833 River Parkway	28-Jan-99	643.5	644.3	642.81	-0.69	13%	$186,898	$44,055	$24,297	$5,727	$30,024
1168 N 72nd St.	02-Feb-99	649.2	648.2	642.81	-6.39	0%	$122,285	$36,712	$0.00	$0.00	$0.00
7021 W Chestnut St.	05-Mar-99	639.3	646	642.81	3.51	100%	$123,486	$37,046	$123,486	$37,046	$160,532
7013 W Chestnut St.	09-Mar-99	647.3	645.7	642.81	-4.49	0%	$93,983	$28,195	$0.00	$0.00	$0.00
1195 N 71st St.	19-Mar-99	649	647.5	642.81	-6.19	0%	$117,479	$58,739	$0.00	$0.00	$0.00
1147 N 68th St.	19-Mar-99	644.5	644	642.81	-1.69	9%	$138,038	$41,385	$12,423	$3,725	$16,148
1183 N 71st St.	19-Mar-99	648.4	647.4	642.81	-5.59	0%	$223,210	$66,963	$0.00	$0.00	$0.00
7005 WChestnut St.	19-Mar-99	646.8	645	642.81	-3.99	0%	$93,983	$28,035	$0.00	$0.00	$0.00
1177 N 71st St.	19-Mar-99	646.8	647.3	642.81	-3.99	0%	$137,237	$41,385	$0.00	$0.00	$0.00
6825 River Parkway	19-Mar-99	644.5	644.2	642.81	-1.69	9%	$239,230	$72,089	$21,531	$6,488	$28,019
7033 W Chestnut St.	19-Mar-99	647.8	646.6	642.81	-4.99	0%	$167,407	$50,222	$0.00	$0.00	$0.00
1176 N 72nd St.	19-Mar-99	650.3	648.5	642.81	-7.49	0%	$191,437	$57,431	$0.00	$0.00	$0.00
7029 W Chestnut St.	06-May-99	647.5	646.4	642.81	-4.69	0%	$123,353	$37,006	$0.00	$0.00	$0.00
7009 W Chestnut St.	06-May-99	646.9	645.5	642.81	-4.09	0%	$76,361	$22,695	$0.00	$0.00	$0.00
7025 W Chestnut St.	06-May-99	646.6	646.2	642.81	-3.79	0%	$230,686	$69,206	$0.00	$0.00	$0.00
7117 W Chestnut St.	06-May-99	649.4	648.2	642.81	-6.59	0%	$194,374	$58,312	$0.00	$0.00	$0.00
7127 W Chestnut St.	06-May-99	650.6	648.8	642.81	-7.79	0%	$160,065	$48,020	$0.00	$0.00	$0.00
7113 W Chestnut St.	06-May-99	649.6	648.1	642.81	-6.79	0%	$135,368	$40,610	$0.00	$0.00	$0.00
7037 W Chestnut St.	06-May-99	647.3	646.8	642.81	-4.49	0%	$201,850	$60,555	$0.00	$0.00	$0.00
7109 W Chestnut St.	06-May-99	649.5	647.9	642.81	-6.69	0%	$224,278	$67,283	$0.00	$0.00	$0.00
1173 N 71st St.	06-May-99	647.9	647.3	642.81	-5.09	0%	$261,391	$78,764	$0.00	$0.00	$0.00
7121 W Chestnut St.	27-Oct-99	649.9	648.6	642.81	-7.09	0%	$240,164	$72,049	$0.00	$0.00	$0.00

[1]FFE, BFE and DDF Source: WEBHCA Analysis-January 1998
[2]Flood Elevation Source: National Weather Service Gauge Data
*All values have been adjusted for inflation

Table 32.9 Loss Estimation Calculations For July 21, 1999 (641.86 ft)											
Property Address	Date of Acquisition	[1]FFE	[1]BFE	[2]Flood Elevation	Flood Depth	[1]DDF	Building Value*	Contents Value*	Building Damage	Contents Damage	Losses Avoided
6817 River Parkway	19-Mar-98	644.6	644.1	641.86	-2.74	0%	$132,768.96	$39,861.35	$0.00	$0.00	$0.00
6833 River Parkway	28-Jan-99	643.5	644.3	641.86	-1.64	9%	$143,092.02	$33,728.83	$12,878.28	$3,035.60	$15,913.88
1168 N 72nd St.	02-Feb-99	649.2	648.2	641.86	-7.34	0%	$93,623.07	$28,107.36	$0.00	$0.00	$0.00
7021 W Chestnut St.	05-Mar-99	639.3	646	641.86	2.56	100%	$94,542.94	$28,362.88	$94,542.94	$28,362.88	$122,905.83
7013 W Chestnut St.	09-Mar-99	647.3	645.7	641.86	-5.44	0%	$71,954.85	$21,586.45	$0.00	$0.00	$0.00
1195 N 71st St.	19-Mar-99	649	647.5	641.86	-7.14	0%	$89,943.56	$44,971.78	$0.00	$0.00	$0.00
1147 N 68th St.	19-Mar-99	644.5	644	641.86	-2.64	0%	$105,683.68	$31,684.66	$0.00	$0.00	$0.00
1183 N 71st St.	19-Mar-99	648.4	647.4	641.86	-6.54	0%	$170,892.76	$51,267.83	$0.00	$0.00	$0.00
7005 W Chestnut St.	19-Mar-99	646.8	645	641.86	-4.94	0%	$71,954.85	$21,463.80	$0.00	$0.00	$0.00
1177 N 71st St.	19-Mar-99	646.8	647.3	641.86	-4.94	0%	$105,070.43	$31,684.66	$0.00	$0.00	$0.00
6825 River Parkway	19-Mar-99	644.5	644.2	641.86	-2.64	0%	$183,157.79	$55,192.64	$0.00	$0.00	$0.00
7033 W Chestnut St.	19-Mar-99	647.8	646.6	641.86	-5.94	0%	$128,169.57	$38,450.87	$0.00	$0.00	$0.00
1176 N 72nd St.	19-Mar-99	650.3	648.5	641.86	-8.44	0%	$146,567.12	$43,970.13	$0.00	$0.00	$0.00
7029 W Chestnut St.	06-May-99	647.5	646.4	641.86	-5.64	0%	$94,440.74	$28,332.22	$0.00	$0.00	$0.00
7009 W Chestnut St.	06-May-99	646.9	645.5	641.86	-5.04	0%	$58,463.31	$17,375.46	$0.00	$0.00	$0.00
7025 W Chestnut St.	06-May-99	646.6	646.2	641.86	-4.74	0%	$176,616.44	$52,984.93	$0.00	$0.00	$0.00
7117 W Chestnut St.	06-May-99	649.4	648.2	641.86	-7.54	0%	$148,815.71	$44,644.71	$0.00	$0.00	$0.00
7127 W Chestnut St.	06-May-99	650.6	648.8	641.86	-8.74	0%	$122,548.10	$36,764.43	$0.00	$0.00	$0.00
7113 W Chestnut St.	06-May-99	649.6	648.1	641.86	-7.74	0%	$103,639.51	$31,091.85	$0.00	$0.00	$0.00
7037 W Chestnut St.	06-May-99	647.3	646.8	641.86	-5.44	0%	$154,539.39	$46,361.82	$0.00	$0.00	$0.00
7109 W Chestnut St.	06-May-99	649.5	647.9	641.86	-7.64	0%	$171,710.43	$51,513.13	$0.00	$0.00	$0.00
1173 N 71st St.	06-May-99	647.9	647.3	641.86	-6.04	0%	$200,124.42	$60,303.07	$0.00	$0.00	$0.00

[1]FFE, BFE and DDF Source: WEMAP/CA Analysis - January 1998
[2]Flood Elevation Source: National Weather Service Gauge Data
*All values have been adjusted for inflation

Table 32.10 Loss Estimation Calculations For July 2, 2000 (641.34 ft)											
Property Address	Date of Acquisition	FFE	BFE	Flood Elevation	Flood Depth	DDF	Building Value	Contents Value	Building Damage	Contents Damage	Losses Avoided
6817 River Parkway	19-Mar-98	644.6	644.1	641.34	-3.26	0%	$137,231.78	$41,201.23	$0.00	$0.00	$0.00
6833 River Parkway	28-Jan-99	643.5	644.3	641.34	-2.16	9%	$147,901.84	$34,862.58	$13,311.17	$3,137.63	$16,448.80
1168 N 72nd St.	02-Feb-99	649.2	648.2	641.34	-7.86	0%	$96,770.06	$29,052.15	$0.00	$0.00	$0.00
7021 W Chestnut St.	05-Mar-99	639.3	646	641.34	2.04	47%	$97,720.86	$29,316.26	$45,928.80	$13,778.64	$59,707.44
7013 W Chestnut St.	09-Mar-99	647.3	645.7	641.34	-5.96	0%	$74,373.50	$22,312.05	$0.00	$0.00	$0.00
1195 N 71st St.	19-Mar-99	649	647.5	641.34	-7.66	0%	$92,966.87	$46,483.44	$0.00	$0.00	$0.00
1147 N 68th St.	19-Mar-99	644.5	644	641.34	-3.16	0%	$109,236.07	$32,749.69	$0.00	$0.00	$0.00
1183 N 71st St.	19-Mar-99	648.4	647.4	641.34	-7.06	0%	$176,637.06	$52,991.12	$0.00	$0.00	$0.00
7005 W Chestnut St.	19-Mar-99	646.8	645	641.34	-5.46	0%	$74,373.50	$22,185.28	$0.00	$0.00	$0.00
1177 N 71st St.	19-Mar-99	646.8	647.3	641.34	-5.46	0%	$108,602.21	$32,749.69	$0.00	$0.00	$0.00
6825 River Parkway	19-Mar-99	644.5	644.2	641.34	-3.16	0%	$189,314.36	$57,047.85	$0.00	$0.00	$0.00
7033 W Chestnut St.	19-Mar-99	647.8	646.6	641.34	-6.46	0%	$132,477.79	$39,743.34	$0.00	$0.00	$0.00
1176 N 72nd St.	19-Mar-99	650.3	648.5	641.34	-8.96	0%	$151,493.74	$45,448.12	$0.00	$0.00	$0.00
7029 W Chestnut St.	06-May-99	647.5	646.4	641.34	-6.16	0%	$97,615.21	$29,284.56	$0.00	$0.00	$0.00
7009 W Chestnut St.	06-May-99	646.9	645.5	641.34	-5.56	0%	$60,428.47	$17,959.51	$0.00	$0.00	$0.00
7025 W Chestnut St.	06-May-99	646.6	646.2	641.34	-5.26	0%	$182,553.13	$54,765.94	$0.00	$0.00	$0.00
7117 W Chestnut St.	06-May-99	649.4	648.2	641.34	-8.06	0%	$153,817.91	$46,145.37	$0.00	$0.00	$0.00
7127 W Chestnut St.	06-May-99	650.6	648.8	641.34	-9.26	0%	$126,667.36	$38,000.21	$0.00	$0.00	$0.00
7113 W Chestnut St.	06-May-99	649.6	648.1	641.34	-8.26	0%	$107,123.19	$32,136.96	$0.00	$0.00	$0.00
7037 W Chestnut St.	06-May-99	647.3	646.8	641.34	-5.96	0%	$159,733.99	$47,920.20	$0.00	$0.00	$0.00
7109 W Chestnut St.	06-May-99	649.5	647.9	641.34	-8.16	0%	$177,482.21	$53,244.66	$0.00	$0.00	$0.00
1173 N 71st St.	06-May-99	647.9	647.3	641.34	-6.56	0%	$206,851.29	$62,330.06	$0.00	$0.00	$0.00
7121 W Chestnut St.	27-Oct-99	649.9	648.6	641.34	-8.56	0%	$190,053.87	$57,016.16	$0.00	$0.00	$0.00

[1]FFE, BFE and DDF Source: WEMPACA Analysis-January 1998
[2]Flood Elevation Source: National Weather Service Gauge Data
*All values have been adjusted for inflation

Table 3.2.11 Loss Estimation Calculations For July 4, 2004 (640.66 ft)

Property Address	Date of Acquisition	[1]FFE	[1]BFE	Flood Elevation	Flood Depth	[1]DDF	Building Value	Contents Value	Building Damage	Contents Damage	Losses Avoided
6817 River Parkway	19-Mar-98	644.6	644.1	640.66	-3.94	0%	$150,540.55	$45,196.93	$0.00	$0.00	$0.00
6833 River Parkway	28-Jan-99	643.5	644.3	640.66	-2.84	0%	$162,245.40	$38,243.56	$0.00	$0.00	$0.00
1168 N 72nd St.	02-Feb-99	649.2	648.2	640.66	-8.54	0%	$106,154.85	$31,869.63	$0.00	$0.00	$0.00
7021 W Chestnut St.	05-Mar-99	639.3	646	640.66	1.36	38%	$107,197.85	$32,159.36	$40,735.18	$12,220.56	$52,955.74
7013 W Chestnut St.	09-Mar-99	647.3	645.7	640.66	-6.64	0%	$81,586.26	$24,475.88	$0.00	$0.00	$0.00
1195 N 71st St.	19-Mar-99	649	647.5	640.66	-8.34	0%	$101,982.82	$50,991.41	$0.00	$0.00	$0.00
1147 N 68th St.	19-Mar-99	644.5	644	640.66	-3.84	0%	$119,829.82	$35,925.77	$0.00	$0.00	$0.00
1183 N 71st St.	19-Mar-99	648.4	647.4	640.66	-7.74	0%	$193,767.36	$58,130.21	$0.00	$0.00	$0.00
7005 W Chestnut St.	19-Mar-99	646.8	645	640.66	-6.14	0%	$81,586.26	$24,336.81	$0.00	$0.00	$0.00
1177 N 71st St.	19-Mar-99	646.8	647.3	640.66	-6.14	0%	$119,134.48	$35,925.77	$0.00	$0.00	$0.00
6825 River Parkway	19-Mar-99	644.5	644.2	640.66	-3.84	0%	$207,674.11	$62,580.37	$0.00	$0.00	$0.00
7033 W Chestnut St.	19-Mar-99	647.8	646.6	640.66	-7.14	0%	$145,325.52	$43,597.66	$0.00	$0.00	$0.00
1176 N 72nd St.	19-Mar-99	650.3	648.5	640.66	-9.64	0%	$166,185.64	$49,855.69	$0.00	$0.00	$0.00
7029 W Chestnut St.	06-May-99	647.5	646.4	640.66	-6.84	0%	$107,081.96	$32,124.59	$0.00	$0.00	$0.00
7009 W Chestnut St.	06-May-99	646.9	645.5	640.66	-6.24	0%	$66,288.83	$19,701.23	$0.00	$0.00	$0.00
7025 W Chestnut St.	06-May-99	646.6	646.2	640.66	-5.94	0%	$200,257.18	$60,077.15	$0.00	$0.00	$0.00
7117 W Chestnut St.	06-May-99	649.4	648.2	640.66	-8.74	0%	$168,735.21	$50,620.56	$0.00	$0.00	$0.00
7127 W Chestnut St.	06-May-99	650.6	648.8	640.66	-9.94	0%	$138,951.60	$41,685.48	$0.00	$0.00	$0.00
7113 W Chestnut St.	06-May-99	649.6	648.1	640.66	-8.94	0%	$117,512.02	$35,253.61	$0.00	$0.00	$0.00
7037 W Chestnut St.	06-May-99	647.3	646.8	640.66	-6.64	0%	$175,225.03	$52,567.51	$0.00	$0.00	$0.00
7109 W Chestnut St.	06-May-99	649.5	647.9	640.66	-8.84	0%	$194,694.48	$58,408.34	$0.00	$0.00	$0.00
1173 N 71st St.	06-May-99	647.9	647.3	640.66	-7.24	0%	$226,911.78	$68,374.85	$0.00	$0.00	$0.00
7121 W Chestnut St.	27-Oct-99	649.9	648.6	640.66	-9.24	0%	$208,485.34	$62,545.60	$0.00	$0.00	$0.00

[1]FFE, BFE and DDF Source: WEB-RCA Analysis - January 1998
[2]Flood Elevation Source: National Weather Service Gauge Data
*All values have been adjusted for inflation

Table 3.2.12 represents potential return on investment based on the cumulative results of the damage estimates for each property and all storm events noted earlier.

Table 3.2.12 Cumulative Loss Estimation and ROI Calculations

Property Address	Date of Acquisition	Total Losses Avoided	Project Investment*	Return on Investment
6817 River Parkway	19-Mar-98	$227,120	$71,000	320%
6833 River Parkway	28-Jan-99	$149,221	$160,000	93%
1168 N 72nd St.	02-Feb-99	$0.00	$91,000	
7021 W Chestnut St.	05-Mar-99	$554,937	$90,000	617%
7013 W Chestnut St.	09-Mar-99	$0.00	$70,340	
1195 N 71st St.	19-Mar-99	$0.00	$89,500	
1147 N 68th St.	19-Mar-99	$46,327	$72,000	64%
1183 N 71st St.	19-Mar-99	$0.00	$88,000	
7005 W Chestnut St.	19-Mar-99	$10,866	$61,000	18%
1177N 71st St.	19-Mar-99	$15,906	$116,337	14%
6825 River Parkway	19-Mar-99	$28,019	$67,500	42%
7033 W Chestnut St.	19-Mar-99	$0.00	$75,500	
1176 N 72nd St.	19-Mar-99	$0.00	$103,000	
7029 W Chestnut St.	06-May-99	$0.00	$82,921	
7009 W Chestnut St.	06-May-99	$0.00	$94,000	
7025 W Chestnut St.	06-May-99	$26,705	$79,000	34%
7117 W Chestnut St.	06-May-99	$0.00	$66,000	
7127 W Chestnut St.	06-May-99	$0.00	$101,000	
7113 W Chestnut St.	06-May-99	$0.00	$70,000	
7037 W Chestnut St.	06-May-99	$0.00	$87,500	
7109 W Chestnut St.	06-May-99	$0.00	$72,500	
1173 N 71st St.	06-May-99	$0.00	$98,000	
7121 W Chestnut St.	27-Oct-99	$0.00	$93,900	
TOTAL:	N/A	$1,059,101	$716,837	148%

*Project Investment – WEM closeout information

Return on investment was calculated using the following formula:

Return on Investment (ROI)

$$\frac{\$1{,}059{,}101 \text{ LA (Loss Avoided)}}{\$716{,}837 \text{ PI (Project Investment or Acquisition Cost)}} \times 100 = 148\% \text{ (ROI)}$$

Table 3.2.13, represents potential losses avoided and return on investment (ROI) for a 100 year flood event modeled using HAZUS-MH MR4.

Table 3.2.13 Losses Avoided - 100 Year HAZUS Model Flood Event										
Property Address	Date of Acquisition	Building Value	HAZUS Building Damage %	Contents Value	HAZUS Contents Damage %	HAZUS Building Damage	HAZUS Content Damage	Losses Avoided	Project Investment	Return on Investment
6817 River Parkway	19-Mar-98	$173,415	28.97%	$52,065	28.95%	$50,238	$15,073	$65,311	$71,000	92%
6833 River Parkway	28-Jan-99	$186,898	26.29%	$44,055	35.43%	$49,136	$15,609	$64,744	$160,000	40%
1168 N 72nd St.	02-Feb-99	$122,285	26.19%	$36,712	25.26%	$32,026	$9,273	$41,300	$91,000	45%
7021 W Chestnut St.	05-Mar-99	$123,486	37.90%	$37,046	32.88%	$46,801	$12,181	$58,982	$90,000	66%
7013 W Chestnut St.	09-Mar-99	$93,983	34.37%	$28,195	28.46%	$32,302	$8,024	$40,326	$70,340	57%
1195 N 71st St.	19-Mar-99	$117,479	24.51%	$58,739	22.92%	$28,794	$13,463	$42,257	$89,500	47%
1147 N 68th St.	19-Mar-99	$138,038	39.95%	$41,385	37.95%	$55,146	$15,705	$70,852	$72,000	98%
1183 N 71st St.	19-Mar-99	$223,210	28.69%	$66,963	28.58%	$64,039	$19,138	$83,177	$88,000	95%
7005 W Chestnut St.	19-Mar-99	$93,983	34.37%	$28,195	28.46%	$32,302	$7,979	$40,281	$61,000	66%
1177 N 71st St.	19-Mar-99	$137,237	29.54%	$41,385	29.43%	$40,540	$12,179	$52,719	$116,337	45%
6825 River Parkway	19-Mar-99	$239,230	31.02%	$72,089	30.61%	$74,209	$22,067	$96,276	$67,500	143%
7033 W Chestnut St.	19-Mar-99	$167,407	33.88%	$50,222	32.90%	$56,718	$16,523	$73,241	$75,500	97%
1176 N 72nd St.	19-Mar-99	$ 191,437	26.19%	$ 57,431	25.26%	$50,137	$14,507	$64,645	$103,000	63%
7029 W Chestnut St.	06-May-99	$123,353	37.90%	$37,006	32.88%	$46,751	$12,168	$58,918	$82,921	71%
7009 W Chestnut St.	06-May-99	$76,361	34.37%	$22,695	28.46%	$26,245	$6,459	$32,704	$94,000	35%
7025 W Chestnut St.	06-May-99	$230,686	33.88%	$69,206	32.90%	$78,156	$22,769	$100,925	$79,000	128%
7117 W Chestnut St.	06-May-99	$194,374	26.25%	$58,312	25.33%	$51,023	$14,770	$65,794	$66,000	100%
7127 W Chestnut St.	06-May-99	$160,065	24.26%	$48,020	22.56%	$38,832	$10,833	$49,665	$101,000	49%
7113 W Chestnut St.	06-May-99	$135,368	26.25%	$40,610	25.33%	$35,534	$10,287	$45,821	$70,000	65%
7037 W Chestnut St.	06-May-99	$201,850	32.53%	$60,555	31.82%	$65,662	$19,269	$84,930	$87,500	97%
7109 W Chestnut St.	06-May-99	$224,278	26.25%	$67,283	25.33%	$58,873	$17,043	$75,916	$72,500	105%
1173 N 71st St.	06-May-99	$261,391	26.31%	$78,764	25.42%	$68,772	$20,022	$88,794	$98,000	91%
7121 W Chestnut St.	27-Oct-99	$240,164	26.25%	$72,049	25.33%	$63,043	$18,250	$81,293	$93,900	87%
TOTALS:								$1,478,870	$1,999,998	74%

Sources: WEM Property Information Sheets and FEMA HAZUS-MH-MR4 (All values have been adjusted for inflation.)

Table 3.2.13 shows a ROI of 74%. The HAZUS model assumes damage from a 100 year flood event, not multiple events as is the case with the actual storm event data. The HAZUS model also assumes that all properties suffered damage during a 100 year flood event.

Data Considerations

Some of the data shortfalls that were encountered were a lack of information on the actual property such as if there was a basement or slab foundation. Accurate property valuation for the Project Investment was difficult to arrive at as some properties did not have any valuation included as in the case of Repetitive Loss Properties where no value is needed for it to be included in an acquisition. Also, factors such as insurance money already paid on a property for damages will be subtracted from the assessed market value and will skew the property valuation that is noted for the property.

Conclusion:

In reviewing the HAZUS data for a 100 year flood event, the resulting potential for losses avoided is encouraging. While the analyses by actual event results have not indicated a dramatic ROI for all properties, there have not been additional flood events of the magnitude that are possible in this area. However, when viewed in the context of the next event does happen, there is no question that there will be significant losses avoided as a result of this acquisition project. And, as time goes by, the return on investment will only continue to grow with each future damage event.

3.3 Project #2: Milwaukee, WI – (1st Lincoln Creek Project)

On June 21, 1997, several communities in Milwaukee County experienced torrential rainfall of as much as 10 inches during a 30 hour period. This was considered in excess of the "100 year rainfall" and overwhelmed storm water systems causing flash flooding across much of the county. In the Lincoln Creek neighborhood, Lincoln Creek crested at 20.09 feet at 9 am CST on the 21st which was 7.09 feet above flood stage. This flooding was rated as major for the area and caused significant damage to individual properties.

The Lincoln Creek area was highlighted for mitigation activity as it had experienced over 4,000 separate flood events from 1960 to 1997. In response to the damages received during the June 21, 1997 storm event and the past history of the area, Wisconsin Emergency Management in collaboration with the City of Milwaukee, moved forward with an application for Federal disaster aid for hazard mitigation assistance. Once approved, the funds were directed to acquisition projects in the Lincoln Creek area. The City of Milwaukee's Lincoln Creek acquisition project (project #1180.0006) proposed to purchase 19 properties. A second project (#1236.004), proposed to purchase two properties in the Lincoln Creek area that had flood damage histories.

Figure 3.3.1 shows the location of the acquisition properties in the Lincoln Creek neighborhood and the USGS Gauge #04087000. The list of these properties and addresses is provided in Table 3.3.1.

Figure 3.3.1 Acquisition Properties in Floodplain

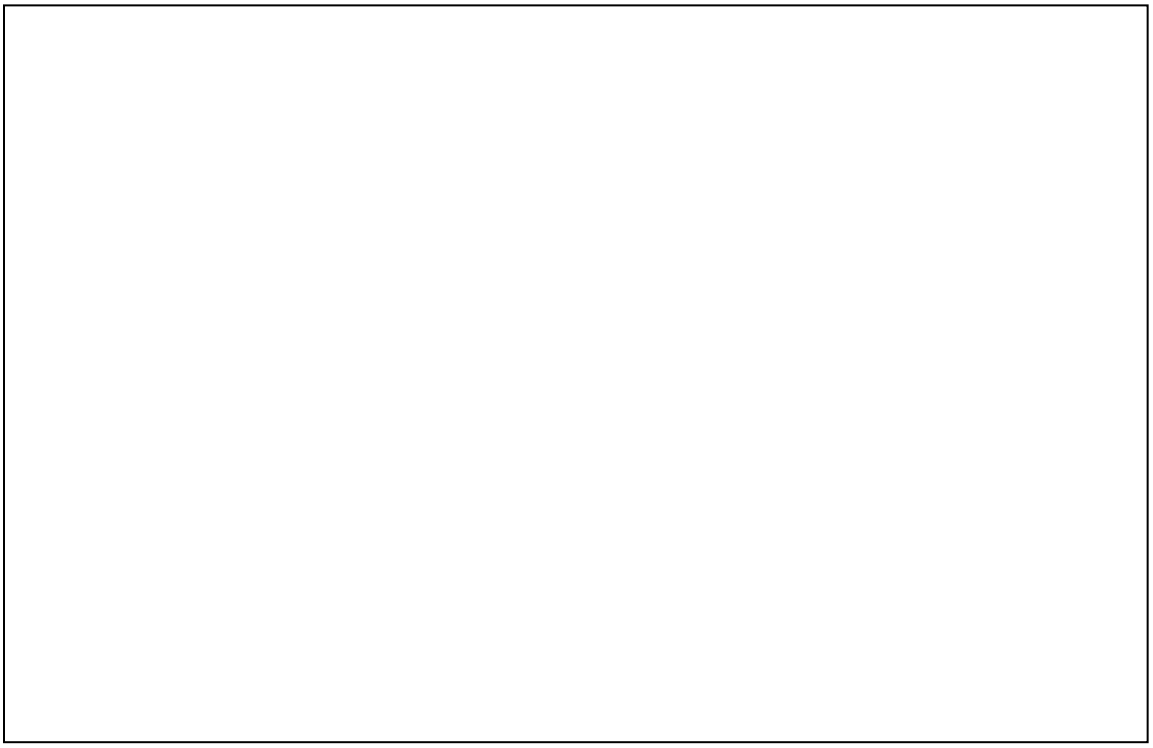


Table 3.31 Proposed Acquisition Properties and Values			
Address	Building Value*	Contents Value*	Total Value*
4608 WCongress St.	$ 49,63	$ 24,816	$ 74,44
4755 N 49th St.	$ 61,38	$ 30,69	$ 92,08
4438 N 45th St.	$ 57,469	$ 28,73	$ 86,204
4028 W Congress St.	$ 60,08	$ 30,04	$ 90,122
6605 N 51st St.	$ 79,673	$ 39,83	$ 119,510
4643 N 44th St.	$ 66,61	$ 29,38	$ 96,000
4444 N 44th St.	$ 58,77	$ 29,38	$ 88,163
4223 W Beethoven Place	$ 53,551	$ 26,77	$ 80,32
6410 N 51st St.	$ 82,28	$ 41,14	$ 123,42
4624 WCongress St.	$ 58,77	$ 29,38	$ 88,163
4642 N 44th St.	$ 54,857	$ 27,42	$ 82,28
4717 N 44th St.	$ 62,51	$ 31,257	$ 93,772
4630 W Congress St.	$ 53,551	$ 26,77	$ 80,32
5220 N 46th St.	$ 52,24	$ 26,122	$ 78,367
4212 W Beethoven Place	$ 74,44	$ 37,224	$ 111,673
4536 N 42nd St.	$ 75,755	$ 37,87	$ 113,63
4248 W Glendale Ave	$ 57,469	$ 28,73	$ 86,204
4715 N 45th St.	$ 58,77	$ 29,38	$ 88,163
5674 S 20th St.	$208,9	$104,4	$ 313,469

*Source: WEM Property Information Sheets; all values have been adjusted for inflation.

In addition to the acquisition project initiated by the City of Milwaukee, the Milwaukee Metropolitan Sewerage District (MMSD) began a flood management project along Lincoln Creek in the fall of 1997. The project was completed in 2002, and involved two large detention basins, one in Havenwoods State Forest and the other north of Green Tree Road. Channel modifications including widening, deepening, and re-engineering (returning to a more natural state – creating meanders, natural rock lining) were also completed. The completed mitigation project offers some protection from a one percent flood (100 year) event. However, it is noted that larger events may continue to cause damage.

Estimated losses for a modeled 100 year flood event are shown in Table 3.3.2. Table 3.3.3 shows the Return on Investment (ROI) for the acquisition project based on flood elevations prior to MMSD mitigation project.

Table 3.32 Losses Avoided - HAZUS-MH MR4 Modeled 100 Year Flood Event

Date of Acquisition	Address	Building Value	Contents Value	Building Damage % HAZUS	Contents Damage % HAZUS	Building Damage	Contents Damage	Project Investment	Total Losses Avoided
17-Jun-99	4608 W Congress St.	$ 49,633	$ 24,816	17%	16%	$ 8,438	$ 3,971	$ 55,678	$ 12,408
18-Jun-99	4755 N 49th St.	$ 61,388	$ 30,694	17%	16%	$ 10,436	$ 4,911	$ 64,678	$ 15,347
22-Jun-99	4438 N 45th St.	$ 57,470	$ 28,735	19%	16%	$ 10,919	$ 4,598	$ 61,678	$ 15,517
22-Jun-99	4028 W Congress St.	$ 60,082	$ 30,041	17%	16%	$ 10,214	$ 4,807	$ 60,078	$ 15,020
28-Jun-99	6605 N51st St.	$ 79,673	$ 39,837	0%	0%	$ -	$ -	$ 74,868	$ -
28-Jun-99	4643 N 44th St.	$ 66,612	$ 29,388	19%	16%	$ 12,656	$ 4,702	$ 68,678	$ 17,358
29-Jun-99	4444 N 44th St.	$ 58,775	$ 29,388	19%	16%	$ 11,167	$ 4,702	$ 62,678	$ 15,869
15-Jul-99	4223 W Beethoven Place	$ 53,551	$ 26,776	17%	16%	$ 9,104	$ 4,284	$ 58,678	$ 13,388
15-Jul-99	6410 N 51st St.	$ 82,286	$ 41,143	0%	0%	$ -	$ -	$ 31,442	$ -
15-Jul-99	4624 W Congress St.	$ 58,775	$ 29,388	17%	16%	$ 9,992	$ 4,702	$ 62,678	$ 14,694
22-Jul-99	4642 N 44th St.	$ 54,857	$ 27,429	17%	16%	$ 9,326	$ 4,389	$ 59,678	$ 13,714
28-Jul-99	4717 N 44th St.	$ 62,515	$ 31,257	19%	16%	$ 11,878	$ 5,001	$ 65,541	$ 16,879
28-Jul-99	4630 WCongress St.	$ 53,551	$ 26,776	17%	16%	$ 9,104	$ 4,284	$ 39,207	$ 13,388
03-Aug-99	5220 N 46th St.	$ 52,245	$ 26,122	0%	0%	$ -	$ -	$ 56,793	$ -
09-Aug-99	4212 W Beethoven Place	$ 74,449	$ 37,224	19%	16%	$ 14,145	$ 5,956	$ 74,678	$ 20,101
20-Aug-99	4536 N 42nd St.	$ 75,755	$ 37,878	19%	16%	$ 14,393	$ 6,060	$ 75,678	$ 20,454
09-Nov-99	4248 WGlendale Ave	$ 57,469	$ 28,735	19%	16%	$ 10,919	$ 4,598	$ 61,678	$ 15,517
20-Jan-00	4715 N 45th St.	$ 58,775	$ 29,388	17%	16%	$ 9,992	$ 4,702	$ 54,541	$ 14,694
25-Jan-02	5674 S 20th St.	$208,980	$104,490	0%	0%	$ -	$ -	$177,678	$ -

Sources: WEM Property Information Sheets and FEMA HAZUS-MH-MR4 (All values have been adjusted for inflation.)

Table 3.33 Return on Investment Calculations (Calculations Based on Flood Elevation Prior to MMSD* Mitigation Project)				
Address	Date of Acquisition	Project Investment	Total Losses Avoided	ROI
4608 W Congress St.	17-Jun-99	$ 55,673	$ 12,408	22%
4755 N 49th St.	18-Jun-99	$ 64,673	$ 15,347	24%
4438 N 45th St.	22-Jun-99	$ 61,673	$ 15,517	25%
4028 W Congress St.	22-Jun-99	$ 60,073	$ 15,020	25%
6605 N 51st St.	28-Jun-99	$ 74,866	$ -	0%
4643 N 44th St.	28-Jun-99	$ 68,673	$ 17,358	25%
4444 N 44th St.	29-Jun-99	$ 62,673	$ 15,869	25%
4223 W Beethoven Place	15-Jul-99	$ 58,673	$ 13,388	23%
6410 N 51st St.	15-Jul-99	$ 31,442	$ -	0%
4624 W Congress St.	15-Jul-99	$ 62,673	$ 14,694	23%
4642 N 44th St.	22-Jul-99	$ 59,673	$ 13,714	23%
4717 N 44th St.	28-Jul-99	$ 65,541	$ 16,879	26%
4630 W Congress St.	28-Jul-99	$ 39,207	$ 13,388	34%
5220 N 46th St.	03-Aug-99	$ 56,793	$ -	0%
4212 W Beethoven Place	09-Aug-99	$ 74,673	$ 20,101	27%
4536 N 42nd St.	20-Aug-99	$ 75,673	$ 20,454	27%
4248 W Glendale Ave	09-Nov-99	$ 61,673	$ 15,517	25%
4715 N 45th St.	20-Jan-00	$ 54,541	$ 14,694	27%
5674 S 20th St.	25-Jan-02	$177,673	$ -	0%
TOTALS:		$925,823	$234,348	25%

Sources: WEM Property Information Sheets and FEMA HAZUS-MH-MR4 (All values have been adjusted for inflation.)

*MMSD - Milwaukee Metropolitan Sewerage District

Return on investment was calculated using the following formula:

Return on Investment (ROI)

$$\frac{\$\ 234{,}348\ \text{LA (Loss Avoided)}}{\$\ 925{,}823\ \text{PI (Project Investment or Acquisition Cost)}} \times 100 = 25\%\ \text{(ROI)}$$

Again, the HAZUS model assumes damage to most properties in the 100-year flood event. The ROI for these properties from this one-time event is 25%. Multiple events will only continue to increase the return on investment for these properties.

After the completion of the MMSD project in the Lincoln Creek area, the floodplains were re-evaluated, resulting in much of the Lincoln Creek community being removed from the flood plain. While this did affect several of the houses in the Lincoln Creek acquisition project, four of the properties would have remained in a potential hazard area. Table 3.3.4 lists those properties and corresponding damages from a modeled 100-year flood event utilizing the revised flood plain data. Figure 3.3.2 shows the location of these properties as well as the updated floodplain. Table 3.3.5 represents the ROI for these properties bases on values established.

Figure 3.3.2 Locations of Acquisition Properties – Updated Floodplain

Table 3.3.4 Losses Avoided - HAZUS-MH MR4 Modeled 100 Year Flood Event
(After MMSD * Mitigation Project Completion)

Date of Acquisition	Address	Building Value	Contents Value	Building Damage % HAZUS	Contents Damage % HAZUS	Building Damage	Contents Damage	Project Investment	Total Losses Avoided
22-Jun-99	4438 N 45th St.	$57,469	$28,735	23.37%	21.32%	$ 13,431	$ 6,126	$61,678	$ 19,557
18-Jun-99	4755 N 49th St.	$61,387	$30,694	22.26%	20.31%	$ 13,665	$ 6,234	$64,678	$ 19,899
28-Jun-99	4643 N 44th St.	$66,612	$29,388	21.41%	18.57%	$ 14,262	$ 5,457	$68,678	$ 19,719
22-Jul-99	4642 N 44th St.	$54,857	$27,429	22.02%	20.26%	$ 12,080	$ 5,557	$59,678	$ 17,637

Sources: WEM Property Information Sheets, FEMA HAZUS-MH-MR4 (All values have been adjusted for inflation)
*MMSD - Milwaukee Metropolitan Sewerage District

Table 3.35 Loss Estimation and Return on Investment Calculations
(Based on Flood Elevation After MMSD* Mitigation Project)

Address	Date of Acquisition	Project Investment	Total Losses Avoided	ROI
4438 N 45th St.	22-Jun-99	$61,678	$ 19,557	31.71%
4755 N 49th St.	18-Jun-99	$64,678	$ 19,899	30.77%
4643 N 44th St.	28-Jun-99	$68,678	$ 19,719	28.71%
4642 N 44th St.	22-Jul-99	$59,678	$ 17,637	29.55%

Sources: WEM Property Information Sheets, FEMA HAZUS-MH-MR4
(All values have been adjusted for inflation)
*MMSD - Milwaukee Metropolitan Sewerage District

3.4 Project #3: Milwaukee, WI – (2nd Lincoln Creek Project)

Table 3.4.1, contains the addresses of the acquisition project properties and the building and contents values used for the project analysis. The values were taken from the property information worksheets provided by Wisconsin Emergency Management and the City of Milwaukee and have been adjusted for inflation.

Figure 3.4.1 shows the location of acquisition properties in the Lincoln Creek area as well as the floodplain for the area. The floodplain used for this analysis is the pre 2008 floodplain.

Table 3.4.1 Acquisition Properties – Addresses and Values

Property Address	Building Value	Content Value	Total Value
4924 W Hampton Ave	$ 76,178	$ 38,089	$ 114,268
4748 N 46th Street	$ 50,376	$ 25,188	$ 75,564

Source: WEM Property Information Sheets – all values adjusted for inflation.

Figure 3.4.1 Acquisition Properties Location in Floodplain

Table 3.4.2 represents potential losses avoided for a 100 year flood event modeled using HAZUS-MH MR4.

Table 3.4.2 Loss Estimation – HAZUS-MH MR4 Modeled 100 Year Flood Event

Property Address	Acquisition Date	Building Value	HAZUS Damage %	Content Value	HAZUS Damage %	Building Damage	Contents Damage	Total Losses Avoided
4924 W Hampton Ave	4/12/2001	$ 76,178.43	17.00%	$ 38,089	16.00%	$ 12,950	$ 6,094	$ 19,045
4748 N 46th Street	4/12/2001	$ 50,376.06	17.00%	$ 25,188	16.00%	$ 8,564	$ 4,030	$ 12,594

Sources: WEM Property Information Sheets, FEMA HAZUS-MH-MR4 (All values have been adjusted for inflation)

Table 3.4.3 represents potential return on investment (ROI) based on the damage estimates calculated in HAZUS for a 100-year flood event.

Table 3.4.3 Return on Investment Calculations				
Property Address	Acquisition Date	Total Losses Avoided	Project Investment	ROI
4924 W Hampton Ave	4/12/2001	$ 19,045	$ 54,480	35%
4748 N 46th Street	4/12/2001	$ 12,594	$ 36,244	35%
TOTAL:		$ 31,642	$ 90,724	35%

Source: WEM Property Information Sheets; all values have been adjusted for inflation

Return on investment was calculated using the following formula:

Return on Investment (ROI)

$ 31,642 LA (Loss Avoided)
---------- X 100 = 35% (ROI)
$ 90,724 PI (Project Investment or Acquisition Cost)

In analyzing the mitigation efforts accomplished in the Lincoln Creek neighborhood, several conclusions can be drawn. As the modeled results from the HAZUS analysis indicate there is a consistent return on investment for the properties involved in the Lincoln Creek acquisition project, with most properties producing over a 20% return per event. There have been 4 events since the completion of the acquisition project that were at or near flood stage; based on estimated losses several of the acquisition properties would have already paid for themselves amounting to a 100% return on investment.

Uniquely, in the Lincoln Creek area, two separate mitigation projects were accomplished independently of each other. In the second project, over 35% ROI was estimated for one event. The resulting outcome illustrates the opportunities that exist for mitigation and the successes that can be realized when those opportunities are pursued. Once again mitigation should be viewed in the context of when the next event happens not if. In this context there is no question that there will be significant losses avoided as a result of well thought out acquisition projects efficiently executed.

3.5 Project #4: Village of Oak Creek (Oak Creek)

Keeping with the strategy developed and approved by the Wisconsin Interagency Disaster Recovery Group (IDRG), and in conjunction with Wisconsin Emergency Management and the Village of Oak Creek, an application was submitted to fund an acquisition project in the community of Oak Creek, WI. The proposed acquisition project involved one property that had a history of flood damages over a number of years and was identified by FEMA as a repetitive loss property under the NFIP.

The application process cites flood damages in 1996, 1998, 1999, and twice in 2000. It is known that the property had flooded prior to 1996 but documentation is not available. After the flooding in May and July of 2000, it was determined the property was not habitable. The application and accompanying communication from Wisconsin Emergency Management further indicated that without acquisition, the property would continue to incur damages with flood insurance claims paid. Funds were obligated from FEMA 1180-DR-WI were made available to accomplish the proposed acquisition.

Table 3.5.1 lists the property involved in the acquisition and the building and content value.

Table 3.5.1 Acquisition Properties – Addresses and Values

Property Address	Building Value	Content Value	Total Value
11040 S. Nicholson Rd	$ 145,147	$72,574	$217,721

Source: WEM Property information sheet; all values have been adjusted for inflation

Figure 35.1 shows the location of the acquisition property and the floodplain in the area along the Root River, in Oak Creek, WI.

Figure 3.5.1 Acquisition Property Location and Floodplain

A HAZUS-MH MR4 flood model analysis was completed to determine estimated damages for a 100 year flood event. Table 3.5.2 shows the results of this analysis. Using the estimated damages from this analysis, the Return on Investment (ROI) was calculated. Table 3.5.3 shows these results.

Table 3.5.2 Loss Estimation – HAZUS-MH MR4 Modeled 100 Year Flood Event

Property Address	Acquisition Date	Building Value	HAZUS Building Damage %	Content Value	HAZUS Contents Damage %	Building Damage	Contents Damage	Project Investment	Total Losses Avoided
11040 S. Nicholson Rd	2/11/2002	$145,147	28.83%	$72,574	36.83%	$41,846	$26,729	$112,183	$68,575

Sources: WEM Property Information Sheets, FEMA HAZUS-MH-MR4 (All values have been adjusted for inflation)

Table 3.5.3 Loss Estimation and Return on Investment Calculations

Address	Date of Acquisition	Project Investment	Total Losses Avoided	ROI
11040 S. Nicholson Rd	2/11/2002	$112,183	$68,575	61.13%

Sources: WEM Property Information Sheets, FEMA HAZUS-MH-MR4
All values have been adjusted for inflation)

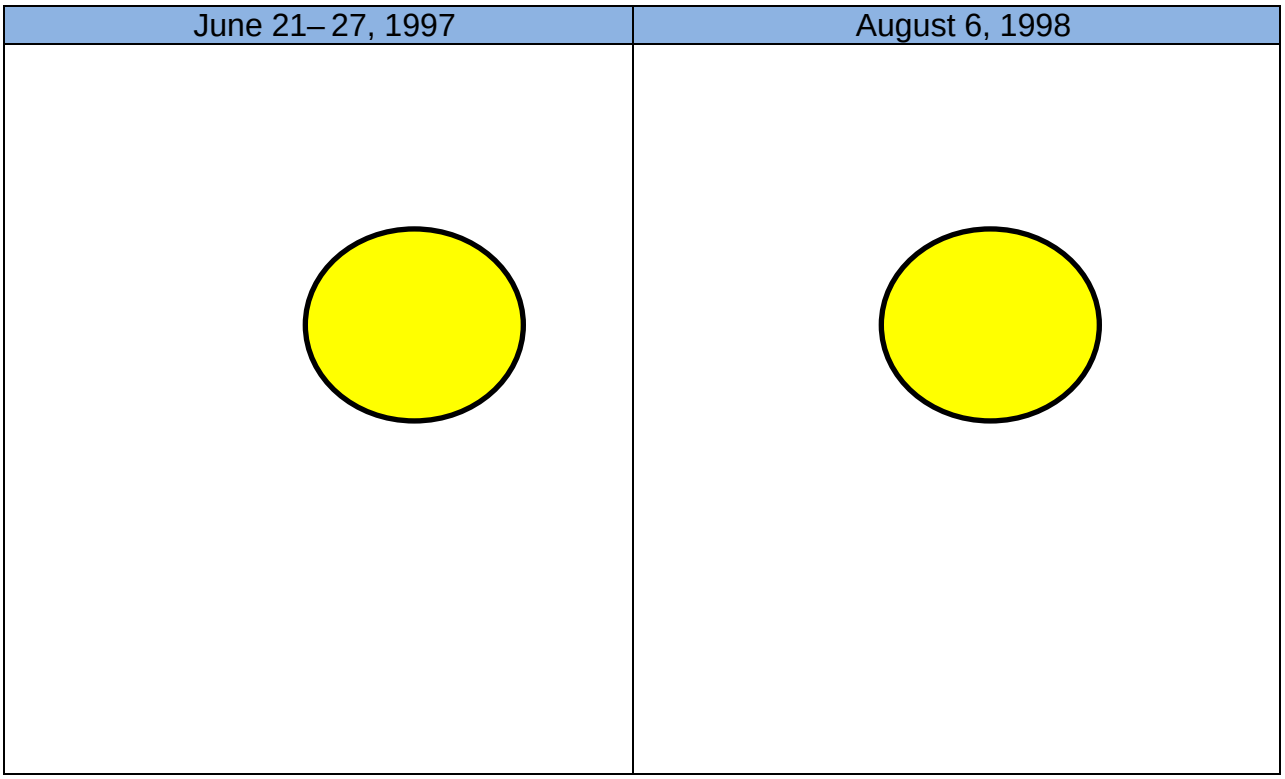
Reviewing National Climatic Data Center (NCDC) data, it appears likely that the property would have flooded as many as three times since the acquisition was initiated. Specifically, it is noted for the February 2001 flood event, the Root River was above flood stage in excess of three days. This caused flooding in many homes along the river in both Racine and Milwaukee Counties. In view of these subsequent flooding events and the amount of losses avoided for such events, it is evident that the acquisition project has been cost effective.

3.6 Project #5: Village of Brown Deer (South Branch)

In the summers of 1997 and 1998 the community of Brown Deer in the northeastern section of Milwaukee County experienced two rainfall events described as "in excess of 100-year rainfall." During the June 21, 1997 event it was reported to the National Climatic Data Center (NCDC) that at one point, Brown Deer and Green Bay roads were under water with fish swimming on the road. Churchill Lane is less than a mile south of Brown Deer road and experienced extreme high water in the area of South Branch, flooding several homes in the area. The same area received significant damage again on August 6 1998 with the Churchill Lane area flooding similar to the 1997 event. Both weather events and subsequent flooding resulted in Presidential Disaster Declarations for the community and as a result, potential HMGP funding.

Rainfall frequency maps for Milwaukee County are presented in Figure 3.6.1, with the approximate location of the acquisition properties in the community of Brown Deer highlighted.

Figure 3.6.1 Rainfall Frequency Maps
Location of Acquisition Properties in Brown Deer
And Measured Rainfall Amounts for June 21-27, 1997 and August 6, 1998



Source: Southeastern Wisconsin Regional Planning Commission (SEWRPC)

Table 3.6.1 contains the addresses of the acquisition project properties and the building and contents values used for the project analysis. The values were taken from the property