Loss Avoidance Study

Sonoma County, California Elevated Structures

April 2008

FEMA

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

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Development of this document was aided by

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Contract No. HSFEHQ-06-D-0162
Task Order HSFEHQ-06-J-0063

Acknowledgements

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Sonoma County Community Development Commission:

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Acknowledgements

Flood disasters have impacted and continue to impact many regions of the United States at a significant frequency and often with devastating results to the built environment. As the nation's population continues to grow and migrate to flood-prone regions, flood related losses continue to escalate. In response, mitigation actions to reduce or eliminate long-term risk to life, property, and infrastructure posed by flooding are being taken in communities around the country.

In Sonoma County, millions of dollars have been invested in flood mitigation projects in an effort to reduce the county's risk to flood hazards. Following the 1995 flood event, Sonoma County established the Sonoma County Flood Elevation Program to assist homeowners with mitigation for flood damaged homes. To date the program has received more than $10.6 million from various sources to fund the program. The structures analyzed in this study were funded as a result of presidential disaster declarations between 1995 and 1997. Various post-construction flooding events provided an opportunity for the structures to be evaluated and assess the effectiveness of the elevation.

Several individuals made up the Loss Avoidance Team for this study. Rebecca Wagoner and David Kennard envisioned the need for this study following the 2006 disaster declarations in Northern California. L. Gina White led the effort to define the scope of the study, collect data, guide the analysis, and develop the report. Daniel Powell and Robert Patten provided technical expertise and were instrumental in collecting data for the analysis. Robert Patten also provided GIS, graphics design and technical writing support throughout the process. Shabbar Saifee provided technical support and review of the analysis. URS participated in data collection, completed the analysis and aided report development.

FEMA Region IX would like to take this opportunity to thank the State of California for their support throughout the study. Special thanks is extended to the staff of the Sonoma County Community Development Commission who spent many hours assisting the Loss Avoidance Team in data collection and whose participation in the study was tireless.

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Executive Summary

Each year federal, state, and local agencies, as well as private entities contribute funds towards mitigation in order to reduce the risk posed to people, the built environment, and the economy by hazards. In California alone, various entities have invested more than $1.4 billion dollars in reducing or eliminating the long-term risk to hazards through mitigation activities.

The Federal Emergency Management Agency (FEMA) awards mitigation grants, through various programs, on the basis of whether proposed projects are cost-effective. Tools that have been used by FEMA in the past for determining the effectiveness of a project are based on the analysis of a probabilistic hazard event, completed prior to project funding and prior to project construction. With such significant investment in mitigation being made, policy makers have taken great interest in the effectiveness of mitigation during actual hazard events. In response, FEMA developed methodology using a quantitative approach to assess the performance of mitigation projects based on actual post-construction hazard events.

FEMA partnered with the State of California and used this quantitative approach to complete the two loss avoidance studies in Northern California. By conducting this type of study, FEMA can identify the benefits of the mitigation projects in terms of economic performance using actual storm events. The results demonstrate the effectiveness of the projects and can be used to promote the value of investing in mitigation measures.

These two independent studies are described below:

- ***Loss Avoidance Study: Northern California Flood Control Mitigation***
  Referred to as the Northern California flood control study, this study provides analysis of flood control mitigation projects designed to reduce the losses from flooding by altering the flood hazard through structural measures.
- ***Loss Avoidance Study: Sonoma County, California Elevated Structures***
  Referred to as the Sonoma County elevation study, this study provides analysis of structures that were elevated above flood levels. By definition, an elevated structure is a building that has no basement and has its lowest elevated floor raised above the ground level by foundation walls, shear walls, posts, piers, pilings, or columns.

This report provides detailed documentation of the methodology implemented during the Sonoma County elevation study and can be used as guidance for the preparation of future loss avoidance studies specific to elevation projects. Additionally, it describes

considerations and recommended practices that were identified during the completion of the study. The appendices to this report describe the specific application of the methodology to the 205 structures initially selected for analysis.

While the results of the Sonoma County elevation study demonstrate the nominal effectiveness of the selected elevations for the flood events analyzed, a comparison of the results with the original elevation construction costs demonstrates the return on investment. For the projects assessed in the Sonoma County elevation study, the aggregate construction cost was $14.1 million[ES.1] and aggregated losses avoided were $13.5 million. This equated to a 96% return on investment.

[ES.1] All figures in this document are adjusted and reported in 2007 dollars.

Section One:
Introduction

Following the 2006 winter floods in Northern California, FEMA conducted a loss avoidance study to assess the effectiveness of elevation projects in the impacted areas.

This report focuses on the elevation of structures along the Russian River and its tributaries in Sonoma County, California. These elevated structures were analyzed to determine the return on investment (ROI) by comparing losses avoided as a result of the elevations to the money invested in the mitigation projects. The structures evaluated within Sonoma County are shown in Figure 1.1.

1.1 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, through several nationwide programs, including the Hazard Mitigation Grant Program (HMGP), 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) FEMA provides states and communities with substantial financial assistance for projects to reduce or eliminate risks from natural hazards. In California alone, multiple entities have contributed more than $1.4 billion for reducing or eliminating long-term risks through mitigation activities.

To evaluate the effectiveness of mitigation projects, FEMA developed a loss avoidance methodology, which is based on the analysis of actual events. By utilizing this methodology, a project sponsor can quantitatively assess the benefits of a completed project in terms of its performance during an actual flood event. From the analysis results, the ROI realized from the mitigation project can be estimated. Such results demonstrate the effectiveness of the project and can be used to promote the value of investing in future mitigation measures.

Prior to this study, FEMA partnered with the State of California to conduct a loss avoidance study in Southern California which analyzed the performance of various flood control mitigation projects. The methodology used to carry out that study and its results can be found in the report titled *Loss Avoidance Study: Southern California Flood Control Mitigation — Part Two: Detailed Methodology* (FEMA, 2007). The study examined the performance of seven flood control projects during actual events that occurred after the projects were completed. The report indicated that the aggregate construction costs were $19.6

Southern California Study
The total losses avoided for the projects analyzed were $7.3 million which yielded an average return on investment of 37%.

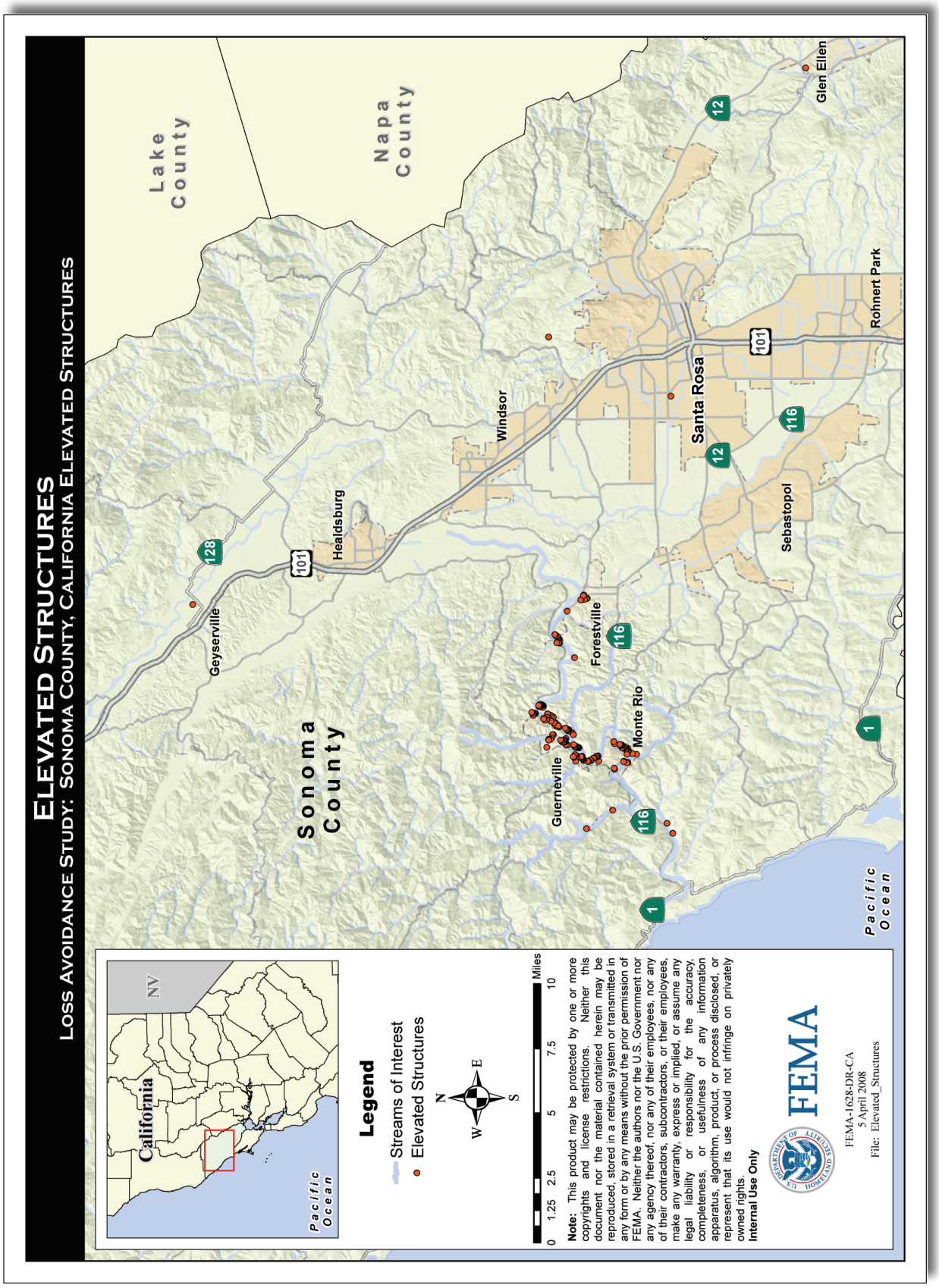
Elevated Structures
Loss Avoidance Study: Sonoma County, California Elevated Structures
Lake County
Napa County
Sonoma County
Geyserville
Healdsburg
Windsor
Santa Rosa
Sebastopol
Rohnert Park
Glen Ellen
Guerneville
Forestville
Monte Rio
Pacific Ocean
128
101
116
12
1
California
NV
Legend
Streams of Interest
Elevated Structures
N
E
S
W
0 1.25 2.5 5 7.5 10 Miles
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Figure 1.1

million and aggregated losses avoided were $7.3 million, which was equivalent to a 37% return on the project investment during the period analyzed.

The methodology used to execute the Northern California flood control study employed the same concepts developed for the Southern California study. While the general principles guiding the study of flood control mitigation projects are similar to those used to conduct a study of elevation projects, the specific methodologies are somewhat different. This is because the intention of a flood control mitigation project is to alter the flood hazard while an elevation project alters the exposure of the structure to the hazard. Because a loss avoidance study of elevation structures requires an alternate methodology, this document provides general guidance on that methodology. It also provides details on the specific methodology used in the Sonoma County elevation study and its results.

1.2 Purpose

The purpose of the Sonoma County elevation study is to verify the effectiveness of elevation projects and to document their economic performance. In doing so, this study endeavors to answer the question, "How much damage could have been caused by a storm event if the elevation had not been completed?" Further, the study provides comprehensive documentation of losses avoided (damages avoided or project benefits) utilizing quantitative methods. The methods incorporated in this study provide a reproducible and verifiable methodology, which make the study's results meaningful and defensible.

1.3 Loss Avoidance Methodology Overview

Verifiable tools used in loss avoidance analyses include Hazards U.S. – Multihazard (HAZUS-MH; FEMA, 2006a) and the FEMA Benefit-Cost Analysis (BCA) Modules (FEMA, 2006b). HAZUS-MH is primarily a planning tool that estimates damages in general terms (census block) for existing site conditions. On the other hand, the BCA Modules provide a more narrowed focus and require site-specific assumptions in order to determine the cost effectiveness of a project. Both HAZUS-MH and the BCA Modules are predictive tools that are used prior to project funding and construction and are based on theoretical flood scenarios. In contrast to the previously mentioned tools, loss avoidance studies quantify losses avoided for completed mitigation projects using actual post-construction storm events. Comparing those storm events in two different scenarios—Mitigation Project Absent (MP_A) and Mitigation Project Complete (MP_C)—provides a comprehensive and detailed methodology that can be used as a template for additional studies throughout the

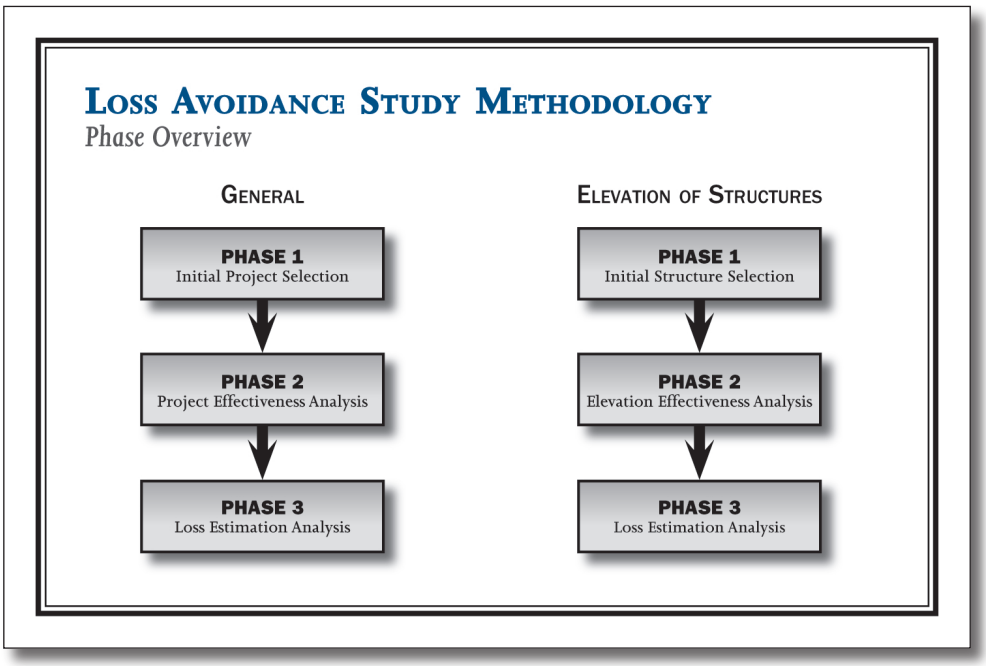
nation to show the effectiveness of mitigation programs and the importance of these programs in reducing damages.

Figure 1.2 illustrates the phases of the methodology for loss avoidance studies and in general the methodology used for analysis of elevated structures. While Phase 1 and Phase 3 would be the same, either generally speaking for any loss avoidance study or for the specific methodology related to an elevation project, Phase 2 is specific to the type of mitigation project performed. This report specifically focuses on the methodology utilized when assessing elevation projects. Figure 1.3 illustrates this methodology in more detail.

Phase 1 focuses on the selection of structures to be included in the study and the development of an initial list of those structures. First, structures are selected based on parameters established for the study, such as defined study area (Section 3.1). This initial selection of structures is then screened based on the availability of data required for completion of the study. The screening process determines which structures will be placed on the final structure list and advance to the analysis phases of the study (Section 3.2). For this study, FEMA initially identified 205 structures for evaluation. After the screening process, eight structures were eliminated from the study. Of the structures eliminated, five were eliminated because they were found to be outside of the study area, and three were eliminated due to data discrepancies.

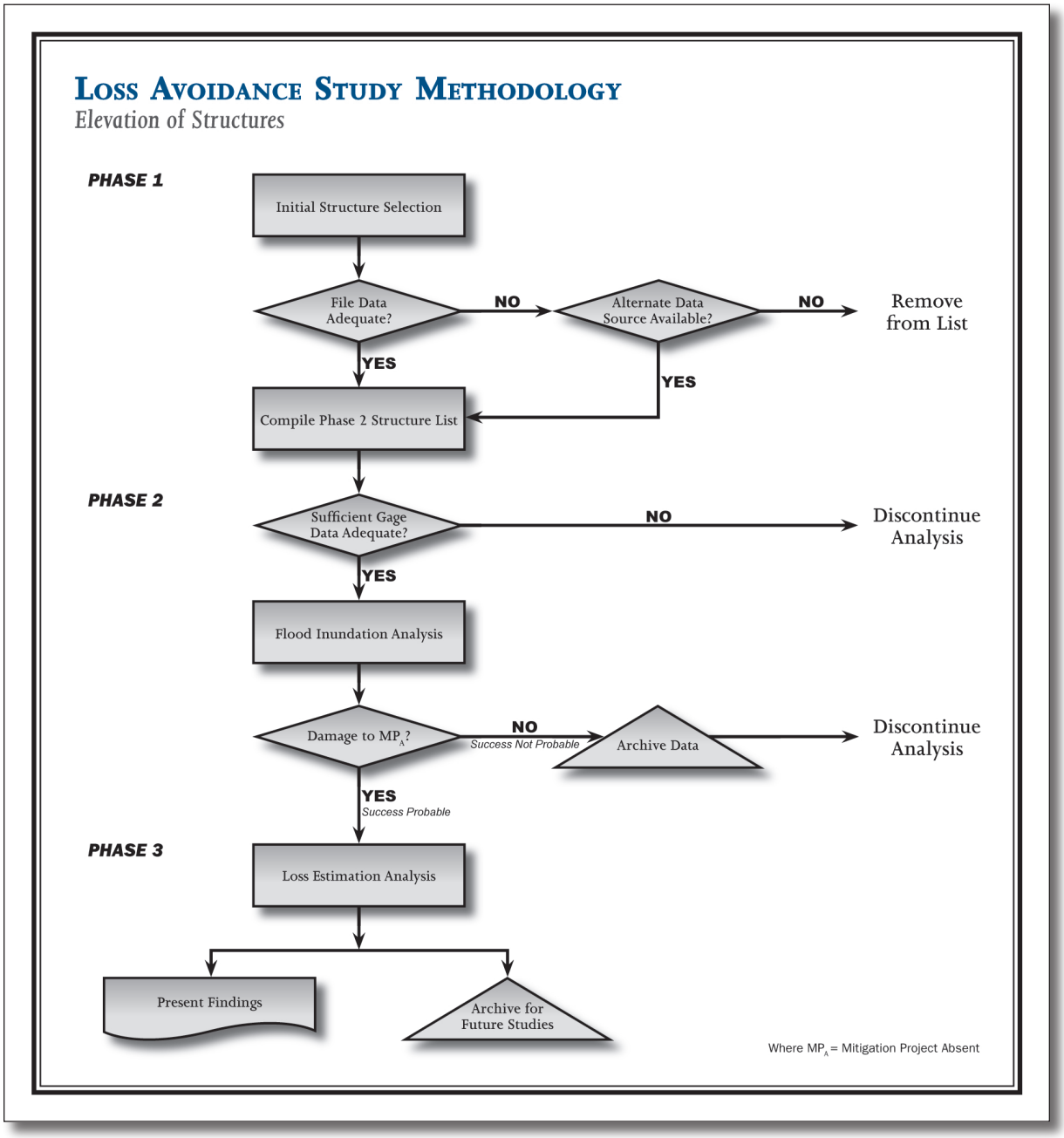
To fully analyze the elevation projects, a Storm Event Analysis and Flood Inundation Analysis are completed in Phase 2 of the

Figure 1.2



methodology. During these analyses, an estimate is made of the depth and extent of inundation from actual storm events that occurred since the structure was elevated. The first task for Phase 2 is to determine whether there are recorded precipitation/flow events of sufficient size to have caused damages if the structure had not been elevated. The scope of work for the study determines which events to include in the analysis. A study can be completed for a single flood event or based on the cumulative losses avoided for all storms that would have impacted the structure (Section 4.2.2). The second task is to determine the MP_A and MP_C flood depths at each structure for those events. In the Sonoma County

Figure 1.3



elevation study, five peak events occurred that would have resulted in losses using the MP_A scenario. No losses were calculated for the MP_C scenario since all of the structures were elevated to or above the 100-year flood elevation. After the structures were elevated, no event occurred that equaled or exceeded the 100-year event.

Phase 3 of the methodology is the Loss Estimation Analysis, which includes two primary steps. First, an economic evaluation of each structure is completed for both the MP_A and MP_C scenarios, for each flood event analyzed. The difference between the total losses for the two scenarios is calculated and losses avoided are determined. Second, the ROI is assessed by comparing the losses avoided to the project investment.

Section Two:

Sonoma County Elevation Initiative

Following extensive flooding in 1995, Sonoma County established the Sonoma County Flood Elevation Program (SCFEP) to assist homeowners with mitigation for flood-damaged homes. The program is implemented by the Sonoma County Community Development Commission. The structures that were elevated as a result of this initiative provided the basis for the Sonoma County elevation study.

2.1 History

As the 1995 floods demonstrated, Sonoma County is highly vulnerable to disasters. In the past 15 years alone, Sonoma County has received six presidential disaster declarations for floods. Each year, floods also cause damage that is not significant enough for a disaster declaration, but nonetheless costs county residents, businesses, and taxpayers millions of dollars. In fact, the county has one of the highest concentrations of repetitively flood-damaged properties (known as repetitive loss properties) in the nation. As of 2004, FEMA had identified 800 repetitive loss properties in the unincorporated areas of the county, the largest number of repetitive loss properties in a single community west of the Rockies. The risks

Figure 2.1 Russian River Flood and Successful Elevated Structures

Source: FEMA Staff Photographer

posed by floods increase as the county's population continues to grow. Sonoma County recognizes the consequences of floods and the need to reduce the effects of this hazard.

In response to this need, the county established the SCFEP. Lists of houses eligible for the program were created after each flood. Assistance was provided for properties that met the following criteria:

1. The structure was a primary residence with year-round occupancy by owners or tenants,
2. The structure was impacted by the 1995 or 1997 floods, and
3. The structure needed to be elevated above the 100-year flood level.

Priority was given to those properties that experienced the highest level of floodwater, had the highest percentage of damage in relation to the value of the structure, and appeared on FEMA's National Flood Insurance Program's (NFIP) repetitive loss list.

2.2 Funding and Timeline

Since its inception the SCFEP has allocated more than $10.6 million for the elevation initiative.

Since its inception, the SCFEP has received $9,353,250 from FEMA through three separate HMGP grants. The HMGP grants, which were administered by the (California) Governor's Office of Emergency Services (OES), provided funding for 238 elevations in the county.

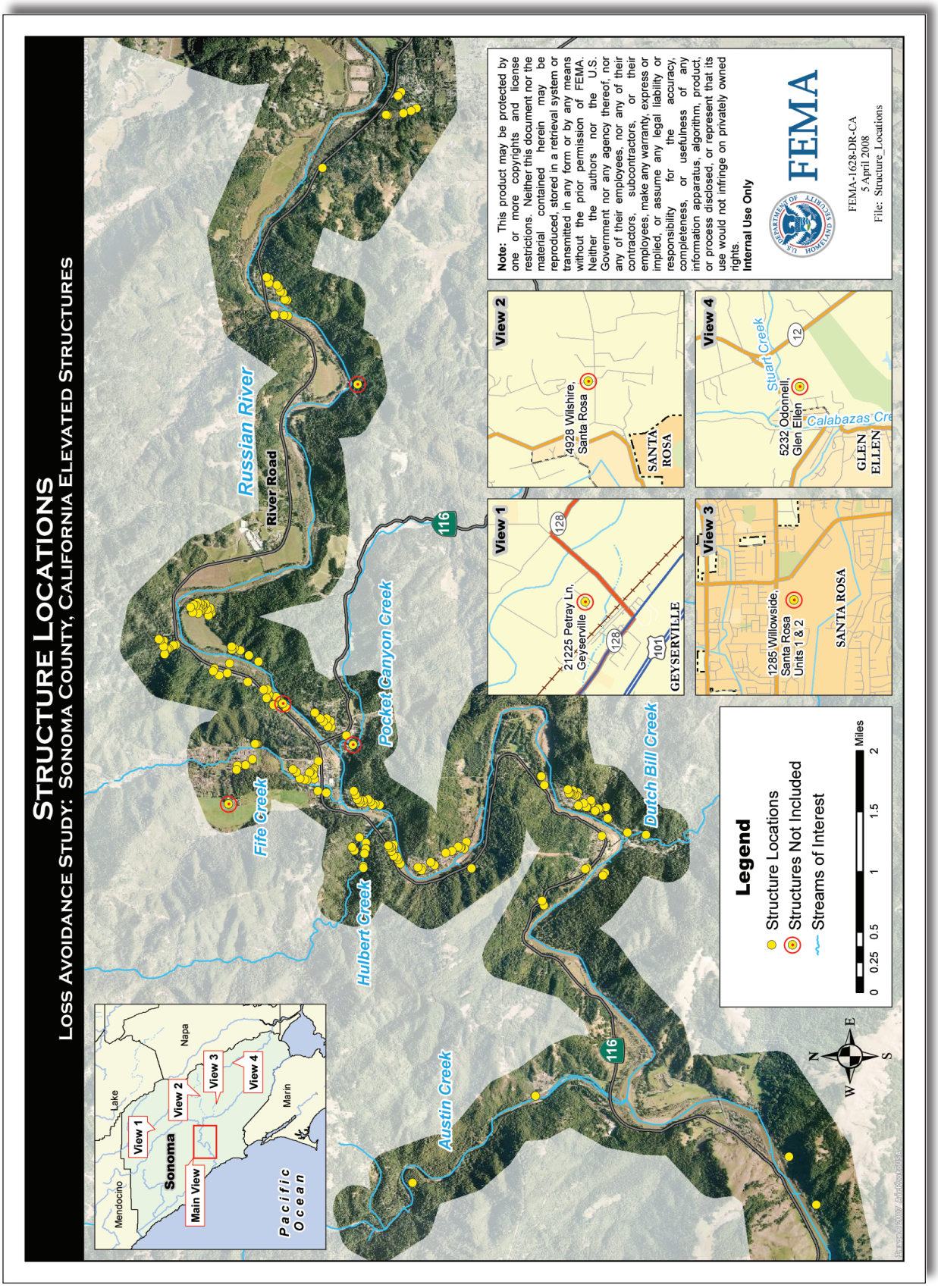
To support its local cost share match, the SCFEP has received over $729,997 in Community Development Block Grant funds and $547,804 in Disaster Recovery Initiative funds from the U.S. Department of Housing and Urban Development.

The first HMGP grant, for $3.45 million dollars in support of 90 elevations, was completed and submitted to OES for closeout in June 2001. The second grant funded $2.06 million for the elevation of 53 structures and was completed in March 2002. The third grant funded 95 elevations with $3.75 million dollars, of which 62 elevations have been completed. As of January 23, 2006, the county had completed 205 of the 238 funded elevations, all of which were initially included in the Sonoma County elevation study.

2.3 Location

Figure 2.2 indicates the locations of the 205 structures elevated by the SCFEP, and initially included in the Sonoma County elevation study. As shown, all but five of the structures are located along the Russian River and its tributaries. (Note that in View 3, two structures located in a Santa Rosa housing complex are assigned the same address).

Figure 2.2


Structure Locations
Loss Avoidance Study: Sonoma County, California Elevated Structures
Russian River
River Road
Fife Creek
Pocket Canyon Creek
Hulbert Creek
Austin Creek
Dutch Bill Creek
116
View 1
21225 Petray Ln, Geyserville
128
101
GEYSERVILLE
View 2
4928 Wilshire, Santa Rosa
SANTA ROSA
View 3
1285 Willowside, Santa Rosa Units 1 & 2
SANTA ROSA
View 4
5232 Odonnell, Glen Ellen
12
Stuart Creek
Calabazas Cre
GLEN ELLEN
Legend
Structure Locations
Structures Not Included
Streams of Interest
0 0.25 0.5 1 1.5 2 Miles
N
S
E
W
Mendocino
Lake
Napa
Sonoma
Marin
Main View
View 1
View 2
View 3
View 4
Pacific Ocean
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2.4 Typical Elevated Structure

Figures 2.3a – 2.3f provide an example of an elevated two-story structure with no basement with a perimeter foundation. The structure has 1800 square feet of living space and was elevated approximately 14 feet. Figure 2.3a depicts the structure in the MP_A scenario. Figures 2.3b, 2.3c and 2.3d show phases of the conventional supporting wall construction method used to elevate the structure. Figure 2.3e is a detail of the connection to the elevated foundation. Figure 2.3d shows the structure in the MP_C scenario. The construction was completed on March 12, 1999 for $57,664 ($73,060 in 2007 dollars). The total ROI calculated for the structure over the five events studied was 565% (Appendix B).

Figures 2.3a - 2.3f Elevation Phases Using Conventional Supporting Wall Construction

Figure 2.3a

Figure 2.3b

Figure 2.3c

Figure 2.3d

Figure 2.3e

Figure 2.3f

Source: HMGP Project File

Section Three:

Phase 1 – Initial Structure Selection

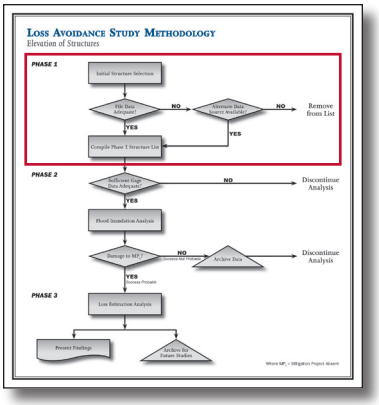


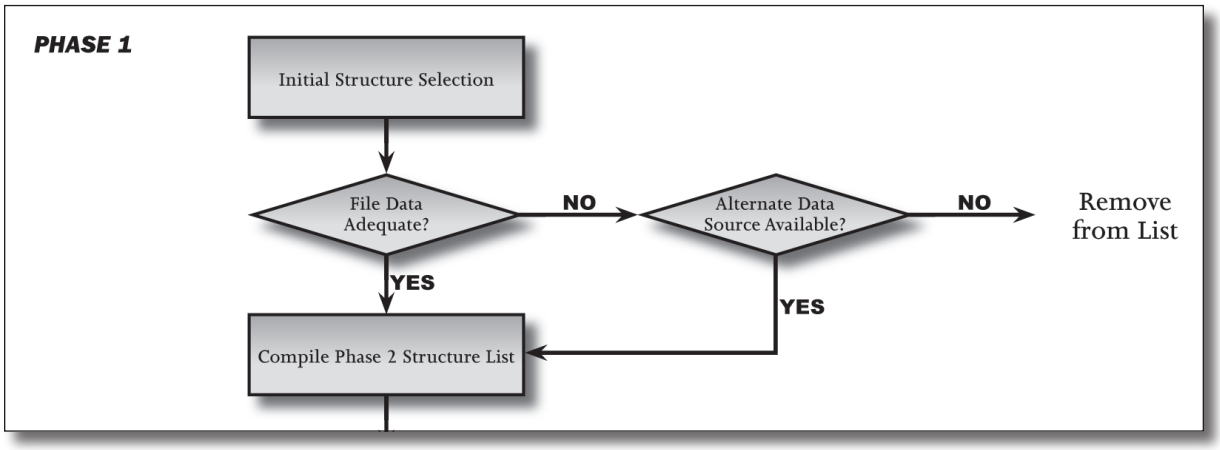
Figure 1.3 provides a detailed illustration of the three-phased methodology for analysis of elevated structures. This section identifies the process for conducting Phase 1, as reproduced in Figure 3.1.

As illustrated in Figure 3.1, two tasks are completed as part of Phase 1 in order to develop an initial structure list:

1. ***Compilation of a list of candidate structures that have been elevated*** and
2. ***Elimination of structures based on availability of data.***

Once the Phase 1 list of elevated structures has been completed, the performance of the selected structures during an actual flood event is evaluated in Phase 2.

Figure 3.1



3.1 Initial Structure Selection

The Initial Structure Selection is based on parameters established by the scope of work for the loss avoidance study. These parameters may include, but are not limited to, the area of interest and date of construction completion.

3.1.1 Area of Interest

The area of interest may vary greatly from study to study. For example, the area of interest could be a single structure, a community, a region within a state, or a watershed. Elevation projects could include a single structure; they more often include multiple structures.

Regardless of the number of structures in a project, the inclusion of each structure in the loss avoidance study is ultimately evaluated individually based on the availability of information for that

structure. All of the elevation projects included in this study are associated with the Russian River and its tributaries within Sonoma County.

3.1.2 Construction Completion Date Baseline

The construction completion date for an elevation has a significant impact on the decision to include a structure in a study, as it creates the necessary baseline for analysis. Structures with an older elevation construction completion date have a higher likelihood of being tested by a potentially damaging event than a structure with a more recent elevation construction completion date. Consequently, it is more likely that losses avoided can be assessed for structures with older elevation construction completion dates. A mitigation project, which may include the elevation of multiple structures, is not closed until after the elevation of each structure included in the project is complete. Therefore, it is important to note that the date of construction completion is the only important date for consideration in this phase of the study, not the project closeout date.

This study includes structures that were elevated in the Russian River Valley following two presidential disaster declarations in Northern California (FEMA-1044-DR-CA and FEMA-1155-DR-CA). The construction completion dates for the structures in the study range from April 17, 1998, to January 23, 2006. Since 1998, there have been five peak flood events that would have impacted structures in the MP_A scenario and were therefore included in the analysis. Of those events, the most recent peak flood event occurred on January 1, 2006. All but one of the structures, the one for which construction was completed on January 23, 2006, had a construction completion date prior to the last storm event analyzed. Since no storm occurred after January 23, 2006, that could have damaged that structure in the MP_A scenario, there were no losses avoided for that structure.

3.2 Structure Screening

The initial list of structures must be evaluated to identify those with the data necessary for the methodology to be applied. If specific data are not available for the structure, that structure should be removed from the list.

3.2.1 Project File Components

HMGP, FMA, and PDM program requirements and guidelines identify the data that must be included with project applications for approval; these data elements are similar to those required for completion of a loss avoidance study. Therefore, if the elevation project was funded through one of these grant programs, the

required data should be available in the project file.

The data required for a loss avoidance study include:

- Actual project costs;
- Construction completion dates for each elevation;
- First Floor Elevations (FFE) for the MP_A and MP_C scenarios in the form of FEMA elevation certificates;
- Structure location information in the form of latitude/longitude data, address, and/or assessor parcel number (APN); and
- Structure information, including the type, basement information, number of floors, square footage, and building replacement value (BRV)

Reviewing the project file data for accuracy is important. For example, the BRV may be outdated. Other data that are not required through the grant application process for elevation projects, but that may be included in the project files, includes hydrologic or hydraulic modeling and topographic information. If these data elements are needed for the study and are not available in the project files, it may be necessary to collect the data through other means, such as local officials, site visits, or resource documents.

3.2.2 Structure Location

For elevation projects, the location information for the structures found in the project files, including the address, APN or latitude and longitude, is used to map the structure locations. Ideally, the mapping is done in a geographic information system (GIS). Methods for establishing structure locations in GIS include:

- ***Geocoding*** – This is the process of using detailed street mapping and GIS technology to determine the approximate structure location from the structure's street address and/or latitude and longitude.
- ***Tax Parcel and GIS Mapping and Databases*** – GIS and database queries based on tax parcel APN and/or address, if available, can also be used to determine a structure's location. Unfortunately, digital parcel data is not available for all counties and may require a fee. Some communities may also have a specialized database with actual structure footprints or point locations.
- ***Aerial Photography*** – Aerial photography can be used in conjunction with geocoding or tax parcel mapping to locate the actual structure within a certain area or parcel boundary.
- ***GPS or Surveying*** – The most time-consuming method is to

conduct a site visit and use Global Positioning System (GPS) or surveying methods to establish the structure location.

3.2.3 Initial Site Visit and Additional Data Collection

An initial site visit should be completed in order to conduct a preliminary assessment of the structures, meet local and state officials, and initiate the more detailed data collection required for Phase 2 and 3, if all of the necessary data are not provided in the project files. The data collection effort depends upon the type of data being collected.

For example, state and local officials may be able to provide specific structure data, such as a current typical replacement value for structures in the area. Other sources for structure replacement costs include quotes from local contractors or cost-estimation guides. Other data, such as information about the structure's basement, can also be verified through a field visit.

If the data needed for each structure are not available from the project files, a site visit, or additional data sources, the structure should be eliminated from the analysis. Additionally, if there are discrepancies in the project data that cannot be resolved through site visits or additional data sources, the structure should be eliminated from the analysis.

A field visit is also a good source of information about the actual storm events that occurred since the structures were elevated. The community may have recorded high water marks, and local officials and residents may be able to provide eye witness accounts of the flood levels during those events. This information could prove to be very useful in the Storm Event Analysis (Section 4.1) and the Flood Inundation Analysis (Section 4.2). It provides guidance on which storm events should be included in the scope of work for the study and also the accuracy of the modeling of those storm events.

3.3 Sonoma County Elevation Study: Initial Structure Selection

Two hundred five structures were identified to be included in the Sonoma County elevation study, and data were collected for each structure. Information was collected from HMGP applications, field visits to the sites, meetings with local officials, and assessor's data. The data collected include the following information about each structure:

- Address,
- APN and parcel maps,
- Latitude/longitude,

- Original construction date,
- Structure type (exterior wall construction),
- Foundation type,
- Number of stories,
- Basement (finished versus unfinished, square footage),
- Living space (square footage),
- Garage (type and square footage),
- BRV at time of construction and for 2007 (The 2007 value was determined to be $172 per square foot, as described in Section 5.1.3.1.),
- Actual costs for elevation construction (which were then adjusted to reflect 2007 values),
- Actual elevation construction completion dates for each structure,
- FFEs for the MP_A and MP_C scenarios, and
- Flood hazard information (base flood elevation, flood zone, and flood levels that occurred during flood events prior to structure elevation).

The initial step in the study was to plot the location of each structure based on the latitude and longitude and parcel maps provided in GIS format, as well as 2005 aerial imagery. Based on the latitude and longitude provided, twelve of the structures were plotted outside the general project area. Using the parcel information, the latitude and longitude for seven of those structures were determined to be incorrect. Their corrected coordinates fell within the project area. As a result, these seven structures were included in the analyses.

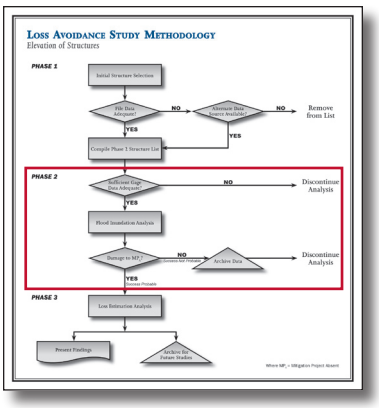
There were no data discrepancies for the other five structures. They were simply located outside the study area (Figure 2.2). Therefore, in accordance with the scope of work for the study, and in consideration of the lengthy analysis required to evaluate individual structures in remote locations, these five structures were eliminated from the analysis.

In addition, there was a discrepancy between the recorded pre- and post-project FFEs was discovered for three of the structures. Because of the length of time necessary to resolve the discrepancies, these three structures were also eliminated from the analysis.

There were sufficient data to analyze the remaining structures. Therefore, out of 205 structures, only eight were initially eliminated from the analysis during screening process.

Section Four:

Phase 2 – Elevation Effectiveness Analysis

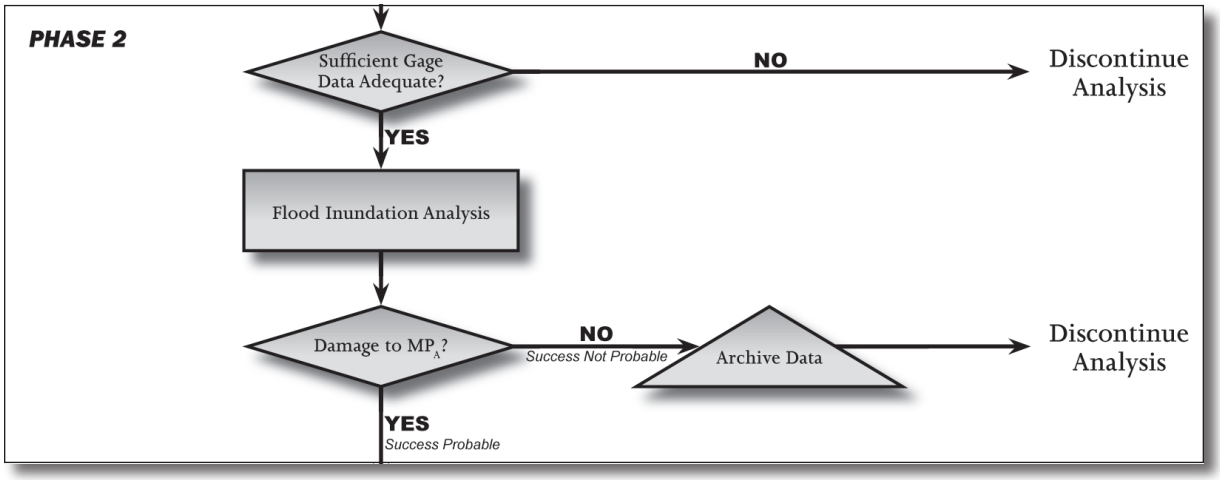


Section Four provides a description of the process for Phase 2, as illustrated in Figure 4.1. There are two major tasks in Phase 2 that must be completed when analyzing elevation projects.

1. ***Storm Event Analysis:***
   To identify potential storm events and assess data availability. This analysis determines the elevation of known MP_C flood events that could have been damaging in the MP_A scenario.

2. ***Flood Inundation Analysis:***
   To determine the depth of flooding that would have occurred at each structure in the MP_A scenario, and that likely occurred in the MP_C scenario.

Figure 4.1



Each of the steps within the tasks listed above is described in detail in the subsections that follow. Structures that were not eliminated during the Phase 1 screening process may be eliminated during any of these steps, either due to lack of data or because a storm of sufficient magnitude to cause damage did not occur after the structure was elevated.

4.1 Storm Event Analysis

The Storm Event Analysis is conducted to determine the storm event in the MP_C scenario that could have caused damage in the MP_A scenario. There are three types of gage data that can be used in the Storm Event Analysis: stream gage stage data, stream gage discharge data, or precipitation gage data. The method used for the analysis varies depending upon the type of gage data available.

4.1.1 Data Collection

Storm Event Analysis Data Sources

For loss avoidance studies, local, regional, state, and federal weather and conservation agencies are the primary source for data.

State and Federal Agencies That Operate Gage Networks Include:

- Local or regional agencies
- State departments of water resources
- National Weather Service (NWS), National Climatic Data Center (NCDC)
- U.S. Geological Survey (USGS)
- U.S. Army Corps of Engineers (USACE)
- U.S. Forest Service (USFS)

As previously stated, in order to estimate losses avoided and determine the benefits of an elevation project, the following question must be answered: "How much damage could have been caused by a storm event if the structure had not been elevated?" Therefore, a loss avoidance study is dependent upon the MP_C occurrence of a storm event significant enough to have produced MP_A damage. The date each structure was elevated must be known to determine the project completion date baseline (Section 3.1). These data may be obtained from the FEMA mitigation grant project files (Section 3.2), community officials, or their consultants.

The scope of work for the study determines whether loss avoidance calculations are conducted for a single storm event with the greatest rainfall or for all storm events that might have or did cause damages. For example, the study sponsor may be interested in only a single event; therefore, that event is used to model the MP_A scenario. In other cases, several events may be modeled for the MP_A scenario. For some structures, more than one storm event may have occurred since the structure was elevated that could have caused damages (or did cause damages) in the study area. A threshold analysis (see Section 4.2.2) aides in determining if a structure would have been damaged by more than one event, thereby having more significant losses avoided and potentially yielding a greater ROI.

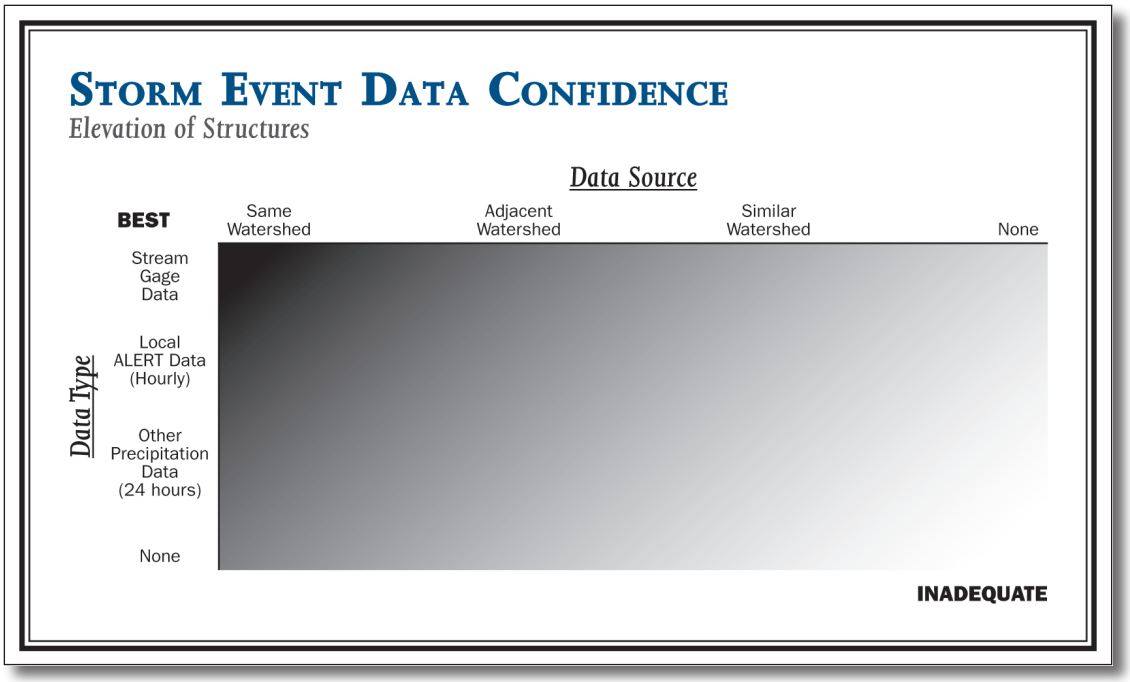
Storm event data are collected from stream or precipitation gages. Stream gages provide flow or stage for a particular channel, whereas precipitation gages provide rainfall at a particular point. When collecting gage data, the following information must be recorded:

- ***Identification number or code*** – This is generally an alphanumeric code used by the agency responsible for maintaining the gage for identification and recordkeeping purposes.
- ***Location*** – The latitude and longitude of the gage are needed to determine proximity of the gage to the project location.
- ***Type*** – The type may be a stream gage or precipitation gage.
- ***Recording period*** – If the scope of work requires the analysis of only one major storm event, the event could be analyzed using gage data for only that event. If performing an analysis of all storm events that might have or did cause damages, stream or precipitation gage data must be available for the entire MP_C time period, based on the earliest date of completion for any of the elevated structures in a given study.
- ***Recording interval*** – This is the frequency of data readings (i.e., data are recorded hourly, daily, or event-based).

Gage data are typically collected by federal, state, and local agencies, which may include local or regional water agencies or flood control districts, state departments of water resources, the National Weather Service, U.S. Geological Survey (USGS), U.S. Army Corps of Engineers (USACE), and U.S. Forest Service (USFS).

The type of data available for the Storm Event Analysis determines the level of confidence in the estimate of losses avoided. As illustrated in Figure 4.2, the best data to complete the Storm Event Analysis are stream gage data for the watershed in which the structures are located. General precipitation data in a similar watershed would provide results with a lower level of confidence.

Figure 4.2



Source: FEMA, 2007 (modified)

The storm event data must be evaluated to determine whether the locations of the gages provide data applicable to the study. Ideally, gages that are adjacent to the elevated structures are used in the analysis. Gages that are not adjacent to the elevated structures, but that provide information on the flooding source impacting elevated structures, can also be used.

As noted in Section 3.2, if accurate high water marks were collected by the community following the actual storm event, the elevations of those marks can also be included in this analysis. The analysis conducted would be similar to that performed for a stream gage that provided only stage data (Section 4.1.5.1).

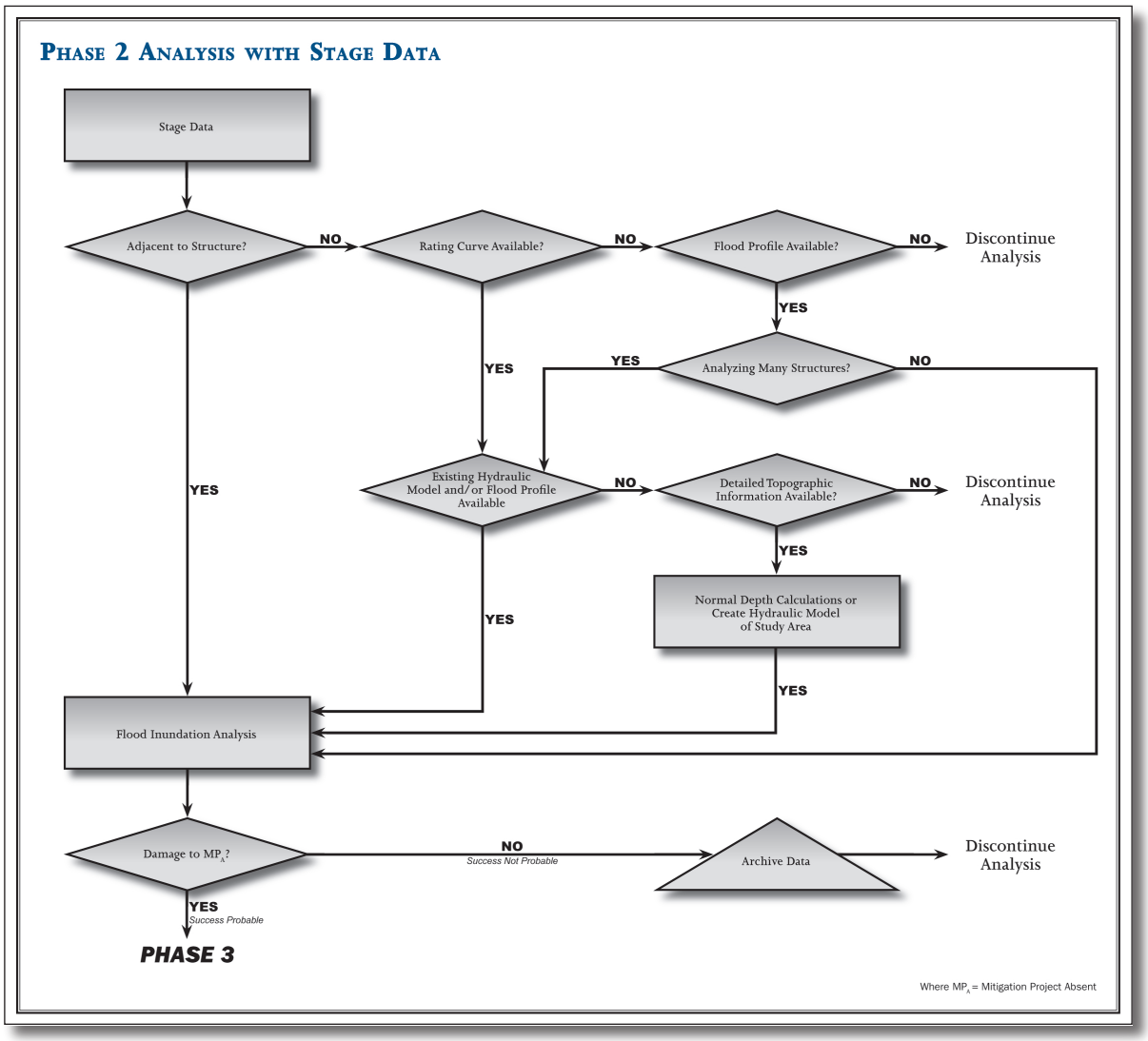
4.1.2 Stream Gage Event Analysis

The availability of sufficient stream gage data for a Storm Event Analysis should be determined, since this is the best source of data for the analysis. If stream gage data are available in or near the study area and have a period of record covering the event(s) of interest, then a stream gage event analysis can be conducted. Stream gage data may include measurements of stage (water-surface elevation), discharge (flow rate), or both. A list of peak events since the first structure was elevated can be compiled from the gage data.

4.1.2.1 Utilizing Stage Data

In the rare event that a gage providing stage data is immediately adjacent to the subject structure, the peak flood elevations can be compared directly to the FFE of the structure without any further analysis. In most cases a gage not adjacent to the structures but located in the vicinity of the study area is used. If sufficient stream

Figure 4.3

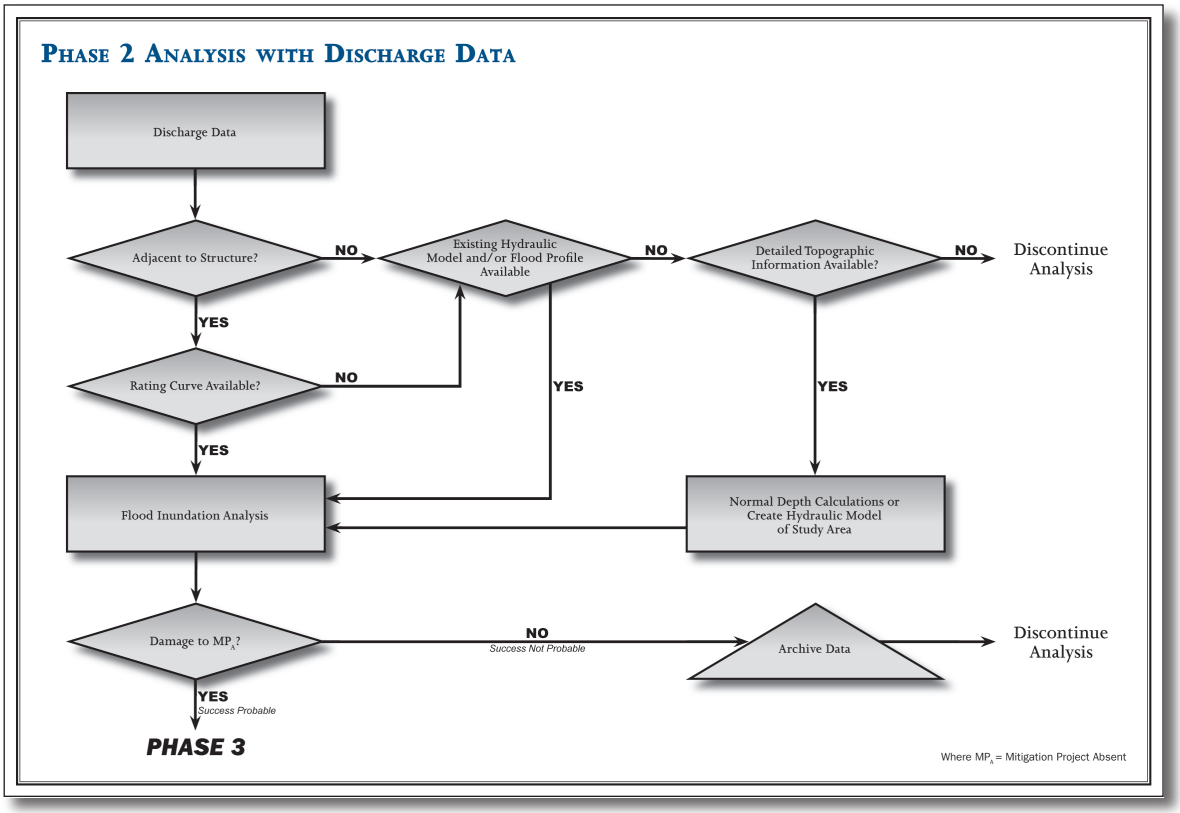


gage stage data are available, the storm events of interest can be identified. If gage data are stored as average stages and do not provide the instantaneous peak elevation, the method to calculate peak stage from average stage values must be determined if required by the scope of work. Otherwise, time-averaged values may be used. Figure 4.3 demonstrates the methodology if stage data are used for the analysis.

4.1.2.2 Utilizing Discharge Data

If the stream gage identified in the study area provides only discharge data, and if sufficient data are available, the runoff peak can be identified for the date of the event(s) of interest. Similar to gages that provide stage data, the discharge data may represent an average runoff over some interval, such as an hour or a day. Depending upon the scope of work, statistical methods for analyzing data may be required to estimate an instantaneous peak, when only time-averaged peak data are available. Once the peak discharge is identified, it can be used in conjunction with hydraulic analysis to determine the water surface elevation of peak events at each structure (Section 4.1.5). Figure 4.4 shows a schematic of the methodology for the Storm Event Analysis if discharge data are used.

Figure 4.4

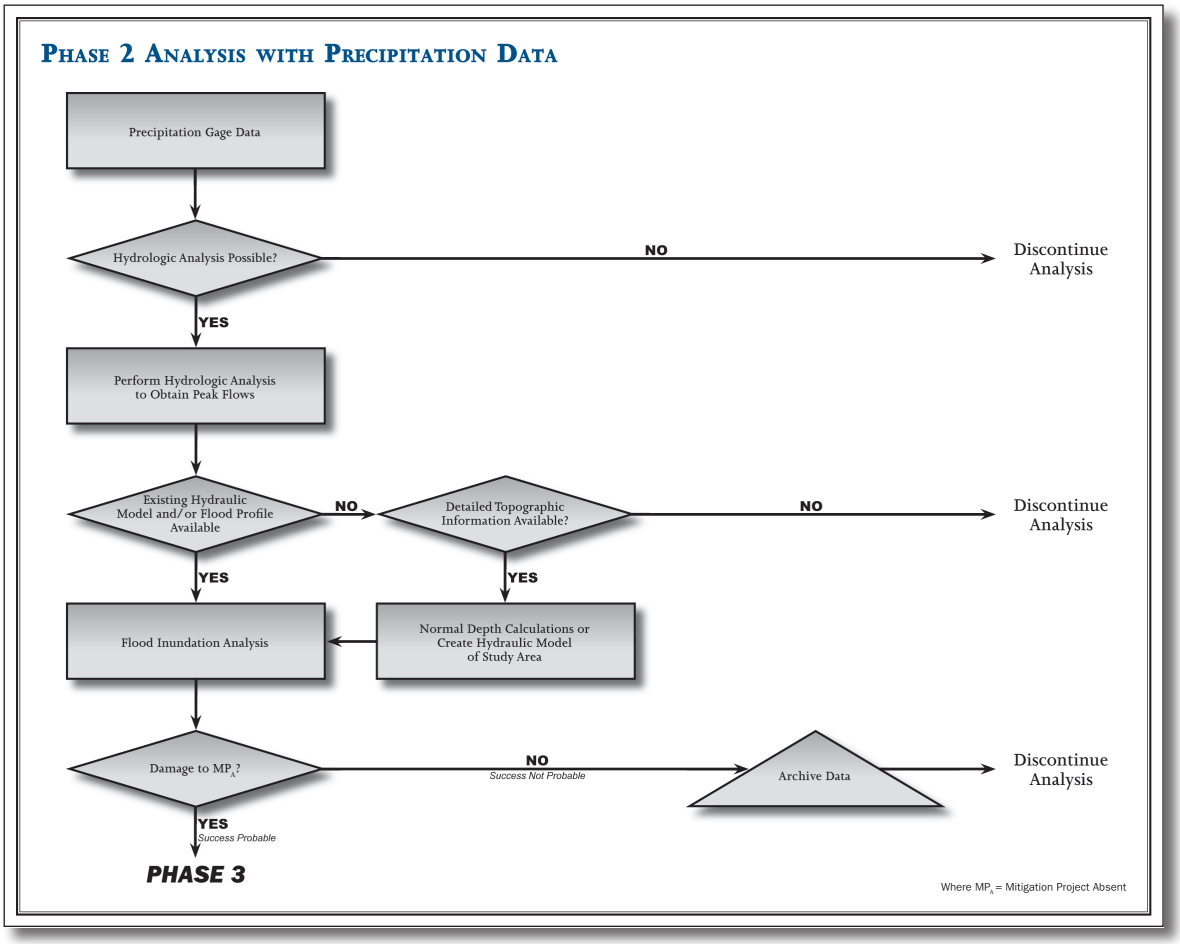


4.1.3 Precipitation Gage Event Analysis

If stream gage data are not available, then precipitation gage data must be analyzed to identify the storm event (or events) of interest. The gage must have a period of record covering the time period of interest, and it must be applicable to the watershed in which the study area is located. Larger watersheds may require data from multiple gages.

The precipitation gage data must be assessed to determine peak rainfall rates and volumes for multiple precipitation durations. The duration of a storm that caused flooding may include periods of no rain if those periods were shorter than the time of concentration for the watershed. The impact of multiple events must be incorporated as the second or third event in a series may cause the flooding if the preceding events saturate the soil. In any case, the precipitation data must be used in a hydrologic analysis to determine the flow rate for peak storm events (Section 4.1.4). Figure 4.5 shows a schematic of the methodology used for Storm Event Analysis when precipitation gage data are used.

Figure 4.5



4.1.4 Hydrologic Analysis

A hydrologic analysis, which is used to determine the amount of runoff, or flow rate, for the event of interest, is necessary if only precipitation gages are available in the study area. Once the amounts of precipitation from the peak events are identified (Section 4.1.3), and all the needed information is available, a hydrologic analysis can be performed. The resulting discharge is then used in conjunction with a hydraulic analysis to complete the Storm Event Analysis (Section 4.1.5).

For studies confined to a limited reach of a single flooding source, hydrologic modeling may only be needed for a single upstream watershed. For larger, multi-reach projects, hydrologic modeling of multiple watersheds may be required. If the required data and models are not available or cannot be developed, then structures in those areas will not be analyzed further.

Hydrologic Analysis Data Sources

Mitigation Project Data:

- HMGP Project Files
- FEMA Databases
- Construction Drawings and Specifications
- GIS Data (Aerial Photography and Political Boundary Mapping)

Hydrologic Modeling Data:

- HMGP Project Files
- Pre- and Post-Construction Hydrology Design and Model Reports
- Local Drainage Plans
- NOAA Design Storm Maps
- FEMA Data (FIRM, DFIRM, FIS, LOMC)
- GIS Data (Streams, Rivers, Watersheds, Land Cover, and Soils)

4.1.4.1 Modifying an Existing Hydrologic Model for Analysis

For some project areas, existing hydrologic models may be available. When these models are available, they can be modified to simulate the event of interest. This may involve simply replacing the original rainfall data with new rainfall data. In other cases, only portions of the original model may be applicable for use in the loss avoidance study. The difficulty of modifying a model for a given project is highly dependent upon the model. Hydrologic modeling software tends to change over time, so obtaining the original model programs may be difficult. Model inputs may require modification so that they are compatible with the latest software. These modifications may not always provide results consistent with the original model output.

4.1.4.2 Performing a New Hydrologic Analysis

Because of the difficulties associated with modifying existing hydrologic models, conducting a new hydrologic analysis may be less time consuming, even when existing models are available.

Regression Equations

From the precipitation data (Section 4.1.3), recurrence intervals for the peak events can be determined. FEMA guidelines and specifications for the preparation of a Flood Insurance Rate Map (FIRM) allow the use of standard regional regression equations to determine peak runoff for specific recurrence intervals. A relationship between the design rainfall amount at different recurrence intervals and the resulting recurrence intervals can be developed. If the recurrence interval of the actual peak event falls between the standard recurrence intervals, runoff can be estimated

based on a line-fitting statistical process. However, since regional regression equations are not reliable when analyzing actual events at specific locations, a simple hydrologic model may provide more accurate results.

New Hydrologic Modeling

The Rational Method can be used to calculate the peak flow for small watersheds (generally considered to be less than 200 acres). The Rational Method is defined as:

$$Q = C \cdot I \cdot A$$

Where **Q** = Runoff in cubic feet per second (cfs)
Where **C** = Dimensionless runoff coefficient (an additional conversion factor is implicitly included since 1 acre-in/hr is approximately equal to 1 cfs)
Where **I** = Average rainfall intensity for a given duration in inches per hour (in/hr)
Where **A** = Contributing drainage area in acres

The runoff coefficient is usually determined from a table based on land use, soil type and land slope, and sometimes storm recurrence interval and/or intensity. It varies from zero (no runoff) to 1.0 (100 percent runoff). The Rational Method increases in accuracy as basin size decreases, imperviousness increases, and homogeneity of basin characteristics increases. To estimate runoff with the Rational Method, the rainfall duration should be greater than the time of concentration calculated for the basin.

More sophisticated hydrologic modeling may be needed for larger watersheds, or when the watershed and drainage network contain reservoirs or other hydraulic structures that alter runoff response. To proceed with the hydrologic analysis, watershed sub-areas must be delineated, hydrologic and physical parameters for the sub-areas must be developed from the available data, and hydrologic configuration parameters must be determined for the model. A list of FEMA acceptable hydrologic models can be found at www.fema.gov.

When there are insufficient data to conduct a hydrologic analysis for a structure, it should be eliminated from the study.

4.1.5 Hydraulic Analysis

Hydraulic analyses are used to estimate water surface elevations at a series of cross-sections for the peak flow event(s) of interest. During the Storm Event Analysis, hydraulic analysis data may be

necessary if:

- Only stage data are provided by the stream gage in the study area,
- Only discharge data are provided by the stream gage in the study area,
- Only precipitation gages are available in the study area, and a hydrologic analysis is performed to determine a discharge rate of the peak event.

4.1.5.1 Using Existing Hydraulic Information or Hydraulic Model for Analysis

Stage Data Available

As noted in Section 4.1.2, in the rare case that only stage data are provided by a stream gage, and the gage is immediately adjacent to a structure, these data can be compared directly to the FFE of the structure. In most cases the gage data must be used in combination with hydraulic analysis to determine the elevation of the peak event at each structure. If the flood source was studied in detail for the FEMA FIRM, obtaining a copy of the existing hydraulic model may be possible. Even if the modeling is not available, the discharge information used in the model and the flood profiles can be found in the Flood Insurance Study (FIS). The following methods can be used to complete the analysis:

- If a published rating curve exists at the gage site, it can be used to estimate the flow rate of the peak event. The flow rate can then be used in conjunction with the existing hydraulic model or a new model can be created (Section 4.1.5.2) to estimate the elevation of the peak event at each structure.
- If flood profiles are available in hard copy only, the location of the gage along the river can be found on an existing flood profile, and the water surface elevation at the gage can be compared to the elevations of plotted profiles. Additionally, the location of the structure in question can also be found on the flood profile. Through interpolation between the plotted profiles, the elevation of the peak event at that structure can be determined. This method is appropriate if the channel geometry and watershed land use have not changed significantly since the existing profiles were produced. Even when a hydraulic model is available, this method is suitable if there are only a few structures being analyzed.
- For analyses that involve multiple structures on a single flooding source, using an existing hydraulic model is best. From the comparison of the elevations and their associated flow rates

Hydraulic Analysis Data Sources

Topographic Data:

- Digital Elevation Data (Contours, LIDAR, and TIN)
- NOAA IfSAR Data
- USGS Topographic Mapping
- Paper Drawing Contours

Hydraulic Modeling Data:

- HMGP Project Files
- Pre- and Post-Construction Hydrology Design and Model Reports
- Local Drainage Plans
- NOAA Design Storm Maps
- FEMA Data (FIRM, DFIRM, FIS, LOMC)
- GIS Data (Streams, Rivers, Watersheds, Land Cover, and Soils

for the existing model's flood profile at the gage location, the flow rate for the event that produced the measured stage can be estimated. The discharge of the event is found through interpolation of the existing model's discharges found in the FIS (usually the 10-, 50-, 100- and 500-year events). The discharge can then be input to the hydraulic model to estimate the elevation at the structure. If an existing hydraulic model does not exist, or if the channel geometry or watershed land use has changed significantly since the existing model was produced, a new model must be created (Section 4.1.5.2).

This method can also be used in the case where accurate high water marks were recorded by the community following the event. Rather than finding the stream gage location on the flood profiles, it would be necessary to determine the location of the high water mark on the profile.

The methodology for performing the analysis using stage data is shown in Figure 4.3.

Discharge Data Available

In the rare event that a flow rate is available from a stream gage that is adjacent to the structure (Section 4.1.2), and a published rating curve that compares flood stage to flow rate is available (such as from the USGS) for the site, the rating curve can be used to estimate the water surface elevation. If the gage is not located adjacent to the structure, hydraulic modeling is necessary to determine the flood elevation of the peak events.

The flood elevation at each structure can be determined using the following methods:

- If the flood source was studied in detail for the FEMA FIRM, but a digital copy of the model is not available, information from the FIS can be used to determine the flood elevation at each structure. A table of discharges can be found in the FIS providing the various discharges used in the model (usually the 10-, 50-, 100- and 500-year events). The measured peak flow rate can be compared to the flow rates associated with each of the flood profiles published in the FEMA FIS. Then the elevation profile for the peak event can be found through interpolation of the existing model's flood profiles.
- If a digital version of an existing hydraulic model of the study area is available, the water surface elevation of the peak event can be determined by entering the discharge data obtained from the stream gage or hydrologic analysis.
- The discharge can be used in conjunction with a new hydraulic model (see Section 4.1.5.2).

A schematic of the method used for performing the analysis using discharge data is shown in Figure 4.4.

4.1.5.2 Performing a New Hydraulic Analysis

If a new hydraulic analysis is necessary, detailed topographic data for all river reaches of interest are necessary for channel cross-sections to be created. Outlier structures or structures located where adequate topographic data are not available should be removed from the structure list. The accuracy of the topographic data varies depending upon the contour intervals. When completing a loss avoidance study, more detailed topographic data are preferred[4.1].

The source and data collection method for topographic data will affect the level of detail and usefulness for hydraulic analysis. Sources of topographic data include:

- ***Photogrammetry*** – Digital topography produced from aerial photogrammetry with ground control and survey.
- ***LIDAR*** – Topography generated by Airborne Light Detection and Ranging Systems (LIDAR).
- ***Surveyed and hardcopy topographic data*** – These topographic data often require a significant amount of manual data interpretation and adjustment. Channel bottom elevation data may only be available through bathymetric surveys.
- ***USGS DEM*** – Typically these data are available on a 30-meter grid (in some cases 10- meter) Digital Elevation Model (DEM) format. While these data are readily available across the United States, often they are not sufficiently detailed or accurate for hydraulic analysis, particularly in areas of flat terrain, or areas with significant recent floodplain development resulting in changes in drainage patterns or channelization.

Limitations of the LIDAR and photogrammetric surveys are that they do not penetrate water so they only provide information on the channel invert if the flight occurs during low flow conditions when most of the channel that conveys water during a flood is visible.

Normal Depth Calculations

When no hydraulic model exists, normal depth calculations are performed. These calculations require the peak event flow rate, the channel cross-section geometry, an estimation of the channel slope, and Manning's n (roughness coefficient). The use of a computer software program, such as FlowMaster (developed by Haestad Methods, now part of Bentley), can aid in performing these calculations.

[4.1] For more information regarding topographic data confidence see *Loss Avoidance Study: Southern California Flood Control Mitigation — Part Two: Detailed Methodology* (FEMA, 2007).

New Hydraulic Model

The parameters required to set up a hydraulic model include cross-section elevation data, roughness coefficients, boundary conditions and inflow, and data for any hydraulic structures located in the model area. A list of FEMA-acceptable hydraulic models can be found on www.fema.gov.

There are numerous tools available, mostly GIS-based, for cutting cross-sections from digital elevation data. ArcGIS (or ArcVIEW), commercial GIS software tools, work with the HEC-RAS model. Other data input tools also come with most private vendor software hydraulic models. If sufficient digital elevation data are not available, cross-sections can also be cut by hand using printed contour maps. This method is very time-consuming when a large number of cross-sections are required.

As with previous data analyses, any project with insufficient stream gage data and/or insufficient hydraulic data is not analyzed further. When a new model is needed, lack of sufficiently detailed topographic data is often the reason a project cannot be adequately modeled.

4.2 Flood Inundation Analysis

To determine if there would have been structures impacted by the peak storm event or events, the final step of the physical parameter analysis is to compare the flood surface elevations to the MP_A and MP_C FFEs.

4.2.1 Analysis Format

Most flood analysis and mapping is conducted in GIS or Computer-Assisted Drafting and Design (CADD) software. Within these software types, flood elevation data can be represented in a number of different formats; these data are usually presented in either raster or Triangular Irregular Network (TIN) formats. In raster format, elevations are represented by 'cells' of certain predetermined resolutions, such as 10 meters by 10 meters. When using the raster format, the resolution must be sufficient to provide adequate detail to calculate an accurate flood depth. TIN-based methods maintain the resolution of the source data better than raster-based methods and are ideal for flood elevation modeling but often require more specialized software and staff expertise.

Unlike loss avoidance studies for flood control projects, determining flood boundaries and flood depths for the entire extent of the project area is not necessary for an elevation study. Flood boundaries and depths are required only at the locations of the individual structures. Therefore, if stage data are used from a gage adjacent to

the structure, the peak water surface elevation can be attributed to the structure itself in GIS. In all other cases, the cross-sections from the hydraulic model can be digitized in GIS and attributed with peak water surface elevations. The flood elevations from multiple cross-sections can then be interpolated and converted to a water surface layer to account for flood elevations in all areas between cross-sections. From this surface, a peak water surface elevation at each structure can be extracted and exported in table format.

When FFE data are available for elevation projects, extracting the flood elevation from the flood elevation surface directly can greatly reduce analysis time, by eliminating the need to compare the ground elevation and flood elevation surfaces. To determine the depth of flooding in the structure for both the MP_A and MP_C scenarios, the FFE for each case is simply subtracted from the water surface elevation determined at each structure. The same process can be used without a GIS tool by estimating the elevation at each structure from the nearest cross-sections used in the hydraulic model, but the process is more tedious and less accurate.

When the FFE is unknown, detailed topographic information is needed (Section 4.1.5.2). The flood depth of the structure is calculated by first calculating the flood depth between the ground and the flood elevation. Then the flood depth at the structure is calculated by subtracting an assumed height above grade, based on the structure's foundation type or structure photography, from this overall flood depth.

4.2.2 Threshold Analysis

The scope of work may require a threshold analysis, which can aid in determining the overall losses avoided since the completion of the elevation. This analysis is performed to determine all of the peak MP_C flood events that could have been damaging in the MP_A scenario. Once a list of possible peak events are compiled from the Storm Event Analysis (Section 4.1), they should be ranked in ascending order according to magnitude. The most severe storm should be analyzed first. The analysis outlined in Section 4.2.1 determines how many structures would have been impacted by the event. Once this is complete, the second most severe storm event should be analyzed. This process should be continued in order of decreasing magnitude until the event that would not have caused damage to any structure is reached.

Threshold Analysis

A threshold analysis can be used to determine how many MP_C events would have caused damage in the MP_A scenario. By considering the cumulative losses avoided for all events, a more accurate ROI determination can be made.

When using this method, always note the construction completion dates for each elevation. Include only those structures for which construction was complete at the time of the event in the analysis of that particular event (Section 3.1).

4.3 Sonoma County Elevation Study: Elevation Effectiveness Analysis

A loss avoidance study is dependent upon the occurrence of a storm event significant enough to have produced MP_A damage. For the Sonoma County elevation study, FEMA decided to calculate losses avoided for all storm events that might have or did cause damage. Therefore, several events were modeled for the MP_A scenario. Based on the availability of stream gage discharge data in the study area, the methodology shown in Figure 4.4 was used. The discharge data was used in conjunction with an existing hydraulic model to perform the Flood Inundation Analysis for all structures in the study.

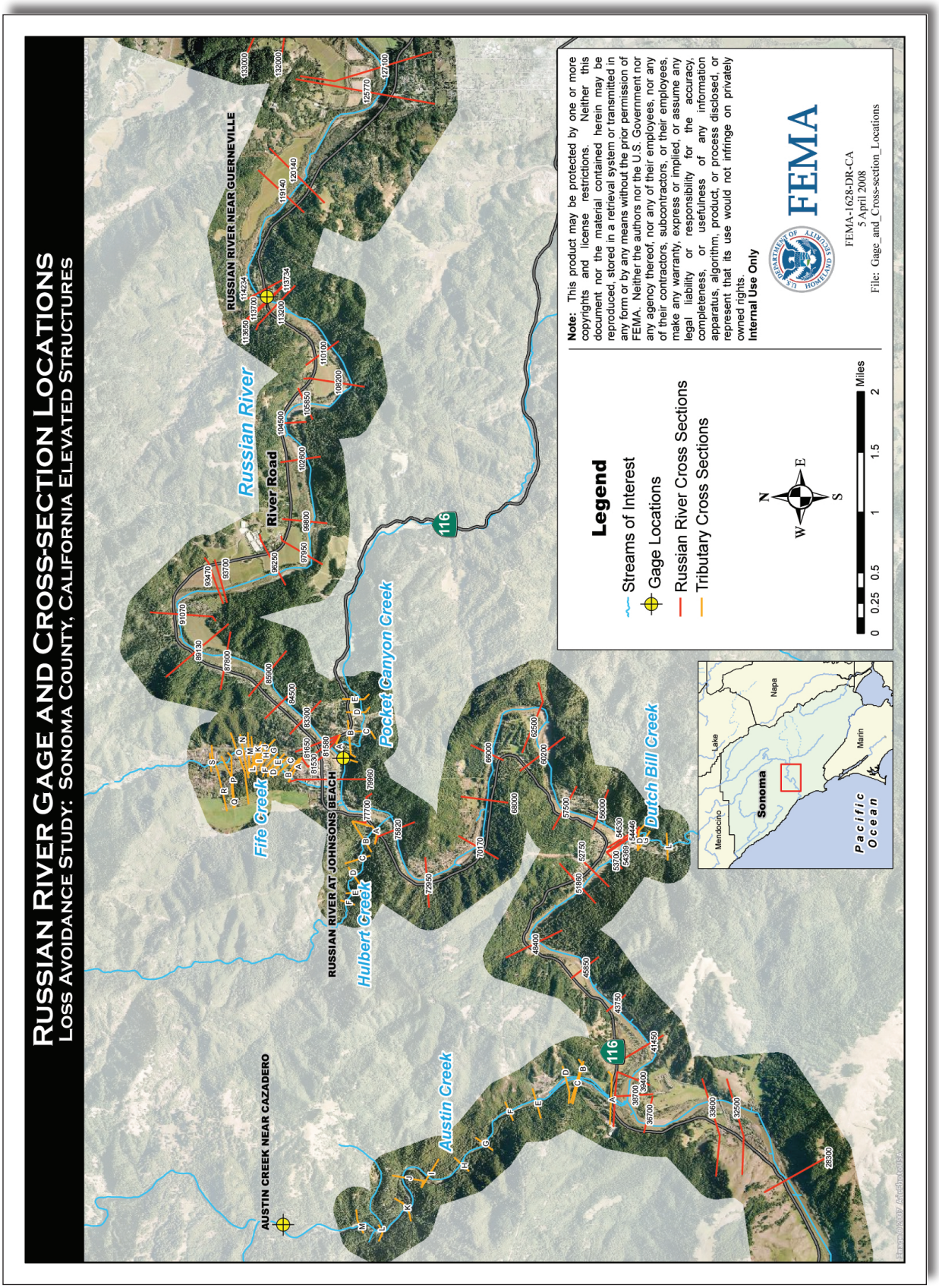
4.3.1 Discharge Data

Discharge data used in this investigation were obtained from historical records prepared by USGS for gages they maintain in the project vicinity. Three gaging stations were identified along the Russian River and one on Austin Creek. The existing gage locations are shown in Figure 4.6 (the Healdsburg gage is not shown on the map due to its remote location).

The Healdsburg gage (ID # 11464000) is located 18 miles upstream of Guerneville and is outside of the study area. The Johnson's Beach station (ID #11467002) measures stage data, but has large gaps in its record so it was not selected for analysis. The Guerneville station (ID # 11467000) (USGS 2007b) was selected for analysis because it has the longest continuous record (Water Year [WY] 1939 to the present). Storms resulting in peak flows at this station were assumed to result in peak flows at other locations along the Russian River.

A number of structures were identified as being located along five tributaries of the Russian River, namely Austin Creek, Fife Creek, Pocket Canyon Creek, Dutch Bill Creek, and Hulbert Creek. Austin Creek is the only tributary which has a USGS gage station (ID # 11467200). Its period of record is from WY 2004 to the present. It is located approximately 3.8 miles upstream of the confluence with Russian River. The location of the gage on Austin Creek is also shown on Figure 4.6.

Peak annual data for the Russian River gage at Guerneville were analyzed to develop the annual exceedance probability using the USACE statistical software package, HEC-SSP Version 1.0. The flow rates associated with various return periods (such as the 500-, 100-, and 10-year events) for the Russian River were determined for that gage location. These are reproduced below in Figure 4.7 and Table 4.1.


RUSSIAN RIVER GAGE AND CROSS-SECTION LOCATIONS
LOSS AVOIDANCE STUDY: SONOMA COUNTY, CALIFORNIA ELEVATED STRUCTURES
AUSTIN CREEK NEAR CAZADERO
RUSSIAN RIVER AT JOHNSONS BEACH
RUSSIAN RIVER NEAR GUERNEVILLE
Russian River
River Road
Fife Creek
Hulbert Creek
Pocket Canyon Creek
Austin Creek
Dutch Bill Creek
116
Legend
Streams of Interest
Gage Locations
Russian River Cross Sections
Tributary Cross Sections
N
W
E
S
0 0.25 0.5 1 1.5 2 Miles
Mendocino
Lake
Napa
Sonoma
Marin
Pacific Ocean
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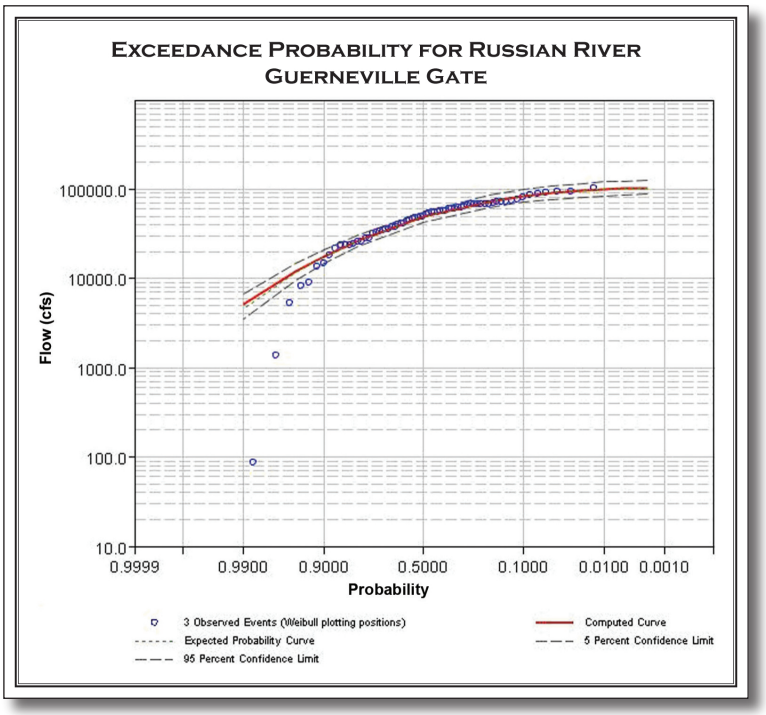
FEMA
FEMA-1628-DR-CA
5 April 2008
File: Gage_and_Cross-section_Locations

Figure 4.6

Figure 4.7



After the first structure was elevated (April 1998), five flood events were found which could have caused damage in the MP_A scenario. The estimated return period of each flood event on the Russian River was determined from the exceedance probabilities shown in Figure 4.7 and Table 4.1. The instantaneous peak flows for the five events, as well as the date of occurrence and the estimated return

Table 4.1

Calculated Return Periods for Russian River Flows near Guerneville Gage

Exceedance Probability (%)	Flow (cfs)	Return Period (Years)
0.2	103,348	**500**
0.5	101,446	**200**
1	99,301	**100**
2	96,251	**50**
5	90,113	**20**
10	83,005	**10**
20	72,485	**5**
50	48,922	**2**
80	26,775	**1.25**
90	17,785	**1.11**
95	12,044	**1.05**
99	5,079	**1.01**

Table 4.2

Measured Peak Flows and Return Periods for Events Analyzed

Peak Flow (cfs)	Date	Return Period (Years)
86,000	January 1, 2006	**17**
63,400	February 18, 2004	**4**
57,600	December 16, 2002	**3**
44,000	January 3, 2002	**2**
35,000	December 30, 2003	**1.5**

period, are given in Table 4.2.

Based on data from the Austin Creek gage, the largest storms on record coincided with the storms on the Russian River shown in Table 4.2, but the peak instantaneous discharge occurred on the day before the peak instantaneous discharge on the Russian River. Gage data were not available for Austin Creek prior to 2003. Storms occurring in January 2002 and December 2002 on the Russian River were assumed to have caused similarly ranked peak flood events on Austin Creek. The placement of the January 2002 and December 2002 peak flows between the December 2003 and February 2004 peak flows on the Russian River was used to interpolate peak flows for these events on Austin Creek. Table 4.3 shows the flows used in the analysis for Austin Creek.

Table 4.3

Flows Used for Modeling Austin Creek

Peak Flow (cfs)	Date	Source
8,100	December 31, 2005	*USGS*
5,850	February 17, 2004	*USGS*
5,676	December 15, 2002	*calculated*
5,269	January 2, 2002	*calculated*
5,000	December 29, 2003	*USGS*

No stream gage data were available for the remaining tributaries (Fife Creek, Pocket Canyon Creek, Dutch Bill Creek, and Hulbert Creek) and no precipitation gages were identified within the watershed in which the tributary study area was located. Therefore, the 10-year discharges for each tributary from the FIS table of discharges were compared to the 10-year discharge of Austin Creek. Table 4.4 shows the FIS 10-year discharges and the comparison ratio.

Table 4.4

10-Year Flows on Russian River Tributaries

Tributary	FIS 10-Year Flow (cfs)	Ratio of Tributary Flow to Austin Creek Flow
Austin Creek	**14,900**	1
Dutch Bill Creek	**2,100**	0.14
Fife Creek	**1,600**	0.11
Pocket Canyon Creek	**1,790**	0.12
Hulbert Creek	**3,300**	0.22

Source: FEMA 2006c

Table 4.5

Flows Used for Modeling Tributaries

Tributary	12/2005 Flow (cfs)	2/2004 Flow (cfs)	12/2002 Flow (cfs)	1/2002 Flow (cfs)	12/2003 Flow (cfs)
Austin Creek	8,100	5,850	5,676	5,269	5,000
Dutch Bill Creek	1,142	824	800	743	705
Fife Creek	870	628	610	566	537
Pocket Canyon Creek	973	703	682	633	601
Hulbert Creek	1,794	1,296	1,257	1,167	1,107

Assuming that the dates of the peak instantaneous discharges on the other tributaries would correspond to the dates of the peak instantaneous discharges of Austin Creek, the Austin Creek flows (Table 4.3) were multiplied by the comparison ratio to get corresponding tributary flows. All flows used in the tributary analysis are reproduced in Table 4.5.

4.3.2 Hydraulic Analysis

Detailed hydraulic studies have been completed for the Russian River and the subject tributaries, as shown on the FIRM for Sonoma County. A hard copy of the USACE HEC-2 hydraulic model used to map the floodway of the Russian River in 1986 was obtained (Michael Baker 2007). Since modeling is only available for the floodway analysis, the output files include data for only the 100-year event. Additionally, the HEC-2 hydraulic modeling of the subject tributaries for the 10-, 50-, 100- and 500-year events, executed between 1977 and 1986, were obtained (Michael Baker 2007). The HEC-2 models of the Russian River and its tributaries models were imported into the HEC-RAS 4.0 Beta model using the HEC-2 cross-sectional inputs.

Table 4.6

FEMA FIS and HEC-2 Model Flow Change Locations

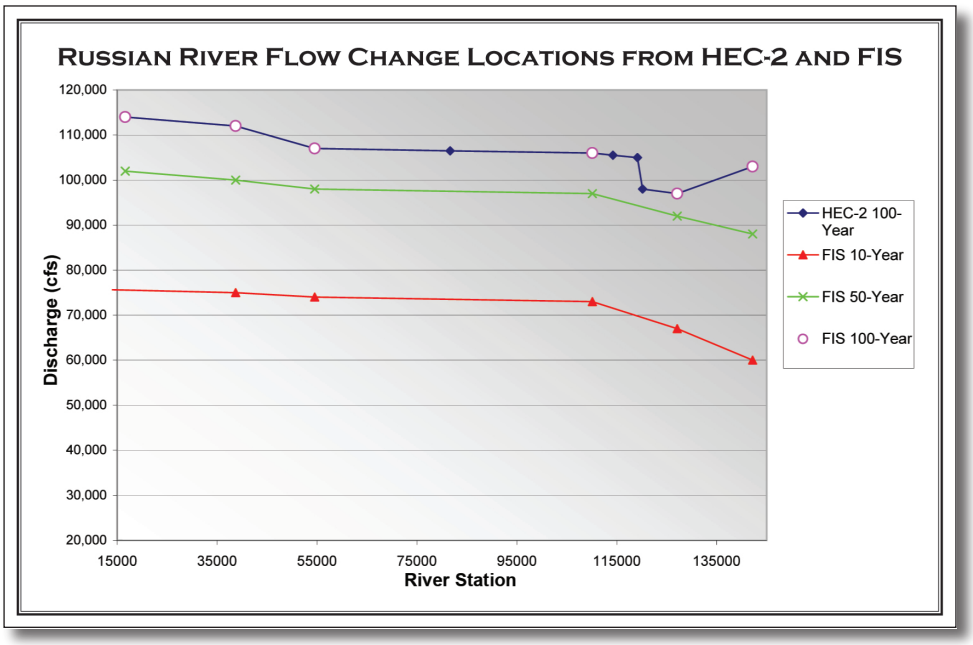
Flow Change Location Description from FIS	River Station	Peak Flows (cfs)			
		FIS 10-Year	FIS 50-Year	FIS 100-Year	HEC-2 Base Flows
Upstream of confluence with Mark West Creek	**142200**	60,000	88,000	103,000	103,000
Downstream of confluence with Mark West Creek	**127100**	67,000	92,000	97,000[1]	97,000
	120140				98,000
	119140				105,000
	114234				105,500
Upstream of Summerhome gage[2]	**110100**	73,000	97,000	106,000	106,000
	81650				106,500
Upstream of confluence with Austin Creek	**54530**	74,000	98,000	107,000	107,000
Upstream of Duncan Mills	**38700**	75,000	100,000	112,000	112,000
At Pacific Ocean	**16600**	76,000	102,000	114,000	114,000

Source: FEMA 2006c, Michael Baker 2007
[1] *Discharge reduced due to storage efforts of Mark West Creek floodplain (from FIS)*
[2] *Discharge data from the Summerhome gage were not available for the Sonoma County Elevation study. The gage was installed in 1954 but was damaged by a storm event in 1974.*

The HEC-2 documentation for the Russian River included ten flow change locations along the modeled reach. Taking note that more flow change locations were included in the model than were described in the FIS summary of discharges table, the HEC-2 flow change locations are reproduced alongside the FIS locations in Table 4.6.

In order to interpolate flow change values and locations for the discharges described in Table 4.2, the flows from Table 4.6 were first graphed against their river station location in Figure 4.8.

Figure 4.8



The geographic location of the Guerneville gage is closest to River Station 114234 in the HEC-2 model (see Figure 4.6). Based on the comparison of the measured flow at this location to the flows in the FEMA FIS and in the HEC-2 model, the change in flow along the river for each storm event was interpolated (or extrapolated) graphically as shown in Figure 4.9. The 100-year flows in the HEC-2 floodway model matched the FIS 100-year discharges, but the flow change location at River Station 127100 includes a discharge that, according to the FIS, is reduced due to storage effects of Mark West Creek floodplain. The FIS does not include similar reductions for the 10-year and 50-year flows which were used for the flow change interpolation. Therefore, the Russian River flows calculated for the storm events used in the Sonoma County elevation study only increase from upstream to downstream.

Figure 4.9

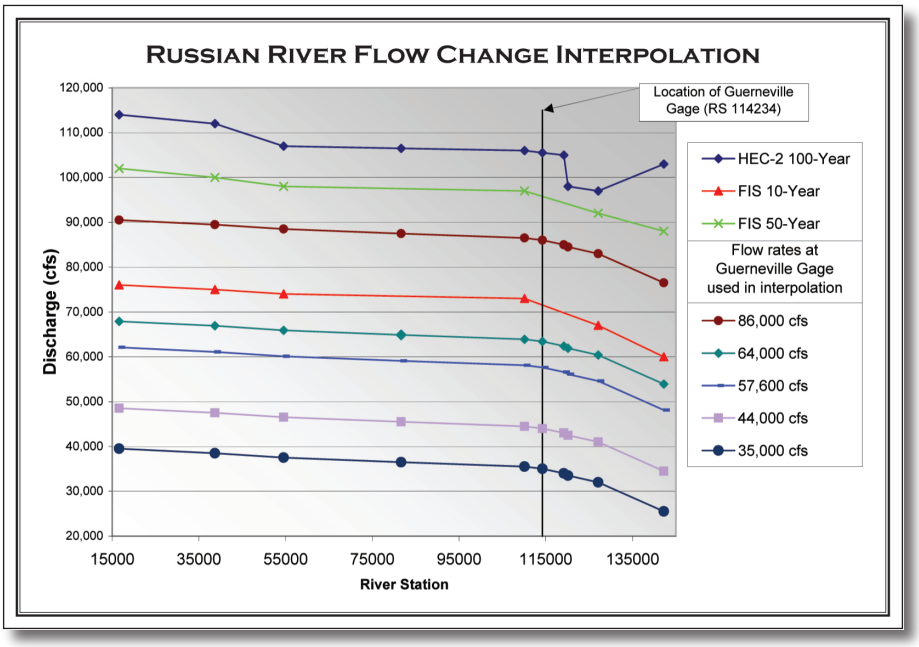


Table 4.7 describes the flow change values and river station locations on the Russian River for the interpolated storms in Figure 4.9. These flows were used along with a downstream boundary condition of a water surface elevation of 5.96 feet (this was the same boundary conditions used for all the flood events provided in the HEC-2 model) to model the Russian River in HEC-RAS.

No flow change locations exist within the modeled reaches of each of the five tributaries; therefore flows from Table 4.5 were used in the model. Downstream boundary conditions for the tributaries were not specified in the HEC-2 modeling. Although all tributary flows were assumed to peak the day before the Russian River experienced its peak instantaneous flow, the peak discharges on the Russian River were used to account for the Russian River flow backing

Table 4.7

Flow Change Locations for Events Studied

River Station of Flow Change Location	Flow Values for Each Event (cfs)				
	January 2006	February 2004	December 2002	January 2002	December 2003
142200	76,500	53,900	48,100	34,500	25,500
127100	83,000	60,400	54,600	41,000	32,000
120140	84,500	61,900	56,100	42,500	33,500
119140	85,000	62,400	56,600	43,000	34,000
114234	86,000	63,400	57,600	44,000	35,000
110100	86,500	63,900	58,100	44,500	35,500
81650	87,500	64,900	59,100	45,500	36,500
54530	88,500	65,900	60,100	46,500	37,500
38700	89,500	66,900	61,100	47,500	38,500
16600	90,500	67,900	62,100	48,500	39,500

up into the tributaries. The peak elevation of the Russian River at its confluence with each tributary was used as the downstream boundary condition for the models of the tributaries. The Russian River cross-section nearest to each tributary confluence is shown in Table 4.8.

Flows from Table 4.7 were modeled for the Russian River in order to find the downstream boundary conditions for modeling each tributary. Table 4.9 shows the water surface elevation on the Russian River at each tributary confluence. These values were used as the downstream water surface elevation boundary conditions in the tributary models, which were modeled independently from the Russian River.

The Russian River and the five tributaries were then modeled in HEC-RAS. The water surface elevations at each river station of the six modeled reaches were used to complete the Flood Inundation Analysis, as described in Section 4.3.3.

Table 4.8

River Station Nearest to Tributary Confluence

Tributary	River Station of Cross-Section
Austin Creek	38700
Dutch Bill Creek	54530
Hulbert Creek	75820
Fife Creek	77700
Pocket Canyon Creek	81530

Table 4.9

Water Surface Elevation at Confluence[1]

Tributary	Downstream Water Surface Elevation for Each Event				
	January 2006	February 2004	December 2002	January 2002	December 2003
Austin Creek	31.58	28.67	27.88	25.79	24.15
Dutch Bill Creek	41.69	37.06	35.82	32.55	30.09
Hulbert Creek	51.78	46.91	45.44	41.59	38.63
Fife Creek	53.12	48.12	46.62	42.71	39.64
Pocket Canyon Creek	55.53	50.70	49.25	45.43	42.27

[1] *Water surface elevation on the Russian River at tributary confluence used as downstream boundary condition in HEC-RAS model*

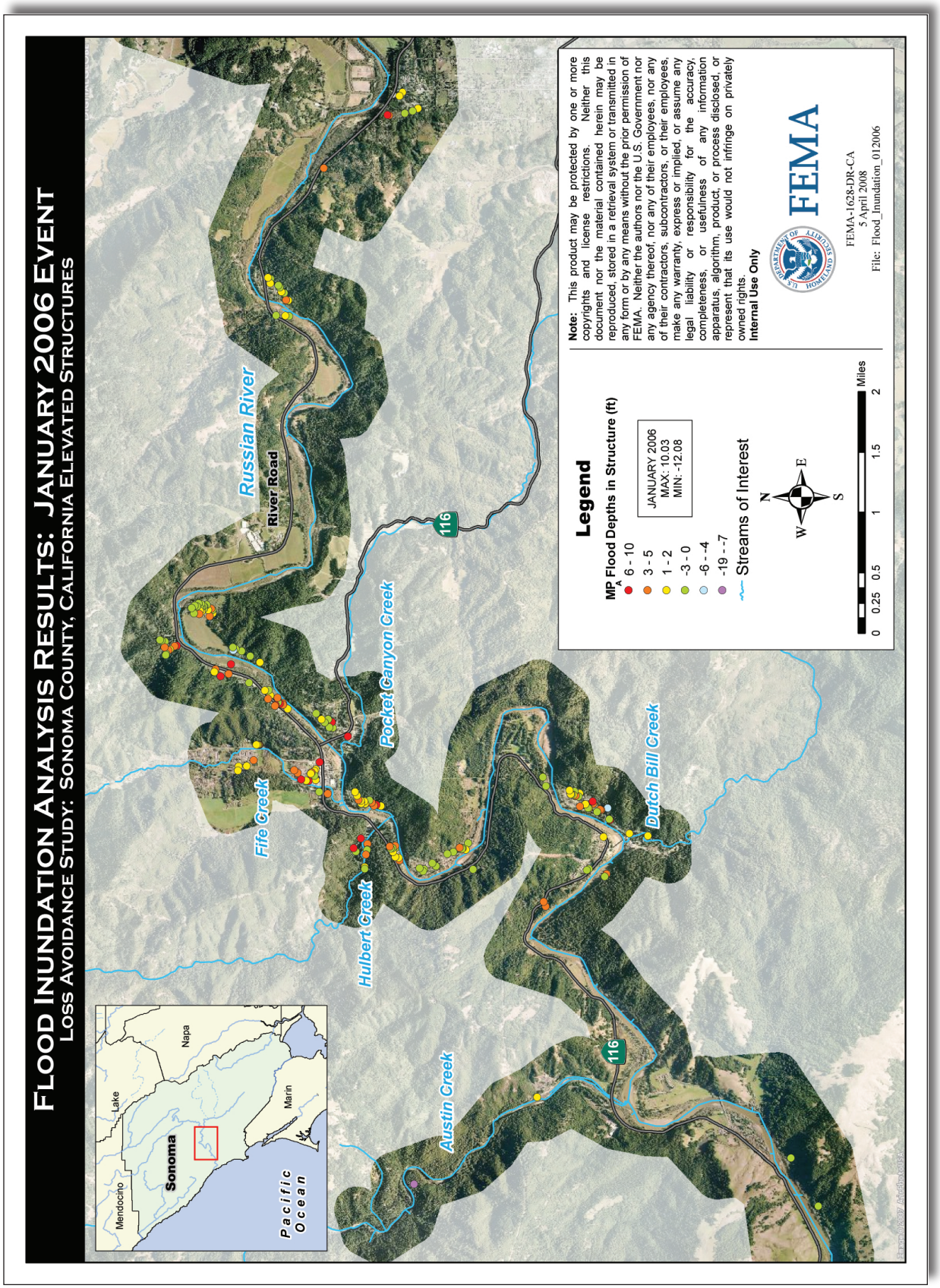
4.3.3 Flood Inundation Analysis

Structure locations were geocoded based on their addresses and then manually corrected using parcel data and aerial imagery to ensure accurate spatial location. Cross-sections shown on the FIRM for Sonoma County were digitized, and additional cross-sections were added based on the locations of cross-sections in the hydraulic modeling used to create the FIRM. Cross-sections in the GIS were then attributed with the flood water surface elevations computed by HEC-RAS. Using the 'Feature to TIN' tool in Environmental Services Research Institute's (ESRI) 3D Analyst, a TIN was then created based on the flood elevations associated with each cross-section, thereby interpolating a digital representation of flood water surface elevation between cross-sections. To avoid interpolation across river bends, a clip was applied using a layer representing the outer edges of the cross-sections. Finally, the structure location points were used to extract the water surface elevation of the modeled flood event at each structure. The FFE was subtracted from the water surface elevation to determine the depth of flooding at each structure. In the process of performing the Flood Inundation Analysis, a discrepancy was discovered between the post-project FFE and the adjacent ground surface elevation for one of the structures. Therefore, the structure was not analyzed further.

The results of the Flood Inundation Analysis are shown in Figure 4.10 for the January 2006 event, which was the most severe event that occurred after the first structure was elevated. The Flood Inundation Analysis results for all the modeled storm events are included in Appendix A.

4.3.4 Threshold Analysis

For the Sonoma County elevation study, FEMA calculated losses avoided for all of the peak MP_C flood events that could have been damaging in the MP_A scenario. The peak storm events determined in Section 4.3.1 were analyzed in order of decreasing magnitude. The results were compiled for the Flood Inundation Analysis. As shown in Appendix A, the December 2003 event, which was the least severe storm analyzed, did not result in flooding at any of the structures except along Fife Creek. Due to the lack of gage data on Fife Creek and the other tributaries of the Russian River, determining the threshold event specific to Fife Creek was not possible. For the Russian River and the other four tributaries, the structures could have been impacted by a maximum of five events.


Flood Inundation Analysis Results: January 2006 Event
Loss Avoidance Study: Sonoma County, California Elevated Structures
Mendocino
Lake
Napa
Sonoma
Marin
Pacific Ocean
Russian River
River Road
Fife Creek
Hulbert Creek
Pocket Canyon Creek
Austin Creek
Dutch Bill Creek
116
Legend
MP Flood Depths in Structure (ft)
6 - 10
3 - 5
1 - 2
-3 - 0
-6 - -4
-19 - -7
JANUARY 2006
MAX: 10.03
MIN: -12.08
Streams of Interest
N
W
E
S
0 0.25 0.5 1 1.5 2 Miles
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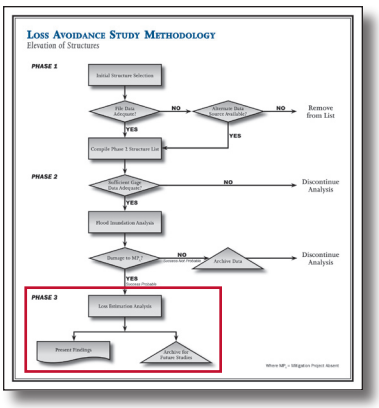
5 April 2008
File: Flood_Inundation_012006

Figure 4.10

Section Five:

Phase 3 – Loss Estimation Analysis

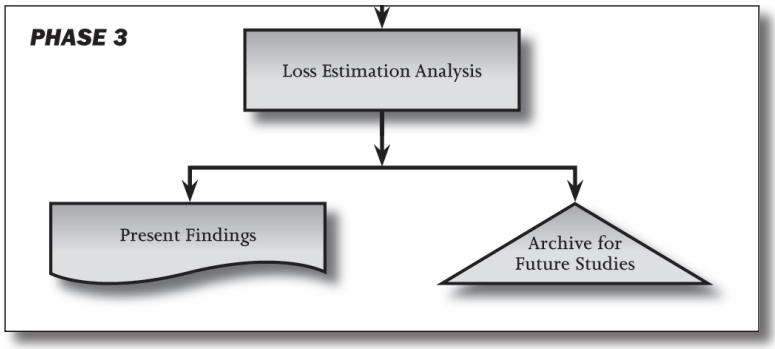


The final phase of a loss avoidance study is to estimate the amount of losses avoided based on the effectiveness of the mitigation project during the modeled storm events. Section Five provides a full synopsis of the process for Phase 3, the Loss Estimation Analysis. The methodology is illustrated in Figure 5.1.

There are two major tasks in Phase 3:

1. *Calculating losses avoided* and
2. *Calculating ROI*

Figure 5.1



5.1 Calculating Losses Avoided

Calculating losses avoided requires knowledge of damages for the MP_A and MP_C scenarios. Figure 5.2 illustrates the formula used to calculate losses avoided.

Figure 5.2

Loss Estimation Analysis

$$MP_A - MP_C = LA$$

Where MP_A = Mitigation Project Absent
Where MP_C = Mitigation Project Completed
Where LA = Losses Avoided

Source: FEMA, 2007

5.1.1 Formulating MP_A and MP_C Damages

During Phase 2 of a loss avoidance study, the following information is determined for each of the structures proceeding through the

Loss Estimation Analysis:

- The post-elevation storm/flow events that caused damages, or would have caused damages in the MP_C and MP_A scenarios, respectively;
- The number and type of structures impacted by the storm events being analyzed for both MP_A and MP_C scenarios; and
- The flood depth at each structure estimated from the Flood Inundation Analysis.

Based on these flood depths, the losses/damages are calculated for both the MP_A and MP_C scenarios. Losses avoided are then calculated by subtracting MP_C damages from the MP_A damages, per the formula presented in Figure 5.2.

When calculating losses, all of the losses should be calculated in present-day values. Therefore, if historical losses are used as estimates, they should be adjusted to present-day values. Other values used in the calculations, such as the value of the structures and the cost of the elevation construction should also be based on present-day values.

5.1.2 Loss Categories

Once the Flood Inundation Analysis is complete and potentially impacted structures have been inventoried, the collected data must be evaluated. As illustrated in Table 5.1, potential damages are divided into loss categories. Loss categories generally include physical damage, loss of function, and emergency management costs, all of which contain multiple loss types.

Table 5.1 reflects the potential damage types for any flood mitigation project. The calculation of the losses avoided for elevation projects differs from flood control projects because there are fewer loss categories for elevation projects. Since elevating a structure only protects the structure from further losses, the loss types would be limited to:

- ***Physical Damage***
  - Structure
  - Contents
- ***Loss of Function***
  - Displacement Expense
  - Loss of Rental Income
  - Loss of Business Income
  - Lost Wages
  - Disruption Time for Residents
  - Loss of Public Services

Table 5.1

Loss Estimation Categories and Types

Loss Category	Loss Types
Physical Damage	Structure Contents Roads and Bridges Infrastructure Landscaping Environmental Impacts Vehicles/Equipment
Loss of Function	Displacement Expense Loss of Rental Income Loss of Business Income Lost Wages Disruption Time for Residents Loss of Public Services Economic Impact of Utility Loss Economic Impact of Road/Bridge Closure
Emergency Management	Debris Cleanup Governmental Expense

Source: FEMA, 2007

Emergency Management costs are generally not included in loss avoidance studies for elevation projects. According to *What Is a Benefit?* (FEMA, 2001), elevation of single residential structures, small groups of structures, or groups at scattered locations does not significantly reduce a community's emergency management costs because the area affected by a disaster is not decreased, and the total population affected by disaster is not decreased, or not decreased significantly. Therefore, emergency management costs should only be considered when a large group of adjacent structures are elevated.

Depth-Damage Curves

Established depth-damage relationships are commonly used for determining losses caused by flood hazards. These relationships, which have been developed by FEMA, USACE, and other agencies using observed data from historical events, generally identify the loss that is likely to occur at certain intervals (i.e., flood depths). For example, FEMA and USACE have published depth-damage curves that relate depth of flooding to potential structure damage, which is value based on a percentage of the BRV. The flood depth-damage relationships are either nationally published estimates, or are estimated from local damage information.

The FEMA BCA Modules, which were developed to standardize determinations of cost-effectiveness for mitigation projects, include

damage curves for determining damage based on the severity of an event. These curves can be adapted to the loss avoidance study (FEMA, 2006b). For the flood module, these relationships are based on historical data taken from flood insurance claims under the NFIP. The modules include curves for the following:

- ***Structure Damage*** – Curves used to calculate physical damages to the structure,
- ***Contents Damage*** – Curves used to calculate damages to the structure's contents,
- ***Displacement Time*** – Curves used to calculate displacement time for residents and/or the loss of rental income, and
- ***Loss of Public Services*** – Curves used to calculate stoppage or delay for the loss of business income and the loss of public services.

No standardized curve currently exists within the FEMA BCA Modules for disruption time for residents; therefore, the time must be estimated.

In addition to the FEMA BCA Modules, depth-damage relationships are also used to estimate physical damage costs in the HAZUS-MH (FEMA, 2006a) flood module. The *HAZUS-MH Technical Manual* (FEMA, 2006a) includes depth-damage curves for 28 general building stock categories (six residential, ten commercial, six industrial, and six other) from flood depths ranging from -4 to 24 feet. Further, USACE has depth-damage and content-to-structure damage ratio tables that are used for preparing economic analyses for USACE flood control and floodplain management projects. However, if the flow and resulting damages are known for particular flood events in the study area from another source, a depth-damage relationship can be constructed for the study area to estimate the total damages for any event.

Once actual flood depths are determined from the Flood Inundation Analysis (Section 4.2), the appropriate damage value can be calculated using values in the damage curve and an interpolative calculation. Damage curves or historical damages from events of similar size must be used to evaluate losses in the MP_A scenario, since the damages are theoretical. However, it may be possible to obtain values of actual losses in the MP_C scenario. Actual losses should be used in the loss avoidance study when they are available. If they are not available, then the MP_C damages can also be estimated using depth-damage curves.

5.1.2.1 Physical Damage

For an elevation study, physical damage is limited to the direct

damage to the structure and its contents. While there may be damage to items stored in the area under the house or to a car in the MP_A scenario, these items are assumed to also be damaged in the MP_C scenario when the structure is elevated. Therefore, there would be no losses avoided for those items.

In order to evaluate the structure and content losses, the value of the structure and its contents must first be determined. Therefore, the following steps must be taken for each structure:

- An inventory of the structure must be completed to determine characteristics such as type of structure, living area, number of floors, and FFE. This type of information is generally obtained through site visits or by researching community databases, such as tax assessment and parcel data (Section 3.2).
- A determination the BRV for each inundated structure must be made. Only the BRV, and not the fair market value of the structure, should be used. The BRV can be found by:
  - Estimation of BRV based on values provided by local officials or local contractors or
  - Calculation of BRV using valuation guides such as Marshall & Swift (Marshall, 2007) or RSMeans (RSMeans, 2007).
- A determination of the value of the contents must be made by:
  - Use of a content-to-structure value ratio in conjunction with the BRV to calculate the value of the contents (for example, the FEMA standard for residential content value provided in the *Mitigation BCA Toolkit* is 30% of the BRV, or a minimum value of $20,000) or
  - Determination of the actual content value through owner interviews, insurance information, and tax records.

Once the value of the structure and its contents is known, damages for various flood scenarios can be estimated using the flood depth-damage relationships discussed previously. To do so, the following steps should be taken:

- A selection of the appropriate depth-damage relationship for the structure type must be made, and the flood depth (found during the Flood Inundation Analysis – Section 4.2) must be correlated with the appropriate percent damage ratio from the depth-damage curve to estimate the percent damage to each structure.
- The percent damage ratio must be multiplied by the replacement value to calculate the damage from the flood event.

Table 5.2 identifies the depth-damage curve that is used in the FEMA

BCA Full Data Flood Module to calculate damages to structures based on various flooding scenarios. For example, if the MP_A Flood Inundation Analysis shows that a single story structure without a basement sustained a flood depth of 1 foot above its FFE for a particular event, the FEMA depth-damage curve estimates that the structure's damage would be approximately 14% of its BRV. If the depth of flooding was found to be 1.4 feet, the damage value would be calculated by interpolating between 14% and 22%.

If the damage percent determined from the depth-damage curve exceeds 50% for a typical structure, the structure should be assumed to be substantially damaged and would be replaced rather than repaired. Therefore, in those instances, the entire BRV should be used to calculate the losses. It should be noted that the substantial damage threshold can vary. For example, if the structure is extremely sub-standard, the threshold would be lower, or if the structure is historic, the threshold may be higher.

A similar process is followed to estimate the damages to the structure's contents. When actual value of the contents is unknown, damage to the contents can be estimated based on the replacement

Table 5.2

Depth-Damage Data

Building Type	1 Story, without Basement	2 Story, without Basement	Split Level, without Basement	1 or 2 Story, with Basement	Split Level, with Basement	Mobile Home
Flood Depth (ft)	Percent Damaged (% of Structure Value)					
-2	0	0	0	4	3	0
-1	0	0	0	8	5	0
0	9	5	3	11	6	8
1	14	9	9	15	16	44
2	22	13	13	20	19	63
3	27	18	25	23	22	73
4	29	20	27	28	27	78
5	30	22	28	33	32	80
6	40	24	33	38	35	81
7	43	26	34	44	36	82
8	44	29	41	49	44	82
9	45	33	43	51	48	82
10	46	38	45	53	50	82
11	47	38	46	55	52	82
12	48	38	47	57	54	82
13	49	38	47	59	56	82
14	50	38	47	60	58	82
15	50	38	47	60	58	82
16	50	38	47	60	58	82
17	50	38	47	60	58	82
18	50	38	47	60	58	82

Source: FEMA BCA Full Data Flood Module

value of the structure and an appropriate content-to-structure ratio. For example, if a single-story structure without a basement has a BRV of $120,000, according to FEMA guidance, the contents can be estimated to be worth 30% of the BRV, or $40,000. The content damage is then determined by multiplying the content value by the percentage of damage from the appropriate depth-damage curve. Table 5.3 provides the FEMA standard depth-damage curve for contents that can be found in the FEMA BCA Full Data Flood Module. Based on this curve, if the example structure was flooded to a depth of 1 foot above the FFE, the damage to the contents would be 21% of $40,000, or $8,400.

5.1.2.2 Loss of Function

For an elevation study, loss of function damages are those economic impacts to the community that occur because of the physical damage to the structure. Loss of function damages can vary extensively depending upon the type of structure damaged. For example, loss of function costs associated with damage to a residence could be costs associated with moving to and renting another residence

Table 5.3

Depth-Damage Data

Building Type	1 Story, without Basement	2 Story, without Basement	Split Level, without Basement	1 or 2 Story, with Basement	Split Level, with Basement	Mobile Home
Flood Depth (ft)	Percent Damaged (% of Contents Value)					
-2	0	0	0	6	4.5	0
-1	0	0	0	12	7.5	0
0	13.5	7.5	4.5	16.5	9	12
1	21	13.5	13.5	22.5	24	66
2	33	19.5	19.5	30	28.5	94.5
3	40.5	27	37.5	34.5	33	100
4	43.5	30	40.5	42	40.5	100
5	45	33	42	49.5	48	100
6	60	36	49.5	57	52.5	100
7	64.5	39	51	66	54	100
8	66	43.5	61.5	73.5	66	100
9	67.5	49.5	64.5	76.5	72	100
10	69	57	67.5	79.5	75	100
11	70.5	57	69	82.5	78	100
12	72	57	70.5	85.5	81	100
13	73.5	57	70.5	88.5	84	100
14	75	57	70.5	90	87	100
15	75	57	70.5	90	87	100
16	75	57	70.5	90	87	100
17	75	57	70.5	90	87	100
18	75	57	70.5	90	87	100

Source: FEMA BCA Full Data Flood Module

while flooding subsides and repairs occur. Loss of function costs associated with damages to a business could be lost business, temporary relocation to another structure, and lost wages for employees. Loss of function costs resulting from damages to public facilities could be the loss of critical public services, such as police and fire departments.

Loss of function costs are based on the amount of time that a facility is not functional after a flood, due to the amount of destruction to the structure and the value of the particular function. Similar to the cost of physical damage, the amount of time that a facility loses function increases with the severity of damage to the structure.

As with physical depth-damage relationships, published relationships between flood depth and duration and loss of function costs can be used to identify these costs. For example, *What Is a Benefit?* contains guidance on methods that can be used to calculate loss of function for each of the types listed above. The *HAZUS-MH Technical Manual* has methods similar to the FEMA BCA Modules, with regional adjustments to various loss of function methods. Additionally, USACE publications on post-disaster impacts from flooding contain information about loss of function from specific locations. Communities may also provide costs from past events that demonstrate the impact of the events. In these cases, local values provide a more accurate representation of a project area than the national or regional values from tools such as the FEMA BCA Modules or HAZUS-MH.

For loss avoidance studies of elevation projects, loss of function includes displacement expense, loss of rental income, disruption time for residents, loss of public service, loss of business income, and lost wages.

Displacement Expense

Displacement time is "the time period during which occupants are displaced from a building in order for repairs to be made" (FEMA, 2006b). Therefore, the loss is associated with the cost of renting a temporary facility during the period of displacement. Displacement should be included in the analysis only if a temporary alternate location is necessary to continue the function of the damaged building while it is being repaired.

The FEMA BCA Modules calculate displacement time as a function of the structural damage. When damage is below a certain threshold (approximately 10% of the BRV), it is considered minimal and the function of the building can resume quickly. When damage is more significant (greater than 10% and less than 50% of the replacement value), the module calculates a value between a month and year. If damage is substantial (greater than 50% of the replacement value),

then a year displacement is the default time for the structure owner to replace the structure or to find a new one. Table 5.4 provides the standard curve provided by the FEMA Full Data Flood module for displacement time.

The losses associated with displacement can be calculated as follows:

- A determination of the cost for the displacement of occupants must be made. Within the *Mitigation BCA Toolkit*, FEMA provides standard values that can be used to calculate costs for displacement, based on a national average. The costs include:
  - Rental costs for temporary facilities, which are estimated as $1 per square foot per month,
  - Other monthly costs of displacement, such as furniture rental, temporary space, extra commuting costs, etc., are estimated to be $500 per month, and
  - One-time costs, such as utility hookup fees, round-trip moving costs, etc., are also estimated to be $500.

  If area-specific costs are available, they will produce a more accurate calculation of actual displacement expense and

Table 5.4

Depth-Damage Data

Building Type	1 Story, without Basement	2 Story, without Basement	Split Level, without Basement	1 or 2 Story, with Basement	Split Level, with Basement	Mobile Home
Flood Depth (ft)	Displacement Time (Days)					
-2	0	0	0	0	0	0
-1	0	0	0	0	0	0
0	0	0	0	38	0	0
1	62	0	0	70	78	302
2	126	54	54	110	102	365
3	166	94	150	134	126	365
4	182	110	166	174	166	365
5	190	126	174	214	206	365
6	270	142	214	254	230	365
7	294	158	222	302	238	365
8	302	182	278	342	302	365
9	310	214	294	365	334	365
10	310	214	294	365	334	365
11	310	214	294	365	334	365
12	310	214	294	365	334	365
13	310	214	294	365	334	365
14	310	214	294	365	334	365
15	310	214	294	365	334	365
16	310	214	294	365	334	365
17	310	214	294	365	334	365
18	310	214	294	365	334	365

Source: FEMA BCA Full Data Flood Module

should be used. Area-specific values can be determined through historic information, information from real estate agents and rental companies, or from emergency assistance organizations, such as the American Red Cross.

- A correlation of the flood depth (found during the Flood Inundation Analysis – Section 4.2) with the appropriate displacement time in the depth-damage curve (Table 5.4) must be made. For example, if a single-story structure without a basement is flooded to a 1-foot depth above the FFE, the residents would be displaced for an estimated total of 62 days.
- The number of displaced days must be multiplied by the displacement expense for each day.

Loss of Rental Income

The owner of residential or commercial rental property may lose income when tenants of a rented property are displaced because of damages resulting from flood losses. Loss of rental income should be calculated on a site-by-site basis. To calculate the loss, A determination of the rental income for the units with potential to flood must be made. Next, the flood depth (found during the Flood Inundation Analysis – Section 4.2) must be correlated with the appropriate displacement time in the depth-damage curve (Table 5.4). Finally, the number of displaced days must be multiplied by the rental loss for each day.

Counting the displacement expense for the renter and the full loss of rental income for the owner is doubly counting benefits and must be avoided. If rental income losses are counted, the displacement expense for the renter should only be included in the situation where the rent at the temporary location is an increase above the previous rent. In this situation, only the difference in rent, rather than the total cost of rent at the temporary residence, should be included. Most often, the loss of rental income is not calculated; instead, displacement expense is estimated for all tenants of a property.

Loss of Business Income

A loss of business income may occur for commercial structures when damage is severe enough to result in temporary loss of function of a structure. According to *What Is a Benefit?* (FEMA, 2001), the proper measure of loss of business income is the net income, not the gross income, since expenses, as well as receipts, are lower when a business is closed.

Business losses can be estimated using the following methods. The results should be validated through field observation and discussion

with local representatives.

- The economic impact of each lost day of operation must be determined (annual net income divided by 365).
- The number of days that business would be interrupted due to flooding must be calculated. The standard curve for loss of function time provided in the FEMA *Mitigation BCA Toolkit* (Table 5.5) can be used to calculate business interruption. The *HAZUS-MH Technical Manual* (FEMA, 2006a) also provides guidance for determining business interruption time based on percentage of structure damage.
- The number of lost days provided must be multiplied by the economic impact of each day.

Lost Wages

Wages can be lost when there is a loss of function for any structure where people are employed. Similar to the loss of business income for the owner, hourly employees can experience a loss of wages when a business closes. In accordance with *What Is a Benefit?* (FEMA, 2001), lost wages are counted only for short-term losses due to temporary business closure and only for hourly employees (FEMA, 2006b). Wages are not counted for salaried employees, unless employees are laid off without pay, or public employees.

Lost wages are calculated by adding the employee's base pay and benefits. *What Is a Benefit?*, which is a part of the *Mitigation BCA Toolkit* provides a national average for wages and benefits at $21.16 per hour (FEMA, 2006b). In place of the national average, regional or local averages can also be used. To calculate total lost wages for employees of an affected business, various types of information are required, including:

- Per hour average wages and benefits, based either on national averages or local data,
- Number of places of employment in the affected area (generally available from local officials), and
- Number of hourly personnel employed by each employer affected (generally available from local officials or from the employer directly).

Once the value of the wages is determined, a calculation of the amount of time lost based on the type of structure damaged can be made.

- The loss of wages would be calculated using the loss of function curve (Table 5.5) if the employer is a public agency or a commercial business. The loss of function time can also be determined using the *HAZUS-MH Technical Manual* data

(FEMA, 2006a) or historic losses.

- The loss of wages would be calculated using the displacement time curve (Table 5.4) if the employee is employed at a residence and would not be employed while the residents are displaced.
- Multiply the number of lost days provided by the value of the wages lost per day.

Disruption Time for Residents

Disruption time for residents should only be counted if the elevated structure is a residential structure. It is the economic value of a person's time spent conducting activities associated with the event, such as preparing for potential evacuations, evacuating, cleaning and repairing property following the event, and making insurance claims. As described in *What Is a Benefit?*, a person's time has value, whether or not that person is formally compensated by an employer (FEMA, 2001). Each hour of time is worth the same amount, whether such time is personal or business, compensated or not. The FEMA BCA Module does not include a standard curve for the calculation of disruption time, as it does for displacement time. The following is the methodology to calculate disruption time, as described by *What Is a Benefit?* (FEMA, 2001):

> *"To count the benefits of disruption, disruption time estimates must be made for each damage level (e.g., flood depth...). Then the dollar value of disruption time is calculated by multiplying the number of adults per house by the national average value of wages and benefits ($21.16) to get a dollar value of disruption time. This dollar value for disruption time can be converted to a percentage of building replacement value and added to the building damage percentage..."*

Although the FEMA modules do not provide a standardized curve, a training course provided at the Emergency Management Institute (EMI), and provided in the 2005 *Mitigation BCA Toolkit*, estimated disruption time to be 40 hours plus an additional 8 hours for every 1% of damage to the structure for each adult in the household. An estimate such as this, or one based on local historical information, can be used to create an appropriate curve for disruption time.

Loss of Public Service

If the elevated structure is a public building that would temporarily close in a flooding event, there is a potential for a loss of public service. Even if the function of the building would be relocated to a temporary facility, there may be loss of function until the temporary facility is activated. Public services include those such as public works departments, police stations, fire departments, or libraries. Additionally, private non-profit organizations, such as schools and

hospitals that are essentially providing public services, are classified as public services. Similar to displacement times, the FEMA BCA Modules calculate loss of function time as a function of the damage to the structure. Table 5.5 demonstrates FEMA's standard curve for loss of function.

According to *What Is a Benefit?* (FEMA, 2001), FEMA makes the very simple and direct assumption that public services are worth what it costs to provide the services to the public. Therefore, the following steps are necessary to calculate the loss of function to a public building:

- The economic impact of each lost day of operation must be established. A loss of public service is assigned an economic value that is equal to the costs necessary to provide that public service. The daily cost of services is estimated from the annual operating budget for the agencies occupying a building. According to *What Is a Benefit?*, the annual operating budget includes all of the direct costs necessary to provide the public services, including salaries and benefits, materials, supplies, utilities, equipment costs, and rent or the annual

Table 5.5

Depth-Damage Data

Building Type	1 Story, without Basement	2 Story, without Basement	Split Level, without Basement	1 or 2 Story, with Basement	Split Level, with Basement	Mobile Home
Flood Depth (ft)	Loss of Function Time (Days)					
-2	0	0	0	4	3	0
-1	0	0	0	8	5	0
0	9	5	3	11	6	8
1	14	9	9	15	16	30
2	22	13	13	20	19	30
3	27	18	25	23	22	30
4	29	20	27	28	27	30
5	30	22	28	30	30	30
6	30	24	30	30	30	30
7	30	26	30	30	30	30
8	30	29	30	30	30	30
9	30	30	30	30	30	30
10	30	30	30	30	30	30
11	30	30	30	30	30	30
12	30	30	30	30	30	30
13	30	30	30	30	30	30
14	30	30	30	30	30	30
15	30	30	30	30	30	30
16	30	30	30	30	30	30
17	30	30	30	30	30	30
18	30	30	30	30	30	30

Source: FEMA BCA Full Data Flood Module

cost of owning the building. Local officials, or the operators of private non-profit entities, can provide information on the annual operating budget. This information may also be available on the agency's web site.

- The flood depth (found during the Flood Inundation Analysis – Section 4.2) must be correlated with the appropriate loss of function time in the depth-damage curve (Table 5.5). For example, if a single-story structure without a basement is flooded to a 1-foot depth above the FFE, the building would lose function for an estimated 14 days.
- The number of lost days must be multiplied by the economic impact of the loss of public service.

If the service is a critical service directly related to emergency response and recovery, a continuity premium can be included when estimating the economic value of the service. A continuity premium is a multiplier on the normal daily cost of service. *What Is a Benefit?* (FEMA, 2001) provides guidance for calculating the continuity premium for critical facilities such as fire, police, medical, emergency operation centers, or emergency shelters. The functional downtimes for these services are expected to be significantly shorter than for ordinary (non-critical) public services. Therefore, if a continuity premium is used, the functional downtimes found in the standard curves must also be adjusted. Table 5.6 provides the suggested values from *What Is a Benefit?* (FEMA, 2001).

5.1.2.3 Emergency Management Costs

Emergency management costs are those costs related to response and recovery activities conducted by local, state, and federal government agencies as a result of a hazard event. For example, the community experiences costs for ensuring public safety. These costs are primarily obtained from historic damage records, such as Project Worksheets (PW) prepared by FEMA during declared disaster events under the Public Assistance Program (PA).

If actual costs from previous events are known, they should be used. If FEMA previously provided PA funds for emergency work, PWs prepared to document emergency work costs may provide relevant information. The following steps can be used to calculate the impacts of other emergency response measures:

- Local representatives can be interviewed to identify the types of services required and the level of effort required in delivering those services.
- The duration of the flood and the appropriate salary categories can be used to estimate the costs for first responders. This

Table 5.6

Economic Impact of Loss of Function of Critical Structures

Condition	Economic Impact
Normal cost of service	• Annual operating budgets from local officials • EOCs: daily base cost of service is annual operating budget divided by average number of days of use, plus daily costs during operation • Shelters: $85 per day for temporary lodging and meals, in accordance with U.S. General Service Administration guidelines
Continuity Premiums police, fire, EOC, or shelter	• 10x cost of normal service
Continuity Premiums medical services	• None: typically during floods, the demand for services is not significantly greater than normal
Adjustment to Functional Downtime	• Police services: 1/3 of typical values • Fire services: 1/3 of typical values • Medical services: 1/2 of typical values • EOC or shelter: Maximum possible displacement times are limited by the typical duration of use of EOCs or shelters

may include costs for rescue, traffic control, and fighting the.

- The estimated flood recovery time and the appropriate salary categories can be used to estimate the impact to other municipal employees. This may include cleanup and costs associated with implementing repairs.

If elevating a large number of structures in one area significantly reduces these emergency management costs, then the benefits of reduced emergency management costs should be counted. This is highly unlikely, because the streets and all other areas surrounding the structures would still be flooded in the MP_C scenario. There may be little difference between MP_A and MP_C for emergency management costs, since high-water evacuations and other emergency response efforts still occur.

5.1.2.4 Calculation Considerations

Once the Storm Event Analysis (Section 4.1) and the Flood Inundation Analysis (Section 4.2) are complete, multiple peak events may be determined to impact one or more of the structures in either the MP_A or the MP_C scenario. Therefore, the total cumulative losses avoided for each structure should be calculated following the construction completion date for the elevation of that structure. For the MP_A scenario, this would be the cumulative losses avoided for all events that would have impacted the structure if it had not been elevated. Only losses for those events that occurred after the

Table 5.7

Loss Estimation Analysis Calculations

MP_A Scenario

Structure	Completion Date of Structure Elevation	Losses by Event			Total MP_A Losses
		December 2002	December 2003	December 2006	
1	May 1999	$\$A_1$	$\$B_1$	$\$C_1$	$MP_{A1} = \$A_1 + \$B_1 + \$C_1$
2	June 2003	N/A	$\$B_2$	$\$C_2$	$MP_{A2} = \$B_2 + \$C_2$
3	May 2005	N/A	N/A	$\$C_3$	$MP_{A3} = \$C_3$

MP_C Scenario

Structure	Completion Date of Structure Elevation	Losses by Event			Total MP_A Losses
		December 2002	December 2003	December 2006	
1	May 1999	$\$D_1$	$\$E_1$	$\$F_1$	$MP_{C1} = \$D_1 + \$E_1 + \$F_1$
2	June 2003	N/A	$\$E_2$	$\$F_2$	$MP_{C2} = \$E_2 + \$F_2$
3	May 2005	N/A	N/A	$\$F_3$	$MP_{C3} = \$F_3$

Losses Avoided

Structure	Completion Date of Structure Elevation	Total MP_A Losses	Total MP_C Losses	Total Losses Avoided (LA)
1	May 1999	MP_{A1}	MP_{C1}	$LA_1 = MP_{A1} - MP_{C1}$
2	June 2003	MP_{A2}	MP_{C2}	$LA_2 = MP_{A2} - MP_{C2}$
3	May 2005	MP_{A3}	MP_{C3}	$LA_3 = MP_{A3} - MP_{C3}$

date of construction completion should be counted. This method should also be used to calculate the total losses for the MP_C scenario. Finally, the losses for the two scenarios are compared to determine the total losses avoided for each storm event. Table 5.7 illustrates this concept.

5.1.3 Sonoma County Elevation Study: Calculating Losses Avoided

All 205 structures initially included in the Sonoma County elevation study are residential structures. Therefore, of the loss categories listed in Section 5.1.2, only the following were considered for the study:

- ***Physical Damage*** – Structure and Contents and
- ***Loss of Function*** – Displacement Expense and Disruption Time for Residents

While some of the structures may have been rental properties, Loss of Rental Income was not included for two reasons. First, no data were readily available for which structures were occupied by renters or on the actual rental income for the properties. Second, as explained in Section 5.1.2.2, counting both displacement expenses and rental income loss is doubly counting benefits. Therefore, since a methodology was available to estimate displacement expense

based on present-day local values, only these losses were counted.

The avoided emergency response costs were considered for the study, but it was determined that the costs would be negligible. As noted in Section 5.1.2, according to *What Is a Benefit?* (FEMA, 2001), groups of structures at scattered locations do not significantly reduce a community's emergency management costs because the area affected by a disaster is not decreased, and the total population affected by the disaster is not decreased, or not decreased significantly. Although the Sonoma County elevation study included a large number of structures, they are scattered over a fairly large area. Therefore, this loss category was not included in the loss calculations.

The depth-damage curves found in the FEMA BCA Full Data Flood Module were used to calculate the avoided losses (Tables 5.2 – 5.5). All of these tables are based on the type of structure impacted (e.g., one-story without basement, two-story with a basement, split-level, etc.). The 'with basement' option assumes that the basement is not finished, and this assumption is reflected in the relevant damage curves (Tables 5.2 – 5.5). Of the 205 structures initially included in the study, 20 of the structures have a finished basement. The most accurate way to evaluate the losses in this case is to assume the FFE is at the basement floor and adjust the damage curve to account for the elevation at which water would begin to enter the basement. There was insufficient information to determine the elevation of the structures' openings or the basement floor. Therefore, for these structures, the above ground FFE and the damage curve for structures 'with basement' were used since this would be a conservative analysis. There were also five structures for which the presence of a basement is unknown. In these instances, to be more conservative, a 'without basement' damage curve was used.

5.1.3.1 Physical Damage

As discussed in Section 5.1.2.1, in order to evaluate the losses due to physical damage, the value of the structure and its contents must first be determined. For all of the structures included in the Sonoma County elevation study, a BRV was available from the HMGP project files. However, since all losses should be calculated using present-day values, an average present-day unit cost was calculated instead of using the outdated values. According to the national cost-estimating guide *Residential Cost Data* (RSMeans, 2007), the average BRV is approximately $154 per square foot. FEMA also contacted local contractors to obtain quotes specific to the Russian River Valley area. Based on these quotes, the average BRV for the area is approximately $190 per square foot. Therefore, an average of the two values, $172 per square foot, was used to calculate the

BRV for each structure based on its square footage (also provided in the HMGP project files).

Since the actual content value for each structure was not available in the HMGP project files, the values were estimated. According to FEMA's *Mitigation BCA Toolkit* (FEMA 2006b), the value of contents for a residential structure can be estimated to be either 30% of the BRV or a minimum of $20,000. The content values were calculated based on these guidelines.

The depths of flooding in each structure during each of the five peak events were determined in the Flood Inundation Analysis (Section 4.2). The respective damage curves for structures (Table 5.2) and contents (Table 5.3) provided by the FEMA Full Data Flood Module were interpolated based on the depths for both the MP_A and MP_C scenarios to calculate damages. In accordance with guidance provided in the FEMA *Mitigation BCA Toolkit* (FEMA, 2006b), if any of the flood depths were found to cause damages exceeding 50% of the BRV, the entire BRV was used to estimate the structure losses.

The results for the study are shown in Table 5.8. The MP_A results show avoided structure damages totaling over $7.5 million and avoided damage to contents totaling over $3.1 million for the five storms analyzed. No losses were estimated for the MP_C scenario since all of the structures were elevated above the 100-year flood elevation, and the largest storm event experienced was approximately a 17-year event. The total losses avoided for physical damage were over $10.5 million due to the elevation projects.

5.1.3.2 Loss of Function

The FEMA *Mitigation BCA Toolkit* (FEMA, 2006b) provides standard values for the costs of displacement ($1.00 per square foot per month that residents are displaced, plus an additional $500 per month, and a one-time-fee of $500) and a standard curve (Table 5.4) to reflect the amount of time that residents are typically displaced based on the depth of flooding in the structure. This curve was used in conjunction with the depth of water in each structure for each of the five peak events (Section 4.3.3) in both the MP_A and MP_C scenarios to calculate the displacement expense using an interpolative method.

To more accurately reflect displacement expense particular to the Russian River Valley area, rental data were gathered from several local property managers and local officials for all communities within commuting distance of the study area. The average temporary residential rental cost was determined to be approximately $1.31 per square foot. This value was used to calculate the displacement expense, and the FEMA standards of $500 per month and the one-

time fee of $500 were also included. The results of the study indicate that for the five storm events analyzed, the avoided displacement expense total over $1.2 million.

The FEMA *Mitigation BCA Toolkit* (FEMA, 2006b) also provides a standard value for disruption of life at $21.16 per hour, but a standard curve for the time of disruption is not available. The estimate used by EMI in its training course, of 40 hours plus an additional 8 hours for every 1% of damage to the structure for each adult in the household, was found to be a reasonable estimate and therefore incorporated into the analysis for the MP_A scenario.

Based on U.S. Census Bureau data from the 2006 American Community Survey, the average household for California has approximately 2.93 people. From the same study, approximately 73.9% of the population is above 18 years old. Therefore, it was assumed there were two adults per household. The results of the analysis show that for the five storm events analyzed, the avoided disruption costs total over $1.7 million.

No disruption time was estimated for the MP_C scenario. According to *What Is a Benefit?* (FEMA, 2001), disruption costs include the time necessary to prepare for potential evacuations, evacuating, cleaning and repairing property following the event, and making insurance claims. A resident may be evacuated even if the structure is elevated and there is no flood damage to the structure. It may also be necessary to clean mud and debris surrounding the structure after the event in the MP_C scenario. These costs were assumed to be the same in the MP_A and MP_C scenario, so these losses were excluded from the calculations. The losses avoided that were calculated for the MP_A scenario account for the time the resident would have used for making insurance claims and the repairs to the damaged structure.

Total Losses Avoided

After calculating the losses avoided for each structure for each of the five peak flood events, the cumulative amount of losses avoided for each structure were calculated for both the MP_A and MP_C scenarios. Only those events that occurred after the structure was elevated were included. The total losses in the MP_C scenario were then subtracted from the total losses in the MP_A scenario for each structure to determine the total losses avoided. As shown in Table 5.8, the total losses avoided for all five storm events were valued at approximately $13.5 million.

No structures **received MP_C damages from any of the five events analyzed. All mitigation efforts were *completely effective*.**

Table 5.8

Loss Estimation Analysis Results

Analysis Information			Results by Loss Category								Losses Avoided Total
			MP_A Scenario Damages				MP_C Scenario Damages				
			Physical Damage		Loss of Function		Physical Damage		Loss of Function		
Event Date	Structures Included in Analysis[1]	Structures For Which Losses Were Avoided	Damage to Structure Subtotal	Damage to Contents Subtotal	Displacement Costs Subtotal	Disruption Costs Subtotal	Damage to Structure Subtotal	Damage to Contents Subtotal	Displacement Costs Subtotal	Disruption Costs Subtotal	
January 3, 2002	134	11	$316,474	$89,097	$31,745	$67,268	$0	$0	$0	$0	**$504,584**
December 16, 2002	161	25	$646,323	$246,085	$78,747	$142,835	$0	$0	$0	$0	**$1,113,990**
December 30, 2003	168	9	$282,903	$70,417	$28,635	$55,852	$0	$0	$0	$0	**$437,807**
February 18, 2004	168	42	$1,000,826	$409,099	$138,835	$240,764	$0	$0	$0	$0	**$1,789,524**
January 1, 2006	195	155	$5,204,284	$2,313,745	$977,639	$1,205,297	$0	$0	$0	$0	**$9,700,965**
		Total	**$7,450,810**	**$3,128,443**	**$1,255,601**	**$1,712,016**	**$0**	**$0**	**$0**	**$0**	**$13,546,870**

All amounts rounded to the nearest dollar.
[1] *Only structures that were elevated prior to the event were included in the analysis.*

5.2 Calculating ROI

Calculating ROI is the final task in determining losses avoided. The results vary depending upon the number of events evaluated for each structure and the resulting level of damage. Figure 5.3 provides an illustration of the formula used in calculating ROI.

Figure 5.3

Return on Mitigation Investment

$$\frac{\$\,LA}{\$\,PI} = \%\,ROI$$

Where **LA** = Losses Avoided
Where **PI** = Project Investment
Where **ROI** = Return on Investment

Source: FEMA, 2007

The denominator of the equation is the total project investment for the project being evaluated, or in the case of elevation projects, the cost to elevate the structure. Project investment does not represent the federal investment alone. Rather, it is the total investment for the project made by all parties involved. The investment total must be representative of the elevation construction costs only and not include work outside the cost to elevate the structures. Also, all of the losses avoided are calculated in present-day values; therefore, the actual costs to elevate each structure should also be adjusted to present-day values.

Depending upon the scope of work for the study, an ROI can be calculated for each individual structure for a mitigation project (which could include multiple structures), by storm event, or for the whole study area (which could include multiple projects). If an ROI is calculated for each structure, the cost to elevate each structure should be determined, rather than using the total mitigation project costs, which could include multiple structures. Table 5.9 illustrates the method to calculate the ROI for each structure.

If an ROI is calculated for multiple structures, taking an average of the ROI for each structure is not appropriate. The total losses avoided for all of the structures should be added together and divided by the total construction costs.

Table 5.9

Return on Mitigation Investment Calculation

Structure	Completion Date of Structure Elevation	Losses Avoided (LA)	Cost of Structure Elevation (PI)	Return on Investment (ROI)
1	May 1999	$LA_1 = \$MP_{A1} - \$MP_{C1}$	$\$PI_1$	$ROI_1 = \$LA_1 / \$PI_1$
2	June 2003	$LA_2 = \$MP_{A2} - \$MP_{C2}$	$\$PI_2$	$ROI_2 = \$LA_2 / \$PI_2$
3	May 2005	$LA_3 = \$MP_{A3} - \$MP_{C3}$	$\$PI_3$	$ROI_3 = \$LA_3 / \$PI_3$

5.2.1 Sonoma County Elevation Study: Calculating ROI

The actual cost of construction to elevate each structure was available from the initial data collection efforts. Each value had to be adjusted to present-day values, since all of the losses were calculated in present-day values. The FEMA Inflation Calculator that can be found on the FEMA *Mitigation BCA Toolkit* (FEMA, 2006b), which uses an inflation rate of 3 percent per year, was used to perform these calculations.

ROI was calculated in four different ways to provide a series of data.

- An ROI was calculated for each individual structure for each of the five storm events analyzed (see Appendix B).
- An ROI was also calculated for each structure based on the cumulative avoided loss for all of the events that would have impacted the structure had it not been elevated (see Appendices C – G).
- A total ROI was calculated for each of the five peak events, based on the cumulative avoided losses for all of the structures that would have been impacted and the total cost to elevate all of the structures. These values are shown in Table 5.10.
- A total ROI was calculated for the study as a whole, based on the total cumulative loss for all structures and all peak storm events ($13.5 million), and the total cost to elevate all of the structures ($14.1 million). The total calculated ROI for the Sonoma County elevation study is 0.96 (see Table 5.10).

The results show that for the study as a whole, 96% of the project costs have been recovered based on losses avoided after the elevation projects were initiated.

Table 5.10

Return on Mitigation Investment

Analysis Information			Results by Loss Category				Losses Avoided Total	Project Investment[2] Adjusted for 2007 Dollars	Current ROI
			Physical Damage		Loss of Function				
Event Date	Structures Included in Analysis[1]	Structures For Which Losses Were Avoided	Damage to Structure Subtotal	Damage to Contents Subtotal	Displacement Costs Subtotal	Disruption Costs Subtotal			
January 3, 2002	134	11	$316,474	$89,097	$31,745	$67,268	**$504,584**	**$9,065,936**	**6%**
December 16, 2002	161	25	$646,323	$246,085	$78,747	$142,835	**$1,113,990**	**$11,223,554**	**10%**
December 30, 2003	168	9	$282,903	$70,417	$28,635	$55,852	**$437,807**	**$11,726,823**	**4%**
February 18, 2004	168	42	$1,000,826	$409,099	$138,835	$240,764	**$1,789,524**	**$11,726,823**	**15%**
January 1, 2006	195	155	$5,204,284	$2,313,745	$977,639	$1,205,297	**$9,700,965**	**$14,053,223**	**69%**
		Total	**$7,450,810**	**$3,128,443**	**$1,255,601**	**$1,712,016**	**$13,546,870**	**$14,186,135[3]**	**96%**

All amounts rounded to the nearest dollar.

[1] *Only structures that were elevated prior to the event were included in the analysis.*

[2] *Project Investment costs for each event include only the costs to elevate the structures that were included in the analysis for that event.*

[3] *Project Investment total includes the cost to elevate all 196 structures that proceeded through al phases of the study.*

Section Six:

Considerations and Recommended Practices

The Sonoma County elevation study yielded findings of potential value to future loss avoidance studies. Many of these findings could be incorporated into the planning and implementation of future elevation projects so that loss avoidance studies can be completed more efficiently. Section Six provides a discussion of considerations and recommended practices based on the findings of the study. These are organized by various stages within the study.

6.1 Structure Data

The data that were made available by the HMGP files was complete enough to begin the analysis of 197 out of 205 structures following the initial structure screening (Section 3.3). The data included essential information, such as the structure type, the MP_A and MP_C FFEs, the construction completion dates, and the actual construction costs. Although location information was provided in the HMGP files, as noted in Section 3.2, the exercise of verifying the locations of the structures using GIS tools proved to be invaluable as it assured more accurate results for the study. Discrepancies in the data for six of the structures were discovered, all of which were corrected within GIS before the Flood Inundation Analysis was initiated.

6.2 Gage Data

As noted in Section 4.3.1, a stream gage that provided a long history of discharge data were available for the Russian River in Guerneville. This was fortunate as a majority of the structures were located along the Russian River. Unfortunately, of the five tributaries to the Russian River that were included in the analysis (Austin Creek, Fife Creek, Pocket Canyon Creek, Dutch Bill Creek, and Hulbert Creek), Austin Creek was the only tributary which had a USGS gage station. Additionally, gage data were not available on Austin Creek prior to 2003. Therefore, the discharge amounts for the storms occurring in January 2002 and December 2002 were estimated. For the remaining four tributaries, discharge data provided by the FEMA FIS were used to estimate the discharges for all storm events. This was based on the assumption that the dates of the peak instantaneous discharges on the other tributaries would correspond to the dates of the peak instantaneous discharges of Austin Creek. Although this is not a practice recommended for a design project, it was deemed valid for the purposes of loss estimation. However, this method was only used after all other options were exhausted. No other sufficient stream or precipitation gage data were available

in the vicinity of the study area.

6.3 Hydrologic And Hydraulic Modeling

Since discharge data were provided by the stream gages in the Russian River and Austin Creek, a hydrologic analysis was unnecessary for the Sonoma County elevation study. As for the hydraulic analysis, the Russian River and all of the tributaries had been studied in detail by FEMA for the NFIP. A digital copy of each FEMA effective model was obtained. Although the original HEC-2 files were only provided in hard copy, recreating the files in HEC-RAS saved a great deal of time and improved the accuracy of the project. A duplicate of the FEMA effective 100-year base flood model was first created for each flooding source, for quality assurance purposes. Once a working model was created, the discharges were simply changed for each storm event analyzed (Section 4.3.2). The actual storm event water surface elevation at each of the modeled cross-sections could then be determined.

6.4 GIS

GIS data proved to be essential in the Sonoma County elevation study. In addition to providing easy verification of the locations of the structures, it was invaluable in the Flood Inundation Analysis. The cross-sections in the FEMA effective hydraulic models were digitized in GIS (Section 4.3.3). Next, for each storm event, the cross-sections in the GIS were attributed with the flood water surface elevations computed by HEC-RAS. By connecting the information at each cross-section, a water surface layer was created to account for the area between the cross-sections. Once the cross-sections were digitized and the TIN created, creating the water surface layer for each storm was relatively easy.

As previously mentioned, each structure was located in GIS using its latitude and longitude, and the MP_A FFEs were associated with each structure. Therefore, GIS data were used to subtract the FFE from the water surface elevation at the structure. This method not only saved a tremendous amount of time, it improved the accuracy of the project.

6.5 Threshold Analysis

The Southern California loss avoidance study focused heavily on the most significant storm event, but recommended that future studies consider performing a threshold analysis. It could be argued that estimating the cumulative losses avoided from all major storms that occurred since the structure was elevated is the most accurate method to determine if there is a positive return on investment. This could be a daunting task without the use of an automated

system. For the Sonoma County elevation study, incorporation of this practice greatly increased the ease of the threshold analysis.

Once the HEC-RAS hydraulic model was prepared and the cross-sections digitized in GIS, performing the Flood Inundation Analysis for each event was relatively easy. The most severe storm was analyzed first, and then the storms were analyzed in order of decreasing magnitude until it was calculated that no structures would have been damaged. The Sonoma County elevation study had an ideal situation in which the hydraulic modeling information was available and GIS could be used. In any case, a threshold analysis is recommended for future studies.

6.6 Loss Estimation Analysis

In comparison to performing a Loss Estimation Analysis for flood control mitigation projects, the calculations for an elevation study are fairly simple. The reason is that there are a limited number of loss types that can be included when only protecting structures. Additionally, the Sonoma County elevation study was focused on residential structures, which further simplified the calculations.

The HMGP project files provided the square footage of each structure. The additional following parameters were used:

- The BRV was estimated for each structure using an average value per square foot based on RSMeans data and local estimates.
- The contents value for each structure was based on the FEMA standard value for contents, at a ratio of 30% of the BRV.
- Displacement expense calculations used an average temporary rental rate based on local values, in addition to the FEMA standard values for relocation costs of a monthly fee of $500 and a one-time fee of $500.
- The FEMA standard estimate of $21.16 was used for lost wages.

FEMA standard damage curves were used in conjunction with the aforementioned values to perform the calculations. A spreadsheet was created with formulas to calculate each loss type based on the structure type (information provided by the HMGP file) and the depth of flooding within the structure (provided by GIS). Based on the actual depth of flooding, an Excel formula was used to acquire the appropriate bounding values in the damage curves and perform an interpolation calculation to find the actual damage value.

The structures were numbered early in the process. The depth of flooding in each structure for the event being analyzed was

calculated in GIS and output to an Excel spreadsheet. A column was created in the loss estimation spreadsheet for the depths, and all other calculations were linked to this column. Once the two spreadsheets were both sorted by the structure number, the column from the GIS output was simply copied into the loss estimation spreadsheet for each storm event and all calculations were easily completed for all structures. This greatly improved the efficiency of the Loss Estimation Analysis efforts and is highly recommended. However, any time large spreadsheets are used with many linked calculations, quality control checks are recommended because the chances for mistakes are increased.

6.7 Additional Analyses

A loss avoidance study is used to analyze the effectiveness of a mitigation project, and can be used to promote the value of investing in mitigation measures. The following are analyses that are not necessary to conduct a loss avoidance study, but should be performed for the benefit of more effectively conveying the results of the study.

6.7.1 Flood Boundary

Mapping the flood boundary of the peak event is not necessary for an elevation loss avoidance study and is only required if desired for reporting purposes. If the flood boundaries for the various event scenarios are needed for study reports and presentations, lower-quality topographic data sources that are readily available, such as USGS DEMs (Section 4.1.5.2), can be used to generate the boundary. If GIS tools are used in the analysis, mapping the flood boundary is fairly simple.

For the Sonoma County elevation study, a flood boundary was not created for each peak flood event. Instead, for graphic purposes, the flood depths at each structure were conveyed using points with various colors associated with the range in flood depths (Figure 4.10 and Appendix A).

6.7.2 Flood Recurrence Interval

Determining the recurrence interval of the peak event is not necessary to conduct a loss avoidance study for elevation projects. For example, the stream gage may provide discharges for multiple events that would have impacted a structure and the depth found for each event, without knowledge of the recurrence interval of those events. Such was the case for the Russian River. The peak discharges were used in the HEC-RAS hydraulic model, and the inundation analyses were performed without any regard to the recurrence intervals.

The recurrence interval may be a useful measure for comparing the studied events to subsequent events, or for comparing the mitigation projects to similar projects in other areas. Therefore, the following methods can be used to determine the recurrence interval, depending upon the type of analysis conducted.

- If a peak flood elevation at a structure is determined from an adjacent stream gage that only provides stage data, and no flood profiles for specific recurrence intervals were available from hydraulic model output, developing a stage-frequency curve based on the historical data provided by the gage is necessary. This can only be accomplished if sufficient historical measurements are available to perform a statistical stage-frequency analysis.
- If the peak event was determined from a stream gage that provides discharge data or from a precipitation gage, and no existing frequency analysis and hydraulic data are available, then the return frequency of the event must be based on a discharge-frequency or storm-frequency statistical analysis. Again, this can only be accomplished if sufficient historical data are available.
- If the peak flood elevation is determined using an existing hydraulic model containing flood profiles calculated for flows with specific recurrence intervals, such as one that was created for a FEMA FIRM, the peak flood elevation found for a structure can be compared to the various water surface elevations calculated in the existing hydraulic model at the two closest cross-sections. Using interpolation between water surface profiles and cross-sections, the recurrence interval of the actual event can be estimated.

In the case of the Sonoma County elevation study, peak annual statistical data for the Russian River gage were used to determine the flow rates of various return intervals (such as the 500-, 100-, and 10-year events) at the gage location. From that information, the return period of the actual events were interpolated (Section 4.3.1).

Appendix A:

Flood Inundation Analysis Results

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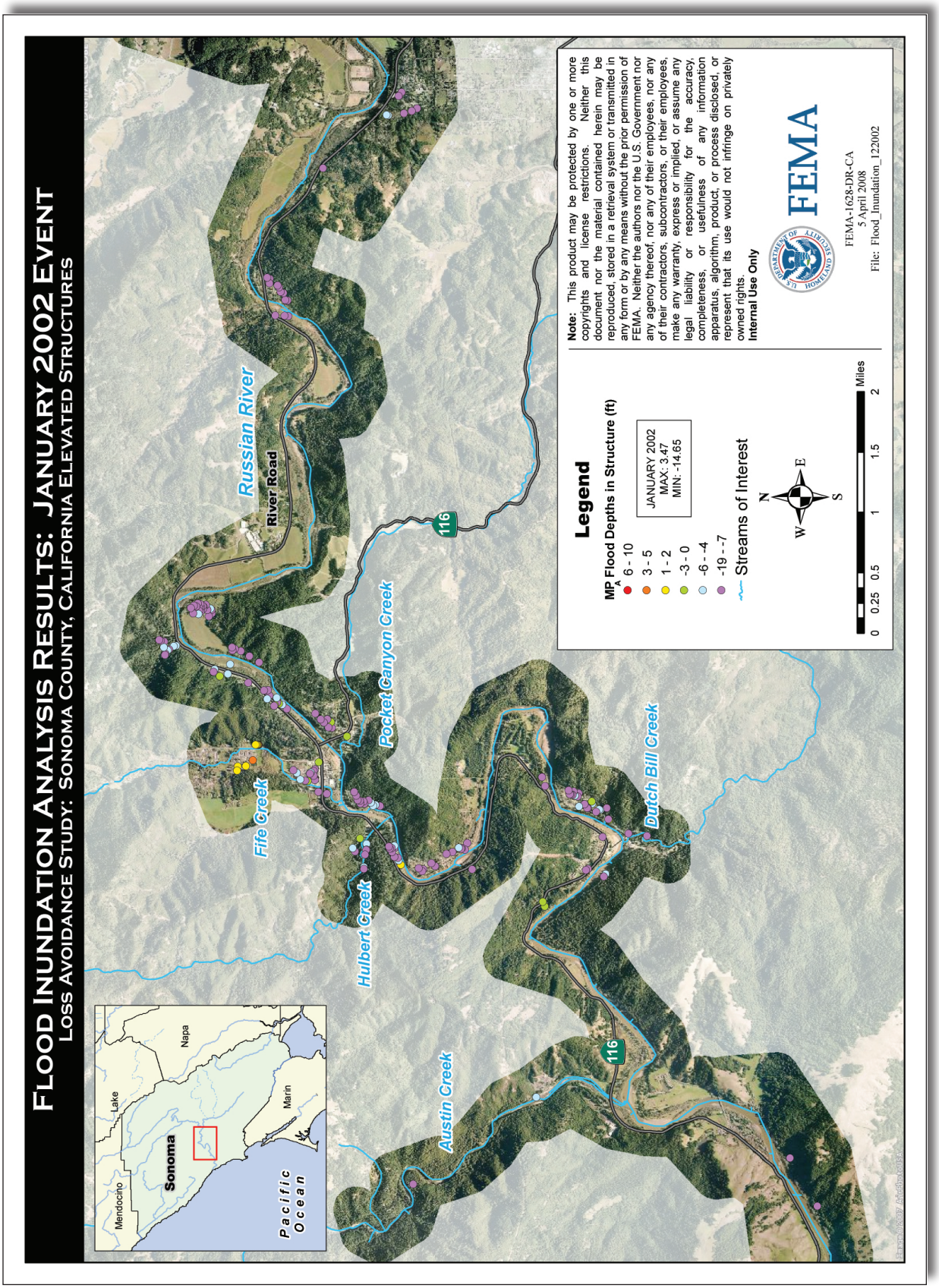
Figure A.4: Flood Inundation Analysis Results for February 2004 Event A-4
Figure A.5: Flood Inundation Analysis Results for January 2006 Event A-5

Figure A.1


Flood Inundation Analysis Results: January 2002 Event
Loss Avoidance Study: Sonoma County, California Elevated Structures
Mendocino
Lake
Napa
Sonoma
Marin
Pacific Ocean
Russian River
River Road
Fife Creek
Hulbert Creek
Pocket Canyon Creek
Dutch Bill Creek
Austin Creek
116
Legend
MP Flood Depths in Structure (ft)
6 - 10
3 - 5
1 - 2
-3 - 0
-6 - -4
-19 - -7
JANUARY 2002
MAX: 3.47
MIN: -14.65
Streams of Interest
N
W
E
S
0 0.25 0.5 1 1.5 2 Miles
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5 April 2008
File: Flood_Inundation_122002

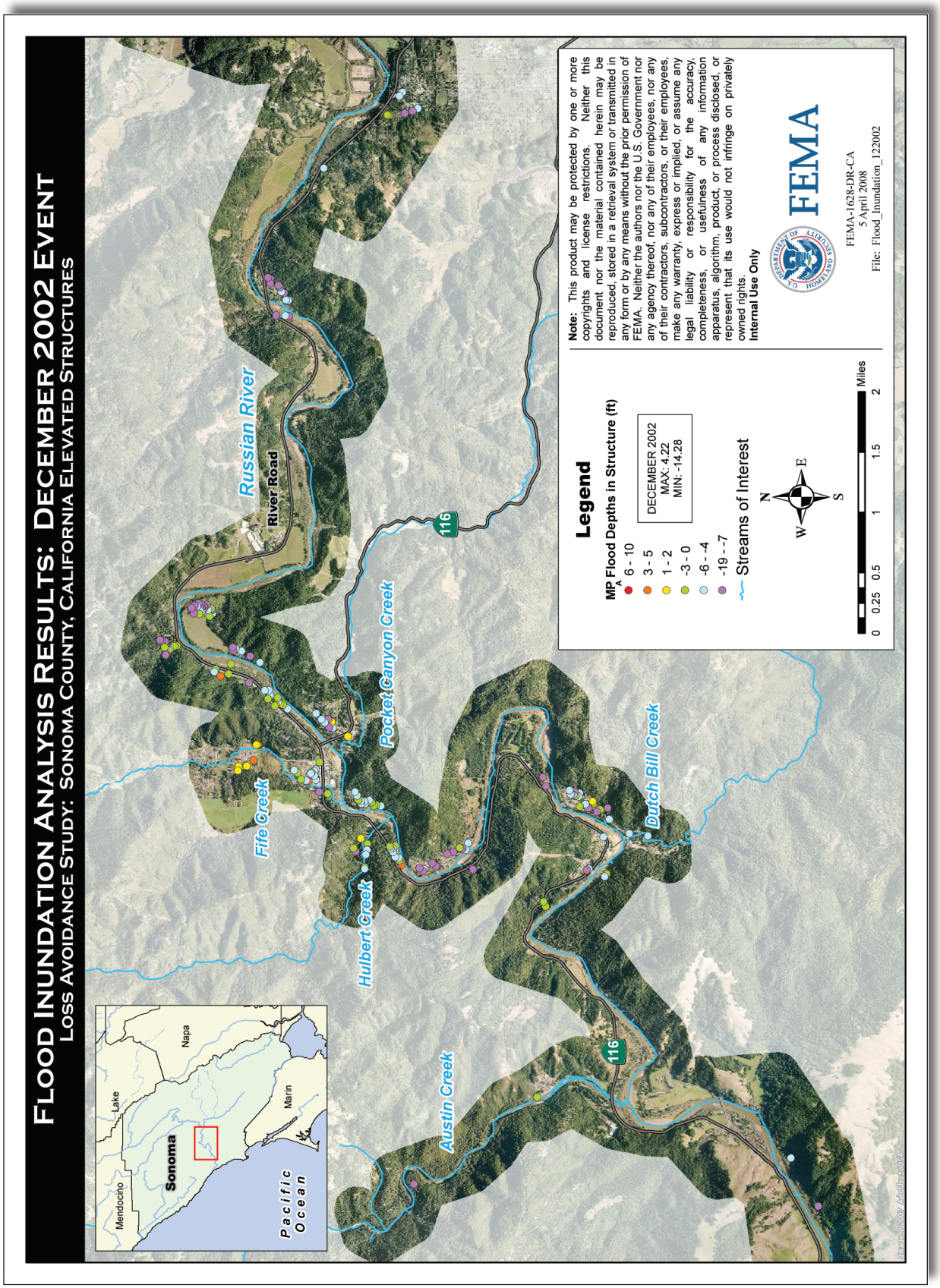
Flood Inundation Analysis Results: December 2002 Event
Loss Avoidance Study: Sonoma County, California Elevated Structures
Russian River
River Road
Fife Creek
Hulbert Creek
Pocket Canyon Creek
Austin Creek
Dutch Bill Creek
116
Mendocino
Lake
Napa
Sonoma
Marin
Pacific Ocean
Legend
MP Flood Depths in Structure (ft)
6 - 10
3 - 5
1 - 2
-3 - 0
-6 - -4
-19 - -7
Streams of Interest
DECEMBER 2002
MAX: 4.22
MIN: -14.28
N
E
S
W
0 0.25 0.5 1 1.5 2 Miles
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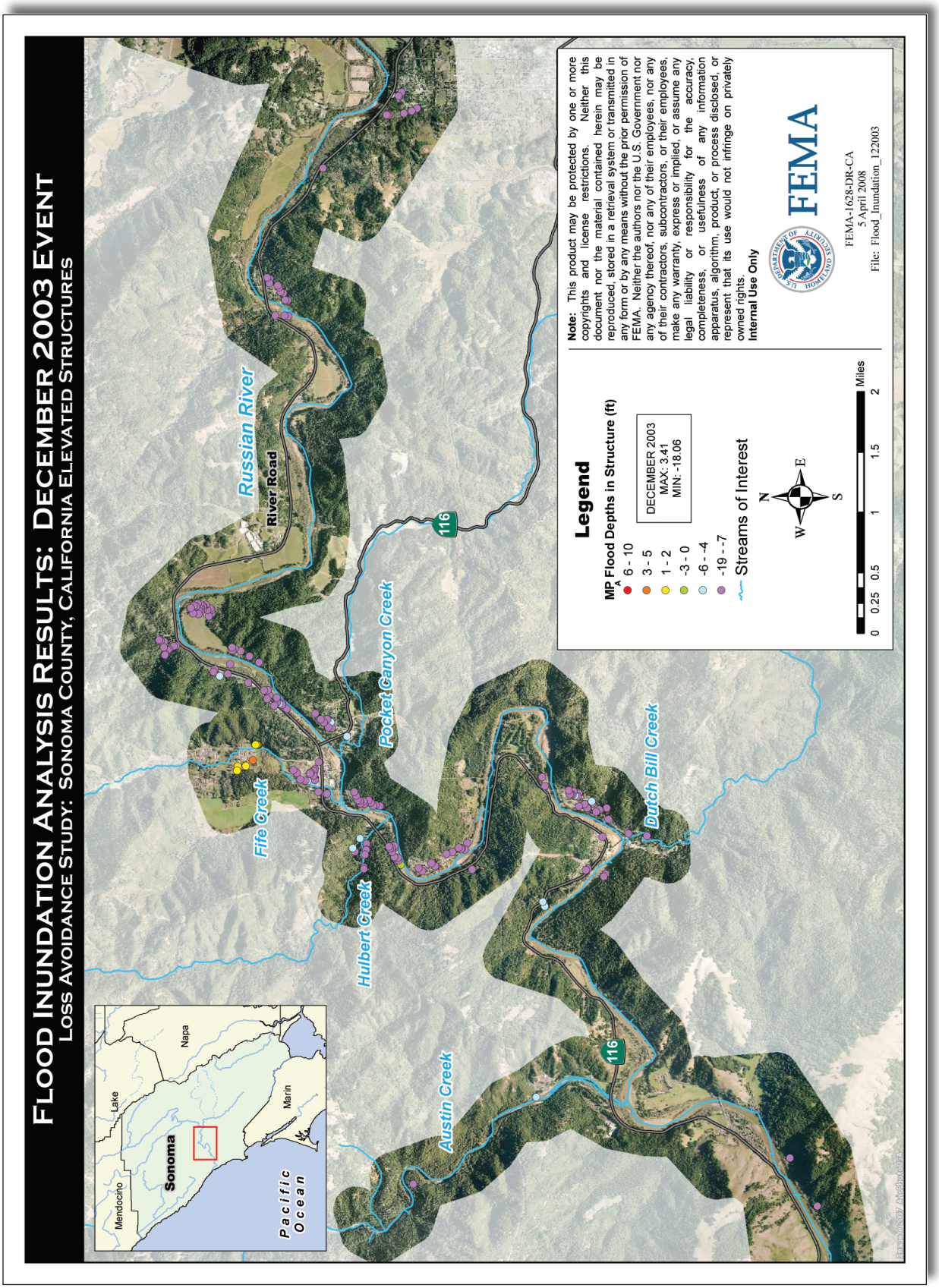
Figure A.2


Flood Inundation Analysis Results: December 2003 Event
Loss Avoidance Study: Sonoma County, California Elevated Structures
Mendocino
Lake
Napa
Sonoma
Marin
Pacific Ocean
Russian River
River Road
Fife Creek
Hulbert Creek
Pocket Canyon Creek
Dutch Bill Creek
Austin Creek
116
Legend
MP Flood Depths in Structure (ft)
6 - 10
3 - 5
1 - 2
-3 - 0
-6 - -4
-19 - -7
DECEMBER 2003
MAX: 3.41
MIN: -18.06
Streams of Interest
N
W
E
S
0 0.25 0.5 1 1.5 2 Miles
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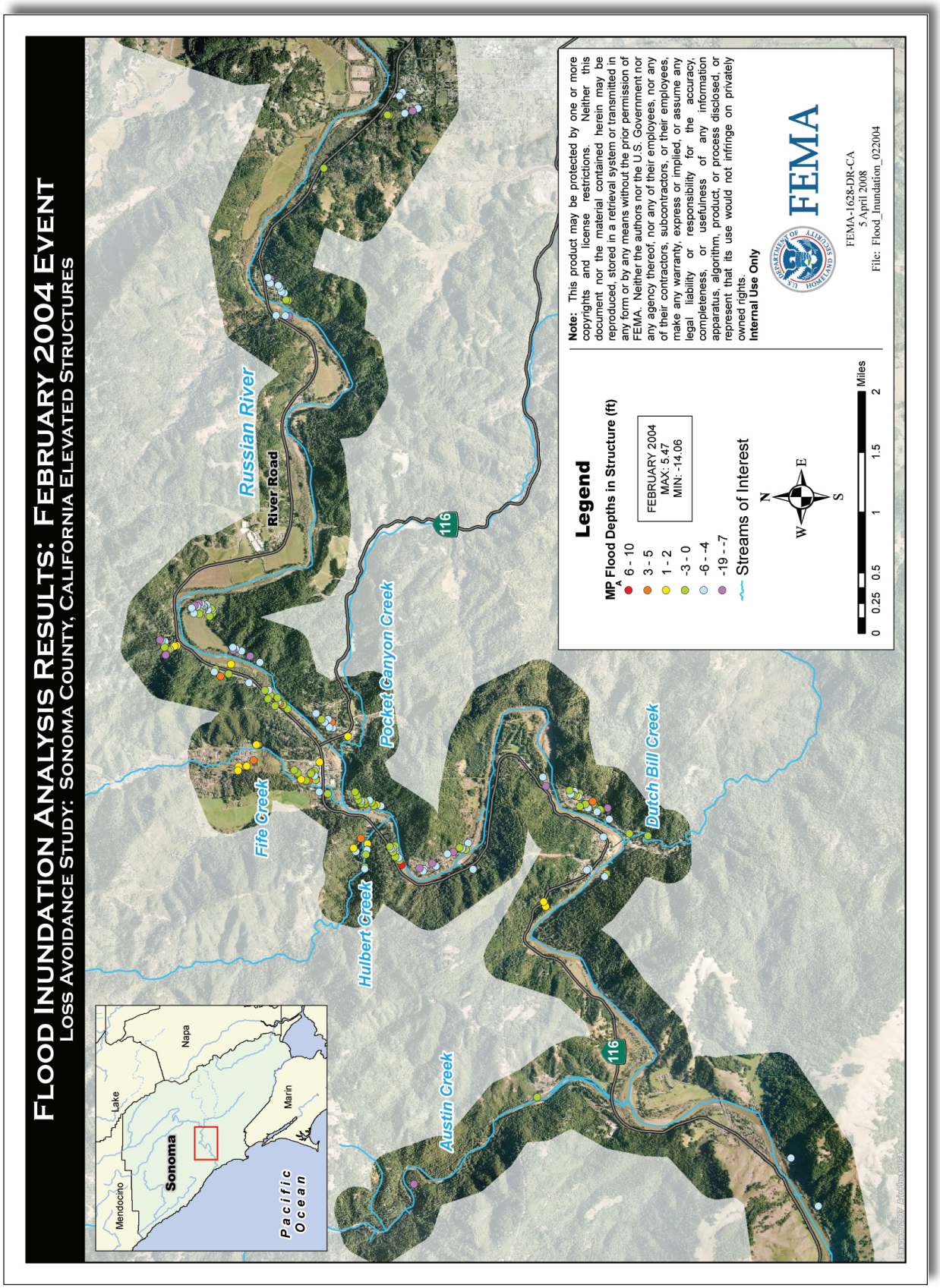
File: Flood_Inundation_122003

Figure A.3


Flood Inundation Analysis Results: February 2004 Event
Loss Avoidance Study: Sonoma County, California Elevated Structures
Russian River
River Road
Fife Creek
Hulbert Creek
Pocket Canyon Creek
Austin Creek
Dutch Bill Creek
116
Mendocino
Lake
Napa
Sonoma
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Pacific Ocean
Legend
MP Flood Depths in Structure (ft)
6 - 10
3 - 5
1 - 2
-3 - 0
-6 - -4
-19 - -7
FEBRUARY 2004
MAX: 5.47
MIN: -14.06
Streams of Interest
N
W
E
S
0 0.25 0.5 1 1.5 2 Miles
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Figure A.4

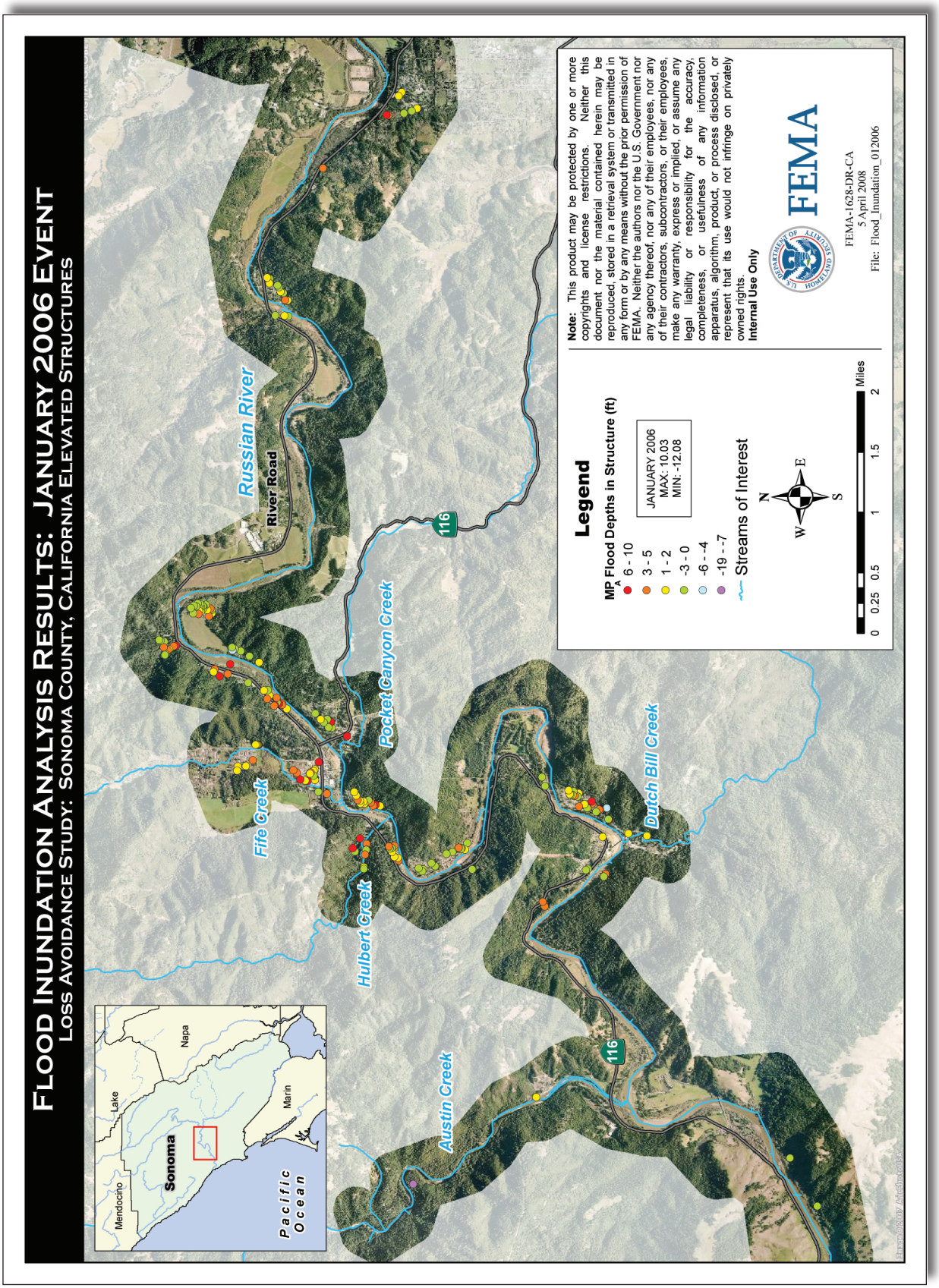
Flood Inundation Analysis Results: January 2006 Event
Loss Avoidance Study: Sonoma County, California Elevated Structures
Mendocino
Lake
Napa
Sonoma
Marin
Pacific Ocean
Russian River
River Road
Fife Creek
Hulbert Creek
Pocket Canyon Creek
Dutch Bill Creek
Austin Creek
116
Legend
MP Flood Depths in Structure (ft)
6 - 10
3 - 5
1 - 2
-3 - 0
-6 - -4
-19 - -7
JANUARY 2006
MAX: 10.03
MIN: -12.08
Streams of Interest
N
W
E
S
0 0.25 0.5 1 1.5 2 Miles
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Figure A.5

Appendix B:

Summary of Losses Avoided and ROI Calculations for All Events

List of Tables

Table B.1: Summary of Losses Avoided and ROI Calculations for All Events B-1

Table B.1 Part 1 of 6

Summary of Losses Avoided and ROI Calculations for All Events

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	ELEVATION COMPLETION DATE	2007 INFLATED COST TO ELEVATE STRUCTURE	JANUARY 3, 2002 LOSSES AVOIDED	DECEMBER 16, 2002 LOSSES AVOIDED	DECEMBER 30, 2003 LOSSES AVOIDED	FEBRUARY 18, 2004 LOSSES AVOIDED	JANUARY 1, 2006 LOSSES AVOIDED	TOTAL LOSSES AVOIDED	ROI
87	14775	Northern	Guernevil	38.51763	-122.97264	4/17/1998	$ 48,710.52	$ -	$ -	$ -	$ -	$ -	$ -	-
10	8672	Trenton R	Forestvil	38.49042	-122.89674	6/19/1998	$ 41,824.80	$ -	$ -	$ -	$ -	$ 32,636.36	$ 32,636.36	0.78
122	16117	Laughlin	Guernevil	38.51084	-122.99656	6/19/1998	$ 49,514.60	$ 43,593.70	$ 44,179.28	$ 43,408.78	$ 44,518.29	$ 45,828.13	$ 221,528.18	4.47
151	17351	HWY 116	Guernevil	38.49438	-123.00961	6/30/1998	$ 51,014.90	$ -	$ -	$ -	$ -	$ 23,331.02	$ 23,331.02	0.46
23	10770	Old River	Forestvil	38.50667	-122.92492	7/10/1998	$ 52,268.45	$ -	$ -	$ -	$ -	$ -	$ -	-
172	19720	Redwood D	Monte Rio	38.47541	-122.99894	7/10/1998	$ 45,950.36	$ -	$ -	$ -	$ -	$ 16,923.99	$ 16,923.99	0.37
120	16055	Riverland	Guernevil	38.50156	-122.99157	7/17/1998	$ 56,860.48	$ -	$ -	$ -	$ -	$ 6,483.56	$ 6,483.56	0.11
152	17355	HWY 116	Guernevil	38.49421	-123.00988	7/17/1998	$ 49,630.52	$ -	$ -	$ -	$ -	$ 58,931.70	$ 58,931.70	1.19
2	1285	Willowsid	Santa Ros	38.44330	-122.75360	8/14/1998		$ -	$ -	$ -	$ -	$ -	$ -	-
181	20226	Willow Rd	Monte Rio	38.47193	-123.00161	8/21/1998	$ 51,014.90	$ -	$ -	$ -	$ -	$ 37,759.96	$ 37,759.96	0.74
113	15627	Riverside	Guernevil	38.50704	-122.98824	9/4/1998		$ -	$ -	$ -	$ -	$ -	$ -	-
125	16325	4th ST	Guernevil	38.50320	-122.99808	9/4/1998	$ 51,014.90	$ -	$ -	$ -	$ -	$ 73,010.61	$ 73,010.61	1.43
190	20399	River Blv	Monte Rio	38.47006	-123.00410	9/18/1998	$ 42,575.43	$ -	$ -	$ -	$ -	$ 49,514.73	$ 49,514.73	1.16
195	20813	River Blv	Monte Rio	38.46762	-123.00582	10/2/1998	$ 71,247.45	$ -	$ 39,323.94	$ -	$ 65,585.20	$ 119,917.36	$ 224,826.50	3.16
199	21340	Monte Cri	Monte Rio	38.47546	-123.01919	10/2/1998	$ 60,625.23	$ -	$ 12,241.30	$ -	$ 31,826.88	$ 78,314.19	$ 122,382.37	2.02
17	10006	Heller St	Monte Rio	38.46892	-123.00398	10/6/1998	$ 49,414.40	$ -	$ -	$ -	$ 7,661.30	$ 60,194.00	$ 67,855.30	1.37
180	20225	Willow Rd	Monte Rio	38.47193	-123.00161	10/9/1998	$ 60,041.98	$ -	$ -	$ -	$ -	$ -	$ -	-
133	16465	HWY 116	Guernevil	38.50188	-123.00095	10/30/1998	$ 49,027.25	$ -	$ -	$ -	$ -	$ 84,544.29	$ 84,544.29	1.72
8	8650	Mirabel R	Forestvil	38.49302	-122.89478	11/6/1998	$ 69,077.57	$ -	$ -	$ -	$ -	$ 26,973.90	$ 26,973.90	0.39
124	16225	Drake Rd	Guernevil	38.49930	-122.99287	11/6/1998	$ 73,679.65	$ -	$ 29,943.33	$ -	$ 62,912.54	$ 142,353.88	$ 235,209.76	3.19
3	1285	Willowsid	Santa Ros	38.44330	-122.75360	11/13/1998		$ -	$ -	$ -	$ -	$ -	$ -	-
110	15619	Riverside	Guernevil	38.50754	-122.98788	11/20/1998	$ 60,949.92	$ -	$ 28,716.54	$ -	$ 50,712.88	$ 92,846.00	$ 172,275.42	2.83
123	16185	Neeley Rd	Guernevil	38.49835	-122.99420	11/20/1998		$ -	$ -	$ -	$ -	$ -	$ -	-
178	20217	Alder Rd	Monte Rio	38.47245	-123.00183	12/11/1998	$ 88,778.35	$ -	$ -	$ -	$ -	$ 27,359.68	$ 27,359.68	0.31
31	11880	Summerhom	Forestvil	38.49798	-122.93892	12/14/1998		$ -	$ -	$ -	$ -	$ -	$ -	-
22	10716	Old River	Forestvil	38.50744	-122.92415	12/24/1998	$ 48,399.81	$ -	$ -	$ -	$ -	$ 12,757.61	$ 12,757.61	0.26
142	16751	Guernewoo	Guernevil	38.49704	-123.00336	12/24/1998	$ 52,623.89	$ -	$ -	$ -	$ -	$ 43,411.37	$ 43,411.37	0.82
132	16463	HWY 116	Guernevil	38.50188	-123.00095	1/5/1999	$ 50,483.62	$ -	$ -	$ -	$ -	$ 91,204.56	$ 91,204.56	1.81
188	20357	HWY 116	Monte Rio	38.46845	-123.00808	1/9/1999	$ 56,129.37	$ -	$ -	$ -	$ -	$ 37,756.91	$ 37,756.91	0.67
35	14216	Mill St	Guernevil	38.50473	-122.99923	1/15/1999	$ 64,957.76	$ -	$ -	$ -	$ -	$ 55,665.43	$ 55,665.43	0.86
146	16811	Center Wa	Guernevil	38.49574	-123.00337	1/22/1999	$ 81,389.55	$ -	$ 6,180.88	$ -	$ 35,562.34	$ 106,071.68	$ 147,814.89	1.82
79	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1/29/1999	$ 98,680.08	$ -	$ -	$ -	$ -	$ 58,112.12	$ 58,112.12	0.59
143	16755	Center Wa	Guernevil	38.49660	-123.02910	1/29/1999	$ 51,256.49	$ -	$ -	$ -	$ -	$ 16,917.19	$ 16,917.19	0.33
28	10940	Sunset Av	Forestvil	38.50763	-122.92840	2/5/1999	$ 76,896.13	$ -	$ -	$ -	$ -	$ 2,190.09	$ 2,190.09	0.03
80	14712	Rio Nido	Rio Nido	38.52076	-122.97954	2/5/1999	$ 56,144.36	$ -	$ -	$ -	$ -	$ 19,567.58	$ 19,567.58	0.35
78	14712	Rio Nido	Rio Nido	38.52076	-122.97954	2/19/1999	$ 62,736.56	$ -	$ -	$ -	$ 1,848.29	$ 59,057.71	$ 60,906.00	0.97
107	15555	Bonita Av	Guernevil	38.50774	-122.98819	2/19/1999	$ 53,547.22	$ -	$ 24,575.87	$ -	$ 47,188.31	$ 95,563.17	$ 167,327.35	3.12
161	17549	Orchard A	Guernevil	38.48898	-123.01251	2/19/1999	$ 57,556.14	$ -	$ -	$ -	$ -	$ -	$ -	-

Table B.1 Part 2 of 6

Summary of Losses Avoided and ROI Calculations for All Events

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	ELEVATION COMPLETION DATE	2007 INFLATED COST TO ELEVATE STRUCTURE	JANUARY 3, 2002 LOSSES AVOIDED	DECEMBER 16, 2002 LOSSES AVOIDED	DECEMBER 30, 2003 LOSSES AVOIDED	FEBRUARY 18, 2004 LOSSES AVOIDED	JANUARY 1, 2006 LOSSES AVOIDED	TOTAL LOSSES AVOIDED	ROI
114	15675	Riverside	Guernevil	38.50651	-122.98881	2/26/1999	$ 74,974.73	$ -	$ -	$ -	$ -	$ 119,842.42	$ 119,842.42	1.60
104	15470	Riverside	Guernevil	38.50837	-122.98640	3/5/1999	$ 50,097.18	$ -	$ -	$ -	$ -	$ 57,641.30	$ 57,641.30	1.15
121	16060	Riverland	Guernevil	38.50111	-122.99214	3/12/1999	$ 72,003.61	$ -	$ -	$ -	$ -	$ 18,832.56	$ 18,832.56	0.26
131	16451	Mill St	Guernevil	38.50375	-122.99927	3/12/1999	$ 73,060.29	$ 4,348.07	$ 98,271.14	$ -	$ 115,040.82	$ 195,172.29	$ 412,832.32	5.65
77	14712	Rio Nido	Rio Nido	38.52076	-122.97954	3/26/1999	$ 62,100.52	$ -	$ -	$ -	$ 12,421.93	$ 60,784.44	$ 73,206.36	1.18
135	16600	Laughlin	Guernevil	38.51346	-123.00310	3/26/1999		$ -	$ -	$ -	$ -	$ -	$ -	-
91	14918	Drake Roa	Guernevil	38.51260	-122.97935	4/2/1999	$ 43,033.66	$ -	$ -	$ -	$ -	$ 16,142.86	$ 16,142.86	0.38
21	10696	Old River	Forestvil	38.50741	-122.92378	4/16/1999	$ 55,637.15	$ -	$ -	$ -	$ -	$ 8,031.49	$ 8,031.49	0.14
138	16664	Center Wa	Guernevil	38.49778	-123.00238	5/21/1999	$ 57,952.78	$ -	$ -	$ -	$ -	$ 79,848.47	$ 79,848.47	1.38
108	15587	Bonita Av	Guernevil	38.50778	-122.98827	5/28/1999	$ 49,109.87	$ -	$ -	$ -	$ -	$ 73,227.55	$ 73,227.55	1.49
115	15850	Riverland	Guernevil	38.50458	-122.99016	5/28/1999	$ 75,005.68	$ -	$ -	$ -	$ -	$ 47,958.84	$ 47,958.84	0.64
19	10599	Grays Rd	Forestvil	38.50856	-122.92287	6/18/1999	$ 56,462.59	$ -	$ -	$ -	$ -	$ -	$ -	-
29	10959	Sunset Av	Forestvil	38.50669	-122.92869	6/18/1999	$ 57,708.87	$ -	$ -	$ -	$ -	$ 25,935.30	$ 25,935.30	0.45
83	14726	Willow Rd	Rio Nido	38.52138	-122.97815	6/18/1999	$ 67,866.22	$ -	$ -	$ -	$ -	$ -	$ -	-
170	18063	Elm Ave	Monte Rio	38.47129	-123.00225	6/18/1999	$ 52,047.93	$ -	$ -	$ -	$ -	$ 5,615.07	$ 5,615.07	0.11
15	9425	Old River	Forestvil	38.50218	-122.90591	7/2/1999	$ 70,054.80	$ -	$ -	$ -	$ -	$ 92,644.21	$ 92,644.21	1.32
187	20309	River Blv	Monte Rio	38.47121	-123.00371	7/2/1999	$ 68,487.69	$ -	$ -	$ -	$ -	$ 88,946.80	$ 88,946.80	1.30
126	16342	5th ST #A	Guernevil	38.50407	-122.99773	7/9/1999	$ 72,278.23	$ -	$ 17,395.18	$ -	$ 38,505.84	$ 92,481.99	$ 148,383.01	2.05
112	15625	Riverside	Guernevil	38.50718	-122.98803	7/16/1999	$ 66,559.56	$ -	$ -	$ -	$ 7,860.79	$ 85,905.05	$ 93,765.84	1.41
101	15280	Old River	Guernevil	38.51086	-122.98450	7/30/1999	$ 50,188.40	$ -	$ -	$ -	$ -	$ 4,477.79	$ 4,477.79	0.09
168	17786	Orchard A	Guernevil	38.48512	-123.01002	8/13/1999	$ 61,162.09	$ -	$ -	$ -	$ -	$ 78,796.27	$ 78,796.27	1.29
119	16010	Drake Rd	Guernevil	38.50086	-122.99042	8/27/1999	$ 100,770.85	$ -	$ 57,402.59	$ -	$ 85,223.56	$ 139,392.83	$ 282,018.98	2.80
177	20201	Willow Rd	Monte Rio	38.47251	-123.00133	8/27/1999	$ 83,348.20	$ -	$ -	$ -	$ -	$ 53,535.34	$ 53,535.34	0.64
139	16686	Center Wa	Guernevil	38.49734	-123.00246	9/3/1999	$ 65,200.02	$ -	$ -	$ -	$ -	$ 57,875.39	$ 57,875.39	0.89
192	20550	Alder Rd	Monte Rio	38.46901	-123.00390	9/10/1999	$ 69,323.91	$ -	$ -	$ -	$ -	$ 70,398.57	$ 70,398.57	1.02
58	14536	Eastern A	Guernevil	38.51529	-122.97383	9/24/1999	$ 65,529.24	$ -	$ -	$ -	$ -	$ 95,975.76	$ 95,975.76	1.46
94	15029	Foothill	Guernevil	38.51429	-122.98312	10/1/1999	$ 88,260.49	$ 133,811.59	$ 153,838.34	$ 126,420.00	$ 161,792.28	$ 191,897.93	$ 767,760.13	8.70
41	14263	Lovers Ln	Guernevil	38.49685	-123.01000	10/8/1999	$ 64,076.62	$ -	$ -	$ -	$ -	$ 23,882.18	$ 23,882.18	0.37
130	16451	4th ST	Guernevil	38.50336	-122.99838	10/8/1999	$ 77,936.34	$ -	$ -	$ -	$ -	$ 67,892.05	$ 67,892.05	0.87
13	8894	Trenton R	Forestvil	38.49405	-122.89800	10/15/1999	$ 74,009.90	$ -	$ -	$ -	$ 2,615.55	$ 88,062.02	$ 90,677.57	1.23
167	17777	Orchard A	Guernevil	38.48521	-123.01011	10/15/1999	$ 61,294.50	$ -	$ -	$ -	$ -	$ 25,686.50	$ 25,686.50	0.42
193	20790	Kingston	Monte Rio	38.46776	-123.00485	10/22/1999	$ 53,633.38	$ -	$ -	$ -	$ -	$ -	$ -	-
64	14619	Eastern A	Guernevil	38.51618	-122.97296	10/25/1999	$ 62,829.73	$ -	$ -	$ -	$ -	$ -	$ -	-
14	8990	Trenton R	Forestvil	38.49428	-122.89801	11/5/1999	$ 70,779.05	$ -	$ -	$ -	$ 14,847.95	$ 82,230.05	$ 97,078.00	1.37
155	17429	River Ln	Guernevil	38.48988	-123.01326	12/3/1999	$ 68,496.40	$ -	$ -	$ -	$ -	$ 7,420.74	$ 7,420.74	0.11
166	17775	Orchard A	Guernevil	38.48530	-123.01025	12/3/1999	$ 59,068.38	$ -	$ -	$ -	$ -	$ -	$ -	-
55	14501	Cherry St	Guernevil	38.49695	-123.01263	12/10/1999	$ 67,830.11	$ -	$ -	$ -	$ -	$ 52,556.57	$ 52,556.57	0.77
179	20219	Alder Rd	Monte Rio	38.47227	-123.00205	12/10/1999	$ 88,091.34	$ -	$ -	$ -	$ -	$ 3,440.56	$ 3,440.56	0.04

Table B.1 Part 3 of 6

Summary of Losses Avoided and ROI Calculations for All Events

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	ELEVATION COMPLETION DATE	2007 INFLATED COST TO ELEVATE STRUCTURE	JANUARY 3, 2002 LOSSES AVOIDED	DECEMBER 16, 2002 LOSSES AVOIDED	DECEMBER 30, 2003 LOSSES AVOIDED	FEBRUARY 18, 2004 LOSSES AVOIDED	JANUARY 1, 2006 LOSSES AVOIDED	TOTAL LOSSES AVOIDED	ROI
200	21608	Moscow Rd	Monte Rio	38.46794	-123.01399	12/17/1999	$ 61,251.18	$ -	$ -	$ -	$ -	$ 57,409.28	$ 57,409.28	0.94
201	21610	Moscow Rd	Monte Rio	38.46799	-123.01410	12/17/1999	$ 64,540.31	$ -	$ -	$ -	$ -	$ 57,409.28	$ 57,409.28	0.89
6	5232	Odonnell	Glen Elle	38.36690	-122.51980	12/23/1999		$ -	$ -	$ -	$ -	$ -	$ -	-
127	16356	4th ST #1	Guernevil	38.50327	-122.99856	1/7/2000	$ 49,581.92	$ -	$ -	$ -	$ -	$ 73,874.76	$ 73,874.76	1.49
128	16356	4th ST #2	Guernevil	38.50327	-122.99856	1/7/2000	$ 46,260.92	$ -	$ -	$ -	$ -	$ 73,874.76	$ 73,874.76	1.60
73	14706	Rio Nido	Guernevil	38.52020	-122.97882	1/14/2000	$ 59,697.31	$ -	$ -	$ -	$ -	$ 36,304.78	$ 36,304.78	0.61
86	14760	Rio Nido	Guernevil	38.52110	-122.98015	1/14/2000	$ 54,569.52	$ -	$ -	$ -	$ -	$ -	$ -	-
141	16725	Guernewoo	Guernevil	38.49750	-123.00326	2/4/2000	$ 93,920.34	$ -	$ -	$ -	$ -	$ 55,325.37	$ 55,325.37	0.59
34	14185	Old Cazad	Guernevil	38.49746	-123.00850	2/25/2000	$ 88,636.88	$ -	$ 98,243.58	$ -	$ 136,389.14	$ 294,375.33	$ 529,008.06	5.97
163	17670	Neeley Rd	Guernevil	38.48727	-123.01067	2/25/2000	$ 89,061.84	$ -	$ -	$ -	$ -	$ -	$ -	-
160	17485	Riverside	Guernevil	38.49283	-123.01257	3/17/2000	$ 106,455.89	$ 47,475.08	$ 108,554.56	$ -	$ 122,131.23	$ 200,204.21	$ 478,365.08	4.49
173	19738	Crescent	Monte Rio	38.47550	-122.99913	3/17/2000	$ 48,222.91	$ -	$ -	$ -	$ -	$ -	$ -	-
27	10870	Forest Hi	Forestvil	38.50711	-122.92462	3/31/2000	$ 74,274.78	$ -	$ -	$ -	$ -	$ 138,266.40	$ 138,266.40	1.86
95	15030	Old River	Guernevil	38.51427	-122.98268	3/31/2000	$ 67,076.21	$ -	$ -	$ -	$ 7,420.74	$ 86,295.45	$ 93,716.19	1.40
102	15410	Riverside	Guernevil	38.50895	-122.98567	5/5/2000	$ 60,013.34	$ -	$ -	$ -	$ -	$ 39,461.92	$ 39,461.92	0.66
164	17711	GreenTree	Guernevil	38.48649	-123.01075	5/12/2000	$ 60,507.55	$ -	$ -	$ -	$ -	$ -	$ -	-
26	10843	Summerhom	Forestvil	38.50607	-122.92607	5/19/2000	$ 81,643.10	$ -	$ -	$ -	$ -	$ -	$ -	-
198	21330	Monte Cri	Monte Rio	38.47520	-123.01900	5/26/2000	$ 54,088.22	$ -	$ 8,528.84	$ -	$ 28,716.21	$ 76,920.94	$ 114,165.99	2.11
159	17461	Riverside	Guernevil	38.49302	-123.01204	6/9/2000	$ 103,286.79	$ -	$ -	$ -	$ 21,529.17	$ 121,494.56	$ 143,023.73	1.38
36	14226	Lovers Ln	Guernevil	38.49662	-123.00931	6/23/2000	$ 55,068.33	$ -	$ -	$ -	$ 22,020.06	$ 73,624.07	$ 95,644.13	1.74
165	17765	GreenTree	Guernevil	38.48577	-123.01004	6/23/2000	$ 75,827.66	$ -	$ -	$ -	$ 13,093.06	$ 60,905.67	$ 73,998.73	0.98
62	14600	Rio Nido	Guernevil	38.51966	-122.97860	7/14/2000	$ 59,283.88	$ -	$ -	$ -	$ 20,536.56	$ 70,824.13	$ 91,360.68	1.54
136	16610	Neeley Rd	Guernevil	38.49827	-123.00121	7/14/2000	$ 68,832.03	$ -	$ -	$ -	$ -	$ 59,328.20	$ 59,328.20	0.86
76	14710	Carrier L	Guernevil	38.51240	-122.99778	8/11/2000	$ 69,821.57	$ 61,060.39	$ 63,483.76	$ 59,675.61	$ 64,522.35	$ 75,946.83	$ 324,688.95	4.65
153	17385	HWY 116 (	Guernevil	38.49397	-123.01058	8/18/2000	$ 71,165.34	$ -	$ -	$ -	$ -	$ 102,022.95	$ 102,022.95	1.43
20	10670	Grays Ct	Forestvil	38.50848	-122.92344	8/25/2000	$ 65,818.53	$ -	$ -	$ -	$ -	$ 43,954.49	$ 43,954.49	0.67
75	14709	Carrier L	Guernevil	38.51224	-122.99767	9/8/2000	$ 75,845.49	$ 56,689.21	$ 58,582.36	$ 55,790.34	$ 59,583.41	$ 69,260.30	$ 299,905.62	3.95
129	16365	4th ST	Guernevil	38.50326	-122.99879	9/8/2000	$ 74,831.36	$ -	$ -	$ -	$ -	$ 12,233.78	$ 12,233.78	0.16
72	14698	Orchard L	Guernevil	38.51696	-122.97305	9/29/2000	$ 71,328.93	$ -	$ -	$ -	$ -	$ -	$ -	-
111	15623	Riverside	Guernevil	38.50708	-122.98816	9/29/2000	$ 73,936.53	$ -	$ 28,756.36	$ -	$ 57,371.01	$ 177,007.48	$ 263,134.86	3.56
16	9894	Bohemian	Monte Rio	38.46261	-123.00829	10/6/2000	$ 103,688.08	$ -	$ -	$ -	$ -	$ 90,040.11	$ 90,040.11	0.87
93	14991	Melody Av	Guernevil	38.51172	-122.98007	10/18/2000	$ 78,956.47	$ -	$ -	$ -	$ -	$ 41,445.86	$ 41,445.86	0.52
49	14501	Armstrong	Guernevil	38.50999	-122.99431	11/3/2000	$ 64,321.62	$ 54,195.71	$ 56,208.98	$ 53,573.05	$ 56,665.59	$ 59,197.75	$ 279,841.08	4.35
51	14501	Armstrong	Guernevil	38.51014	-122.99429	11/3/2000	$ 64,321.62	$ 28,282.64	$ 31,012.00	$ 27,492.61	$ 32,838.47	$ 43,133.12	$ 162,758.84	2.53
11	8706	Trenton R	Forestvil	38.49118	-122.89737	11/17/2000	$ 67,569.74	$ -	$ -	$ -	$ -	$ -	$ -	-
61	14594	Eastern A	Guernevil	38.51580	-122.97331	12/1/2000	$ 89,649.78	$ -	$ -	$ -	$ -	$ 31,932.47	$ 31,932.47	0.36
24	10840	Buena Vis	Forestvil	38.50648	-122.92594	12/8/2000	$ 59,411.02	$ -	$ -	$ -	$ -	$ 53,952.33	$ 53,952.33	0.91
186	20295	Alder Rd	Monte Rio	38.46974	-123.00342	12/8/2000	$ 68,272.38	$ -	$ -	$ -	$ 6,763.86	$ 70,675.06	$ 77,438.92	1.13

Table B.1 Part 4 of 6

Summary of Losses Avoided and ROI Calculations for All Events

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	ELEVATION COMPLETION DATE	2007 INFLATED COST TO ELEVATE STRUCTURE	JANUARY 3, 2002 LOSSES AVOIDED	DECEMBER 16, 2002 LOSSES AVOIDED	DECEMBER 30, 2003 LOSSES AVOIDED	FEBRUARY 18, 2004 LOSSES AVOIDED	JANUARY 1, 2006 LOSSES AVOIDED	TOTAL LOSSES AVOIDED	ROI
191	20503	River Blv	Monte Rio	38.46926	-123.00457	12/8/2000	$ 67,066.98	$ -	$ -	$ -	$ -	$ -	$ -	-
67	14650	Eastern A	Guernevil	38.51665	-122.97250	12/15/2000	$ 73,044.78	$ -	$ -	$ -	$ -	$ 7,967.02	$ 7,967.02	0.11
44	14315	Lovers La	Guernevil	38.49700	-123.01078	1/12/2001	$ 60,228.72	$ -	$ -	$ -	$ -	$ 59,905.60	$ 59,905.60	0.99
134	16570	River Rd	Guernevil	38.50227	-123.00143	1/12/2001	$ 62,629.18	$ -	$ -	$ -	$ -	$ 36,259.56	$ 36,259.56	0.58
162	17570	Orchard A	Guernevil	38.48869	-123.01241	1/12/2001	$ 66,260.73	$ -	$ -	$ -	$ -	$ -	$ -	-
144	16775	Center Wa	Guernevil	38.49648	-123.00304	2/23/2001	$ 72,121.18	$ -	$ -	$ -	$ 21,308.69	$ 92,160.37	$ 113,469.06	1.57
92	14991	Foothill	Guernevil	38.51503	-122.98273	3/2/2001	$ 77,335.98	$ -	$ -	$ -	$ -	$ 58,209.66	$ 58,209.66	0.75
103	15437	Riverside	Guernevil	38.50879	-122.98592	3/9/2001	$ 98,776.64	$ -	$ -	$ -	$ -	$ 26,658.98	$ 26,658.98	0.27
196	21081	River Blv	Monte Rio	38.46545	-123.00781	3/9/2001	$ 72,345.65	$ -	$ -	$ -	$ -	$ 61,417.09	$ 61,417.09	0.85
70	14680	Orchard L	Guernevil	38.51677	-122.97294	3/30/2001	$ 60,043.28	$ -	$ -	$ -	$ -	$ -	$ -	-
137	16635	Center Wa	Guernevil	38.49815	-123.00203	4/25/2001	$ 95,921.18	$ -	$ -	$ -	$ -	$ 36,246.22	$ 36,246.22	0.38
5	4928	Wilshire	Santa Ros	38.45420	-122.68790	4/27/2001		$ -	$ -	$ -	$ -	$ -	$ -	-
81	14717	Canyon 7	Rio Nido	38.52104	-122.97930	4/27/2001	$ 81,354.38	$ -	$ -	$ -	$ -	$ 86,959.30	$ 86,959.30	1.07
74	14707	Willow Rd	Rio Nido	38.52095	-122.97822	5/4/2001	$ 68,309.93	$ -	$ -	$ -	$ -	$ -	$ -	-
52	14501	Armstrong	Guernevil	38.50982	-122.99431	5/11/2001	$ 63,688.56	$ 26,102.25	$ 29,446.18	$ 24,247.94	$ 31,285.34	$ 41,484.31	$ 152,566.01	2.40
68	14651	Carrier L	Guernevil	38.51139	-122.99755	5/18/2001	$ 68,477.09	$ 30,736.16	$ 32,142.92	$ 29,968.84	$ 32,654.47	$ 40,452.72	$ 165,955.11	2.42
71	14687	Orchard L	Guernevil	38.51716	-122.97317	5/18/2001	$ 67,436.82	$ -	$ -	$ -	$ -	$ 13,923.90	$ 13,923.90	0.21
90	14917	Melody Av	Guernevil	38.51291	-122.97993	6/8/2001	$ 101,181.95	$ -	$ -	$ -	$ -	$ -	$ -	-
154	17388	Riverside	Guernevil	38.49368	-123.01049	6/8/2001	$ 63,296.03	$ -	$ -	$ -	$ -	$ 53,893.26	$ 53,893.26	0.85
82	14723	Northern	Guernevil	38.51717	-122.97233	6/29/2001	$ 68,339.78	$ -	$ -	$ -	$ -	$ -	$ -	-
60	14569	Eastern A	Guernevil	38.51567	-122.97344	6/30/2001	$ 128,679.77	$ -	$ -	$ -	$ -	$ 66,596.06	$ 66,596.06	0.52
189	20387	River Blv	Monte Rio	38.47021	-123.00403	7/27/2001	$ 81,563.33	$ -	$ -	$ -	$ -	$ -	$ -	-
50	14501	Armstrong	Guernevil	38.51027	-122.99437	8/24/2001	$ 83,085.68	$ 18,289.78	$ 20,051.52	$ 17,230.39	$ 34,890.59	$ 45,255.75	$ 135,718.03	1.63
25	10841	Summerhom	Forestvil	38.50616	-122.92596	10/12/2001	$ 61,124.72	$ -	$ -	$ -	$ -	$ 42,821.45	$ 42,821.45	0.70
202	21616	Moscow Rd	Monte Rio	38.46817	-123.01437	10/12/2001	$ 105,774.07	$ -	$ -	$ -	$ -	$ 15,158.60	$ 15,158.60	0.14
12	8810	Trenton R	Forestvil	38.49231	-122.89778	11/9/2001	$ 79,802.18	$ -	$ -	$ -	$ -	$ 12,998.01	$ 12,998.01	0.16
53	14501	Armstrong	Guernevil	38.50961	-122.99432	11/9/2001	$ 67,591.89	$ -	$ -	$ -	$ -	$ 13,895.51	$ 13,895.51	0.21
158	17460	River Ln	Guernevil	38.49009	-123.01334	12/28/2001	$ 59,122.98	$ -	$ -	$ -	$ -	$ -	$ -	-
89	14902	Melody Av	Guernevil	38.51307	-122.97908	1/25/2002	$ 114,965.27	$ -	$ -	$ -	$ -	$ 46,109.49	$ 46,109.49	0.40
9	8656	Mirabel *	Forestvil	38.49302	-122.89478	3/1/2002	$ 75,190.70	$ -	$ -	$ -	$ -	$ 29,436.29	$ 29,436.29	0.39
194	20801	River Blv	Monte Rio	38.46781	-123.00557	3/4/2002	$ 105,678.49	$ -	$ -	$ -	$ -	$ 38,143.63	$ 38,143.63	0.36
118	15991	Riverland	Guernevil	38.50292	-122.99100	3/8/2002	$ 74,514.72	$ -	$ -	$ -	$ -	$ 24,474.92	$ 24,474.92	0.33
97	15083	Leasowe L	Guernevil	38.51092	-122.98076	3/29/2002	$ 77,054.38	$ -	$ -	$ -	$ -	$ -	$ -	-
54	14501	Armstrong	Guernevil	38.50961	-122.99432	4/19/2002	$ 77,494.80	$ -	$ -	$ -	$ -	$ 18,891.99	$ 18,891.99	0.24
45	14420	Western A	Guernevil	38.51741	-122.97371	4/26/2002	$ 71,233.30	$ -	$ -	$ -	$ -	$ -	$ -	-
109	15604	Riverside	Guernevil	38.50748	-122.98748	5/10/2002	$ 66,733.48	$ -	$ -	$ -	$ -	$ 50,132.11	$ 50,132.11	0.75
145	16794	Center Wa	Guernevil	38.49598	-123.00330	5/17/2002	$ 117,439.73	$ -	$ 40,401.82	$ -	$ 81,009.59	$ 254,905.84	$ 376,317.26	3.20
105	15486	River Rd	Guernevil	38.50859	-122.98705	5/27/2002	$ 76,973.83	$ -	$ -	$ -	$ 9,587.00	$ 62,358.93	$ 71,945.93	0.93

Table B.1 Part 5 of 6

Summary of Losses Avoided and ROI Calculations for All Events

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	ELEVATION COMPLETION DATE	2007 INFLATED COST TO ELEVATE STRUCTURE	JANUARY 3, 2002 LOSSES AVOIDED	DECEMBER 16, 2002 LOSSES AVOIDED	DECEMBER 30, 2003 LOSSES AVOIDED	FEBRUARY 18, 2004 LOSSES AVOIDED	JANUARY 1, 2006 LOSSES AVOIDED	TOTAL LOSSES AVOIDED	ROI
40	14261	Lovers Ln	Guernevil	38.49679	-123.00987	5/31/2002	$ 34,110.80	$ -	$ -	$ -	$ -	$ -	$ -	-
7	8647	Mirabel *	Forestvil	38.34926	-122.89468	6/28/2002	$ 76,231.49	$ -	$ -	$ -	$ -	$ 43,795.28	$ 43,795.28	0.57
147	16847	Center Wa	Guernevil	38.49523	-123.00364	6/28/2002	$ 67,770.21	$ -	$ -	$ -	$ -	$ 34,705.79	$ 34,705.79	0.51
4	2030	Cazadero	Cazadero	38.49101	-123.06134	7/19/2002	$ 68,793.60	$ -	$ -	$ -	$ -	$ -	$ -	-
85	14736	Willow Rd	Rio Nido	38.52162	-122.97804	8/9/2002	$ 91,892.47	$ -	$ -	$ -	$ -	$ -	$ -	-
106	15549	Riverside	Guernevil	38.50770	-122.98711	8/23/2002	$ 89,748.32	$ -	$ 22,228.64	$ -	$ 45,529.29	$ 141,444.40	$ 209,202.33	2.33
1	645	Austin Cr	Cazadero	38.47660	-123.04763	9/13/2002	$ 74,310.44	$ -	$ -	$ -	$ -	$ 58,907.38	$ 58,907.38	0.79
32	14060	Church St	Guernevil	38.50294	-122.99777	9/20/2002	$ 63,777.73	$ -	$ -	$ -	$ -	$ 39,476.05	$ 39,476.05	0.62
148	17314	Riverside	Guernevil	38.49372	-123.00972	10/1/2002	$ 61,843.37	$ -	$ -	$ -	$ 26,512.24	$ 109,839.43	$ 136,351.66	2.20
39	14259	Old Cazad	Guernevil	38.49824	-123.01002	10/11/2002	$ 121,875.80	$ -	$ 4,279.42	$ -	$ 20,119.39	$ 65,897.11	$ 90,295.92	0.74
84	14736	Rio Nido	Guernevil	38.52081	-122.97986	11/1/2002	$ 78,361.15	$ -	$ -	$ -	$ -	$ -	$ -	-
156	17443	Riverside	Guernevil	38.49321	-123.01158	11/1/2002	$ 99,605.62	$ -	$ -	$ -	$ -	$ 112,272.75	$ 112,272.75	1.13
150	17336	Riverside	Guernevil	38.49363	-123.00996	11/8/2002	$ 80,376.36	$ -	$ -	$ -	$ -	$ 6,515.38	$ 6,515.38	0.08
59	14549	Eastern A	Guernevil	38.51542	-122.97370	11/15/2002	$ 60,626.85	$ -	$ -	$ -	$ -	$ -	$ -	-
175	20021	Beech Ave	Monte Rio	38.47004	-123.01294	11/26/2002	$ 61,269.62	$ -	$ -	$ -	$ -	$ 17,108.99	$ 17,108.99	0.28
140	16724	Center Wa	Guernevil	38.49696	-123.00261	12/9/2002	$ 84,465.60	$ -	$ -	$ -	$ -	$ 72,695.28	$ 72,695.28	0.86
197	21225	Petray Ln	Monte Rio	38.71720	-122.88650	12/11/2002		$ -	$ -	$ -	$ -	$ -	$ -	-
18	10590	Grays Rd	Forestvil	38.50863	-122.92267	12/13/2002	$ 85,280.38	$ -	$ -	$ -	$ -	$ 28,406.15	$ 28,406.15	0.33
37	14226	Mill St	Guernevil	38.50480	-122.99922	1/16/2003	$ 99,708.43	$ -	$ -	$ -	$ 21,795.83	$ 85,971.81	$ 107,767.64	1.08
169	17837	Orchard A	Guernevil	38.48459	-123.00937	2/10/2003	$ 79,015.36	$ -	$ -	$ -	$ -	$ 25,707.66	$ 25,707.66	0.33
96	15076	Old River	Guernevil	38.51332	-122.98313	3/7/2003	$ 77,436.15	$ -	$ -	$ -	$ 29,126.30	$ 114,381.38	$ 143,507.67	1.85
116	15961	Riverland	Guernevil	38.50250	-122.99013	3/14/2003	$ 65,746.58	$ -	$ -	$ -	$ -	$ 117,373.88	$ 117,373.88	1.79
157	17456	Orchard A	Guernevil	38.50560	-122.99640	6/19/2003	$ 67,447.40	$ -	$ -	$ -	$ -	$ -	$ -	-
203	25832	Freezeout	Monte Rio	38.44569	-123.05726	8/7/2003	$ 56,869.76	$ -	$ -	$ -	$ -	$ 5,980.04	$ 5,980.04	0.11
184	20274	Alder Rd	Monte Rio	38.47058	-123.00302	11/6/2003	$ 57,044.87	$ -	$ -	$ -	$ -	$ 30,947.47	$ 30,947.47	0.54
100	15270	Old River	Guernevil	38.51086	-122.98450	2/26/2004	$ 60,843.59	$ -	$ -	$ -	$ -	$ 16,325.10	$ 16,325.10	0.27
30	11035	Sunset Av	Forestvil	38.50634	-122.92900	3/9/2004	$ 103,397.80	$ -	$ -	$ -	$ -	$ -	$ -	-
42	14290	Old Cazad	Guernevil	38.49830	-123.01039	4/15/2004	$ 69,362.50	$ -	$ -	$ -	$ -	$ 60,840.79	$ 60,840.79	0.88
174	19821	Crescent	Monte Rio	38.47559	-123.00039	4/20/2004	$ 84,733.19	$ -	$ -	$ -	$ -	$ -	$ -	-
205	26709	Freezeout	Monte Rio	38.44266	-123.06462	5/11/2004	$ 75,780.97	$ -	$ -	$ -	$ -	$ -	$ -	-
88	14821	Northern	Guernevil	38.51804	-122.97304	6/10/2004	$ 81,807.74	$ -	$ -	$ -	$ -	$ 5,697.67	$ 5,697.67	0.07
56	14509	Cherry St	Guernevil	38.49702	-123.01300	8/20/2004	$ 75,780.97	$ -	$ -	$ -	$ -	$ -	$ -	-
57	14530	Western A	Guernevil	38.51571	-122.97427	8/20/2004	$ 95,250.58	$ -	$ -	$ -	$ -	$ 85,655.99	$ 85,655.99	0.90
204	25832	Freezeout	Monte Rio	38.44569	-123.05726	8/20/2004	$ 125,093.85	$ -	$ -	$ -	$ -	$ -	$ -	-
149	17325	Riverside	Guernevil	38.49373	-123.01006	9/21/2004	$ 65,587.16	$ -	$ -	$ -	$ -	$ 10,149.61	$ 10,149.61	0.15
69	14652	Rio Nido	Guernevil	38.51959	-122.97867	10/11/2004	$ 77,574.04	$ -	$ -	$ -	$ -	$ 82,363.18	$ 82,363.18	1.06
38	14259	Mill Ct	Guernevil	38.50519	-122.99862	10/18/2004	$ 168,319.90	$ -	$ -	$ -	$ -	$ 141,095.05	$ 141,095.05	0.84
183	20251	Willow Rd	Monte Rio	38.47128	-123.00185	10/27/2004	$ 70,571.73	$ -	$ -	$ -	$ -	$ 47,165.91	$ 47,165.91	0.67

Table B.1 Part 6 of 6

Summary of Losses Avoided and ROI Calculations for All Events

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	ELEVATION COMPLETION DATE	2007 INFLATED COST TO ELEVATE STRUCTURE	JANUARY 3, 2002 LOSSES AVOIDED	DECEMBER 16, 2002 LOSSES AVOIDED	DECEMBER 30, 2003 LOSSES AVOIDED	FEBRUARY 18, 2004 LOSSES AVOIDED	JANUARY 1, 2006 LOSSES AVOIDED	TOTAL LOSSES AVOIDED	ROI
99	15170	Drake Rd	Guernevil	38.50971	-122.98124	11/1/2004	$ 94,665.82	$ -	$ -	$ -	$ -	$ 76,844.59	$ 76,844.59	0.81
63	14612	Eastern A	Guernevil	38.51611	-122.97301	11/8/2004	$ 70,601.24	$ -	$ -	$ -	$ -	$ -	$ -	-
171	18105	HWY 116	Guernevil	38.48509	-123.01335	12/8/2004	$ 78,945.72	$ -	$ -	$ -	$ -	$ -	$ -	-
66	14630	Eastern A	Guernevil	38.51634	-122.97281	12/14/2004	$ 74,827.87	$ -	$ -	$ -	$ -	$ 8,381.99	$ 8,381.99	0.11
48	14479	Western A	Guernevil	38.51681	-122.97386	1/10/2005	$ 67,231.82	$ -	$ -	$ -	$ -	$ 24,197.82	$ 24,197.82	0.36
65	14620	Eastern A	Guernevil	38.51620	-122.97293	1/10/2005	$ 66,807.99	$ -	$ -	$ -	$ -	$ 13,639.96	$ 13,639.96	0.20
46	14464	Western A	Guernevil	38.51691	-122.97393	4/15/2005	$ 69,062.88	$ -	$ -	$ -	$ -	$ 68,030.88	$ 68,030.88	0.99
117	15980	Drake Rd	Guernevil	38.50128	-122.99000	4/21/2005	$ 73,562.31	$ -	$ -	$ -	$ -	$ 37,587.32	$ 37,587.32	0.51
176	20030	El Rancho	Monte Rio	38.47041	-123.01345	6/27/2005	$ 83,705.47	$ -	$ -	$ -	$ -	$ -	$ -	-
98	15105	River Rd	Guernevil	38.51304	-122.98285	7/1/2005	$ 90,801.44	$ -	$ -	$ -	$ -	$ 115,493.16	$ 115,493.16	1.27
182	20240	Willow Rd	Monte Rio	38.47166	-123.00166	7/1/2005	$ 95,543.05	$ -	$ -	$ -	$ -	$ 86,977.64	$ 86,977.64	0.91
33	14070	Mill St	Guernevil	38.50304	-122.99929	7/15/2005	$ 102,351.75	$ -	$ -	$ -	$ -	$ 55,450.31	$ 55,450.31	0.54
47	14469	Western A	Guernevil	38.51690	-122.97383	11/3/2005	$ 106,231.03	$ -	$ -	$ -	$ -	$ 41,668.66	$ 41,668.66	0.39
185	20290	Willow Rd	Monte Rio	38.46963	-123.00262	11/5/2005	$ 97,958.08	$ -	$ -	$ -	$ -	$ 140,825.17	$ 140,825.17	1.44
43	14301	Mill Ct	Guernevil	38.50537	-122.99819	1/23/2006	$ 114,911.44	$ -	$ -	$ -	$ -	$ -	$ -	-

TOTAL COSTS OF CONSTRUCTION	JAN 02 LOSSES AVOIDED	DEC 02 LOSSES AVOIDED	DEC 03 LOSSES AVOIDED	FEB 04 LOSSES AVOIDED	JAN 2006 LOSSES AVOIDED	TOTAL LOSSES AVOIDED
$ 14,168,134.70	$ 504,584.58	$ 1,113,989.33	$ 437,807.56	$ 1,789,524.36	$ 9,700,965.13	$ 13,546,870.96
ROI:	0.04	0.08	0.03	0.13	0.68	0.96

9 structures eliminated from the analysis due to screening process

Not included in the calculations - the elevation was not completed before the event

Appendix C:

Summary of Losses Avoided and ROI Calculations for January 2002 Event

List of Tables

Table C.1: Summary of Losses Avoided and ROI Calculations for January 2002 Event . . C-1

Table C.1 Part 1 of 7

Summary of Losses Avoided and ROI Calculations for January 2002 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	JAN 02 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
1	645	Austin Cr	Cazadero	38.47660	-123.04763	1 Story, without Basement	1432	30.80	36.70	9/13/2002	$ 246,304.00	$ 74,310.44	Austin Creek	25.92	-4.9						
2	1285	Willowsid	Santa Ros	38.44330	-122.75360	1 Story, without Basement	1100	70.40	79.80	8/14/1998	$ 189,200.00	$ 41,405.03			-70.4						
3	1285	Willowsid	Santa Ros	38.44330	-122.75360	1 Story, without Basement	1100	70.90	78.00	11/13/1998	$ 189,200.00	$ 53,996.70			-70.9						
4	2030	Cazadero	Cazadero	38.49101	-123.06134	1 Story, without Basement	648	47.00	53.20	7/19/2002	$ 111,456.00	$ 68,793.60	Austin Creek	32.37	-14.6						
5	4928	Wilshire	Santa Ros	38.45420	-122.68790	1 Story, without Basement	0	65.50	71.00	4/27/2001	$ -	$ 75,834.52			-65.5						
6	5232	Odonnell	Glen Elle	38.36690	-122.51980	1 Story, without Basement	1664	226.30	229.90	12/23/1999	$ 286,208.00	$ 50,194.74			-226.3						
7	8647	Mirabel Rd	Forestville	38.34926	-122.89468	1 Story, without Basement	804	69.80	75.40	6/28/2002	$ 138,288.00	$ 76,231.49	Russian River	59.73	-10.1						
8	8650	Mirabel R	Forestvil	38.49302	-122.89478	2 Story, without Basement	1280	70.30	75.70	11/6/1998	$ 220,160.00	$ 69,077.57	Russian River	59.60	-10.7	$ -	$ -	$ -	$ -	$ -	0.00
9	8656	Mirabel Rd	Forestville	38.49302	-122.89478	1 Story, without Basement	764	70.40	74.90	3/1/2002	$ 131,408.00	$ 75,190.70	Russian River	59.60	-10.8						
10	8672	Trenton R	Forestvil	38.49042	-122.89674	1 Story, without Basement	784	70.00	78.00	6/19/1998	$ 134,848.00	$ 41,824.80	Russian River	59.42	-10.6	$ -	$ -	$ -	$ -	$ -	0.00
11	8706	Trenton R	Forestvil	38.49118	-122.89737	1 Story, without Basement	624	73.10	76.10	11/17/2000	$ 107,328.00	$ 67,569.74	Russian River	59.36	-13.7	$ -	$ -	$ -	$ -	$ -	0.00
12	8810	Trenton R	Forestvil	38.49231	-122.89778	1 Story, without Basement	780	71.00	77.10	11/9/2001	$ 134,160.00	$ 79,802.18	Russian River	59.29	-11.7	$ -	$ -	$ -	$ -	$ -	0.00
13	8894	Trenton R	Forestvil	38.49405	-122.89800	1 Story, without Basement	892	66.00	75.90	10/15/1999	$ 153,424.00	$ 74,009.90	Russian River	59.21	-6.8	$ -	$ -	$ -	$ -	$ -	0.00
14	8990	Trenton R	Forestvil	38.49428	-122.89801	1 Story, without Basement	780	65.40	76.50	11/5/1999	$ 134,160.00	$ 70,779.05	Russian River	59.21	-6.2	$ -	$ -	$ -	$ -	$ -	0.00
15	9425	Old River	Forestvil	38.50218	-122.90591	1 Story, without Basement	842	67.00	77.30	7/2/1999	$ 179,224.00	$ 70,054.80	Russian River	58.63	-8.4	$ -	$ -	$ -	$ -	$ -	0.00
16	9894	Bohemian	Monte Rio	38.46261	-123.00829	1 Story, without Basement	1200	40.90	48.90	10/6/2000	$ 412,800.00	$ 103,688.08	Dutch Bill Creek	32.55	-8.4	$ -	$ -	$ -	$ -	$ -	0.00
17	10006	Heller St	Monte Rio	38.46892	-123.00398	1 Story, without Basement	564	37.70	47.60	10/6/1998	$ 97,008.00	$ 49,414.40	Russian River	32.63	-5.1	$ -	$ -	$ -	$ -	$ -	0.00
18	10590	Grays Rd	Forestvil	38.50863	-122.92267	1 Story, without Basement	1008	67.40	72.50	12/13/2002	$ 173,376.00	$ 85,280.38	Russian River	55.62	-11.8						
19	10599	Grays Rd	Forestvil	38.50856	-122.92287	1 Story, without Basement	880	69.20	72.60	6/18/1999	$ 186,448.00	$ 56,462.59	Russian River	55.57	-13.6	$ -	$ -	$ -	$ -	$ -	0.00
20	10670	Grays Ct	Forestvil	38.50848	-122.92344	1 Story, without Basement	792	67.30	71.60	8/25/2000	$ 294,464.00	$ 65,818.53	Russian River	55.49	-11.8	$ -	$ -	$ -	$ -	$ -	0.00
21	10696	Old River	Forestvil	38.50741	-122.92378	1 Story, without Basement	720	67.50	71.70	4/16/1999	$ 123,840.00	$ 55,637.15	Russian River	55.13	-12.4	$ -	$ -	$ -	$ -	$ -	0.00
22	10716	Old River	Forestvil	38.50744	-122.92415	1 Story, without Basement	600	66.70	71.00	12/24/1998	$ 103,200.00	$ 48,399.81	Russian River	54.82	-11.9	$ -	$ -	$ -	$ -	$ -	0.00
23	10770	Old River	Forestvil	38.50667	-122.92492	1 Story, without Basement	1180	67.40	72.10	7/10/1998	$ 202,960.00	$ 52,268.45	Russian River	54.59	-12.8	$ -	$ -	$ -	$ -	$ -	0.00
24	10840	Buena Vis	Forestvil	38.50648	-122.92594	1 Story, without Basement	600	63.40	71.50	12/8/2000	$ 103,200.00	$ 59,411.02	Russian River	54.56	-8.8	$ -	$ -	$ -	$ -	$ -	0.00
25	10841	Summerhom	Forestvil	38.50616	-122.92596	1 Story, without Basement	520	64.00	71.50	10/12/2001	$ 89,440.00	$ 61,124.72	Russian River	54.59	-9.4	$ -	$ -	$ -	$ -	$ -	0.00
26	10843	Summerhom	Forestvil	38.50607	-122.92607	2 Story, without Basement	960	67.20	75.40	5/19/2000	$ 165,120.00	$ 81,643.10	Russian River	54.61	-12.6	$ -	$ -	$ -	$ -	$ -	0.00
27	10870	Forest Hi	Forestvil	38.50711	-122.92462	1 Story, without Basement	3276	65.00	71.50	3/31/2000	$ 563,472.00	$ 74,274.78	Russian River	54.64	-10.4	$ -	$ -	$ -	$ -	$ -	0.00
28	10940	Sunset Av	Forestvil	38.50763	-122.92840	1 Story, without Basement	972	66.80	74.80	2/5/1999	$ 167,184.00	$ 76,896.13	Russian River	54.44	-12.4	$ -	$ -	$ -	$ -	$ -	0.00
29	10959	Sunset Av	Forestvil	38.50669	-122.92869	1 Story, without Basement	893	65.70	72.90	6/18/1999	$ 153,596.00	$ 57,708.87	Russian River	54.38	-11.3	$ -	$ -	$ -	$ -	$ -	0.00
30	11035	Sunset Av	Forestvil	38.50634	-122.92900	1 or 2 Story, with Basement	776	69.00	72.50	3/9/2004	$ 217,408.00	$ 103,397.80	Russian River	54.35	-14.7						

Table C.1 Part 2 of 7

Summary of Losses Avoided and ROI Calculations for January 2002 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	JAN 02 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
31	11880	Summerhom	Forestvil	38.49798	-122.93892	1 Story, without Basement	1260	73.20	66.90	12/14/1998	$ 216,720.00	$ 63,553.65	Russian River	52.85	-20.4						
32	14060	Church St	Guernevil	38.50294	-122.99777	1 Story, without Basement	1045	54.70	60.80	9/20/2002	$ 179,740.00	$ 63,777.73	Russian River	45.01	-9.7						
33	14070	Mill St	Guernevil	38.50304	-122.99929	2 Story, without Basement	1390	53.00	59.20	7/15/2005	$ 239,080.00	$ 102,351.75	Russian River	44.53	-8.5						
34	14185	Old Cazad	Guernevil	38.49746	-123.00850	1 or 2 Story, with Basement	2070	44.90	56.80	2/25/2000	$ 356,040.00	$ 88,636.88	Hulbert Creek	42.34	-2.6	$ -	$ -	$ -	$ -	$ -	0.00
35	14216	Mill St	Guernevil	38.50473	-122.99923	1 Story, without Basement	935	53.10	59.50	1/15/1999	$ 160,820.00	$ 64,957.76	Russian River	44.16	-8.9	$ -	$ -	$ -	$ -	$ -	0.00
36	14226	Lovers Ln	Guernevil	38.49662	-123.00931	2 Story, without Basement	700	47.20	56.10	6/23/2000	$ 120,400.00	$ 55,068.33	Hulbert Creek	42.04	-5.2	$ -	$ -	$ -	$ -	$ -	0.00
37	14226	Mill St	Guernevil	38.50480	-122.99922	1 Story, without Basement	1190	49.70	59.00	1/16/2003	$ 204,680.00	$ 99,708.43	Russian River	44.56	-5.1						
38	14259	Mill Ct	Guernevil	38.50519	-122.99862	2 Story, without Basement	2264	49.60	59.10	10/18/2004	$ 389,408.00	$ 168,319.90	Fife Creek	43.68	-5.9						
39	14259	Old Cazad	Guernevil	38.49824	-123.01002	2 Story, without Basement	852	46.80	55.20	10/11/2002	$ 146,544.00	$ 121,875.80	Hulbert Creek	42.59	-4.2						
40	14261	Lovers Ln	Guernevil	38.49679	-123.00987	1 Story, without Basement	986	54.10	56.50	5/31/2002	$ 169,592.00	$ 34,110.80	Hulbert Creek	42.66	-11.4						
41	14263	Lovers Ln	Guernevil	38.49685	-123.01000	1 Story, without Basement	975	52.20	56.00	10/8/1999	$ 167,700.00	$ 64,076.62	Hulbert Creek	42.67	-9.5	$ -	$ -	$ -	$ -	$ -	0.00
42	14290	Old Cazad	Guernevil	38.49830	-123.01039	1 or 2 Story, with Basement	1265	53.10	56.30	4/15/2004	$ 473,000.00	$ 69,362.50	Hulbert Creek	42.61	-10.5						
43	14301	Mill Ct	Guernevil	38.50537	-122.99819	1 or 2 Story, with Basement	1764	50.70	59.00	1/23/2006	$ 545,584.00	$ 114,911.44	Fife Creek	43.15	-7.6						
44	14315	Lovers La	Guernevil	38.49700	-123.01078	1 Story, without Basement	780	49.90	55.60	1/12/2001	$ 134,160.00	$ 60,228.72	Hulbert Creek	42.78	-7.1	$ -	$ -	$ -	$ -	$ -	0.00
45	14420	Western A	Guernevil	38.51741	-122.97371	1 Story, without Basement	880	58.80	65.60	4/26/2002	$ 151,360.00	$ 71,233.30	Russian River	47.27	-11.5						
46	14464	Western A	Guernevil	38.51691	-122.97393	1 Story, without Basement	656	53.40	61.20	4/15/2005	$ 112,832.00	$ 69,062.88	Russian River	47.27	-6.1						
47	14469	Western A	Guernevil	38.51690	-122.97383	1 Story, without Basement	841	56.50	65.90	11/3/2005	$ 144,652.00	$ 106,231.03	Russian River	47.30	-9.2						
48	14479	Western A	Guernevil	38.51681	-122.97386	1 Story, without Basement	728	57.40	66.70	1/10/2005	$ 125,216.00	$ 67,231.82	Russian River	47.30	-10.1						
49	14501	Armstrong	Guernevil	38.50999	-122.99431	1 Story, without Basement	564	49.90	59.50	11/3/2000	$ 97,008.00	$ 64,321.62	Fife Creek	52.71	2.8	$ 25,270.58	$ 11,371.76	$ 7,041.08	$ 10,512.29	$ 54,195.71	0.84
50	14501	Armstrong	Guernevil	38.51027	-122.99437	2 Story, without Basement	569	51.70	60.60	8/24/2001	$ 97,868.00	$ 83,085.68	Fife Creek	52.73	1.0	$ 8,925.56	$ 4,016.50	$ 567.25	$ 4,780.47	$ 18,289.78	0.22
51	14501	Armstrong	Guernevil	38.51014	-122.99429	1 Story, without Basement	564	51.80	60.60	11/3/2000	$ 97,008.00	$ 64,321.62	Fife Creek	52.72	0.9	$ 13,193.09	$ 5,936.89	$ 2,855.45	$ 6,297.22	$ 28,282.64	0.44
52	14501	Armstrong	Guernevil	38.50982	-122.99431	1 Story, without Basement	922	52.70	59.00	5/11/2001	$ 158,584.00	$ 63,688.56	Fife Creek	52.71	0.0	$ 14,351.85	$ 6,458.33	$ 535.29	$ 4,756.77	$ 26,102.25	0.41
53	14501	Armstrong	Guernevil	38.50961	-122.99432	1 Story, without Basement	890	54.10	58.40	11/9/2001	$ 153,080.00	$ 67,591.89	Fife Creek	52.71	-1.4	$ -	$ -	$ -	$ -	$ -	0.00
54	14501	Armstrong	Guernevil	38.50961	-122.99432	1 Story, without Basement	1310	54.10	58.40	4/19/2002	$ 225,320.00	$ 77,494.80	Fife Creek	52.71	-1.4						
55	14501	Cherry St	Guernevil	38.49695	-123.01263	1 Story, without Basement	1350	50.10	56.00	12/10/1999	$ 232,200.00	$ 67,830.11	Hulbert Creek	43.94	-6.2	$ -	$ -	$ -	$ -	$ -	0.00
56	14509	Cherry St	Guernevil	38.49702	-123.01300	1 Story, without Basement	760	53.40	61.80	8/20/2004	$ 130,720.00	$ 75,780.97	Hulbert Creek	44.06	-9.3						
57	14530	Western A	Guernevil	38.51571	-122.97427	1 Story, without Basement	950	54.40	64.90	8/20/2004	$ 163,400.00	$ 95,250.58	Russian River	47.24	-7.2						
58	14536	Eastern A	Guernevil	38.51529	-122.97383	1 Story, without Basement	1617	55.90	64.70	9/24/1999	$ 278,124.00	$ 65,529.24	Russian River	47.29	-8.6	$ -	$ -	$ -	$ -	$ -	0.00
59	14549	Eastern A	Guernevil	38.51542	-122.97370	1 Story, without Basement	656	59.70	64.00	11/15/2002	$ 112,832.00	$ 60,626.85	Russian River	47.33	-12.4						
60	14569	Eastern A	Guernevil	38.51567	-122.97344	2 Story, without Basement	1080	54.10	63.60	6/30/2001	$ 185,760.00	$ 128,679.77	Russian River	47.34	-6.8	$ -	$ -	$ -	$ -	$ -	0.00

Table C.1 Part 3 of 7

Summary of Losses Avoided and ROI Calculations for January 2002 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	JAN 02 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
61	14594	Eastern A	Guernevil	38.51580	-122.97331	1 Story, without Basement	1180	57.60	61.20	12/1/2000	$ 202,960.00	$ 89,649.78	Russian River	47.32	-10.3	$ -	$ -	$ -	$ -	$ -	0.00
62	14600	Rio Nido	Guernevil	38.51966	-122.97860	1 Story, without Basement	670	52.00	62.90	7/14/2000	$ 115,240.00	$ 59,283.88	Russian River	46.72	-5.3	$ -	$ -	$ -	$ -	$ -	0.00
63	14612	Eastern A	Guernevil	38.51611	-122.97301	1 Story, without Basement	640	60.30	66.80	11/8/2004	$ 110,080.00	$ 70,601.24	Russian River	47.33	-13.0						
64	14619	Eastern A	Guernevil	38.51618	-122.97296	1 Story, without Basement	928	59.70	64.10	10/25/1999	$ 159,616.00	$ 62,829.73	Russian River	47.38	-12.3	$ -	$ -	$ -	$ -	$ -	0.00
65	14620	Eastern A	Guernevil	38.51620	-122.97293	1 Story, without Basement	832	58.10	68.10	1/10/2005	$ 143,104.00	$ 66,807.99	Russian River	47.35	-10.8						
66	14630	Eastern A	Guernevil	38.51634	-122.97281	1 Story, without Basement	968	58.40	68.70	12/14/2004	$ 166,496.00	$ 74,827.87	Russian River	47.36	-11.0						
67	14650	Eastern A	Guernevil	38.51665	-122.97250	1 Story, without Basement	796	58.40	66.90	12/15/2000	$ 136,912.00	$ 73,044.78	Russian River	47.39	-11.0	$ -	$ -	$ -	$ -	$ -	0.00
68	14651	Carrier L	Guernevil	38.51139	-122.99755	1 Story, without Basement	663	53.10	62.00	5/18/2001	$ 114,036.00	$ 68,477.09	Fife Creek	53.93	0.8	$ 14,995.73	$ 6,748.08	$ 2,847.49	$ 6,144.86	$ 30,736.16	0.45
69	14652	Rio Nido	Guernevil	38.51959	-122.97867	1 Story, without Basement	572	50.90	63.80	10/11/2004	$ 98,384.00	$ 77,574.04	Russian River	46.71	-4.2						
70	14680	Orchard L	Guernevil	38.51677	-122.97294	1 Story, without Basement	686	59.00	63.90	3/30/2001	$ 117,992.00	$ 60,043.28	Russian River	47.35	-11.7	$ -	$ -	$ -	$ -	$ -	0.00
71	14687	Orchard L	Guernevil	38.51716	-122.97317	1 Story, without Basement	855	58.10	64.90	5/18/2001	$ 147,060.00	$ 67,436.82	Russian River	47.35	-10.8	$ -	$ -	$ -	$ -	$ -	0.00
72	14698	Orchard L	Guernevil	38.51696	-122.97305	1 Story, without Basement	384	59.30	64.40	9/29/2000	$ 66,048.00	$ 71,328.93	Russian River	47.34	-12.0	$ -	$ -	$ -	$ -	$ -	0.00
73	14706	Rio Nido	Guernevil	38.52020	-122.97882	1 Story, without Basement	1240	56.70	63.00	1/14/2000	$ 213,280.00	$ 59,697.31	Russian River	46.73	-10.0	$ -	$ -	$ -	$ -	$ -	0.00
74	14707	Willow Rd	Rio Nido	38.52095	-122.97822	1 Story, without Basement	960	58.80	63.70	5/4/2001	$ 165,120.00	$ 68,309.93	Russian River	46.85	-12.0	$ -	$ -	$ -	$ -	$ -	0.00
75	14709	Carrier L	Guernevil	38.51224	-122.99767	1 Story, without Basement	1301	56.20	60.70	9/8/2000	$ 223,772.00	$ 75,845.49	Fife Creek	57.19	1.0	$ 31,216.19	$ 14,047.29	$ 5,010.02	$ 6,415.71	$ 56,689.21	0.75
76	14710	Carrier L	Guernevil	38.51240	-122.99778	1 Story, without Basement	1356	56.50	65.20	8/11/2000	$ 233,232.00	$ 69,821.57	Fife Creek	57.56	1.1	$ 33,771.99	$ 15,197.40	$ 5,495.85	$ 6,595.15	$ 61,060.39	0.87
77	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	557	52.35	63.00	3/26/1999	$ 95,804.00	$ 62,100.52	Russian River	46.73	-5.6	$ -	$ -	$ -	$ -	$ -	0.00
78	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	557	53.02	63.00	2/19/1999	$ 95,804.00	$ 62,736.56	Russian River	46.73	-6.3	$ -	$ -	$ -	$ -	$ -	0.00
79	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	557	53.25	62.90	1/29/1999	$ 95,804.00	$ 98,680.08	Russian River	46.73	-6.5	$ -	$ -	$ -	$ -	$ -	0.00
80	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	563	56.70	63.00	2/5/1999	$ 96,836.00	$ 56,144.36	Russian River	46.73	-10.0	$ -	$ -	$ -	$ -	$ -	0.00
81	14717	Canyon 7	Rio Nido	38.52104	-122.97930	2 Story, without Basement	1491	53.50	64.90	4/27/2001	$ 256,452.00	$ 81,354.38	Russian River	46.79	-6.7	$ -	$ -	$ -	$ -	$ -	0.00
82	14723	Northern	Guernevil	38.51717	-122.97233	1 Story, without Basement	1672	61.20	64.20	6/29/2001	$ 287,584.00	$ 68,339.78	Russian River	47.39	-13.8	$ -	$ -	$ -	$ -	$ -	0.00
83	14726	Willow Rd	Rio Nido	38.52138	-122.97815	1 Story, without Basement	671	59.00	64.00	6/18/1999	$ 115,412.00	$ 67,866.22	Russian River	46.88	-12.1	$ -	$ -	$ -	$ -	$ -	0.00
84	14736	Rio Nido	Guernevil	38.52081	-122.97986	1 Story, without Basement	873	60.70	62.40	11/1/2002	$ 150,156.00	$ 78,361.15	Russian River	46.72	-14.0						
85	14736	Willow Rd	Rio Nido	38.52162	-122.97804	2 Story, without Basement	1230	59.30	64.10	8/9/2002	$ 211,560.00	$ 91,892.47	Russian River	46.90	-12.4						
86	14760	Rio Nido	Guernevil	38.52110	-122.98015	1 Story, without Basement	606	59.30	64.80	1/14/2000	$ 104,232.00	$ 54,569.52	Russian River	46.71	-12.6	$ -	$ -	$ -	$ -	$ -	0.00
87	14775	Northern	Guernevil	38.51763	-122.97264	1 Story, without Basement	856	60.20	68.40	4/17/1998	$ 147,232.00	$ 48,710.52	Russian River	47.36	-12.8	$ -	$ -	$ -	$ -	$ -	0.00
88	14821	Northern	Guernevil	38.51804	-122.97304	1 Story, without Basement	640	58.40	65.70	6/10/2004	$ 110,080.00	$ 81,807.74	Russian River	47.33	-11.1						
89	14902	Melody Av	Guernevil	38.51307	-122.97908	1 or 2 Story, with Basement	986	57.60	65.60	1/25/2002	$ 331,960.00	$ 114,965.27	Russian River	46.57	-11.0						
90	14917	Melody Av	Guernevil	38.51291	-122.97993	1 or 2 Story, with Basement	760	60.90	61.50	6/8/2001	$ 261,440.00	$ 101,181.95	Russian River	46.56	-14.3	$ -	$ -	$ -	$ -	$ -	0.00

Table C.1 Part 4 of 7

Summary of Losses Avoided and ROI Calculations for January 2002 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	JAN 02 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
91	14918	Drake Roa	Guernevil	38.51260	-122.97935	1 Story, without Basement	564	56.80	61.30	4/2/1999	$ 97,008.00	$ 43,033.66	Russian River	46.55	-10.3	$ -	$ -	$ -	$ -	$ -	0.00
92	14991	Foothill	Guernevil	38.51503	-122.98273	1 or 2 Story, with Basement	824	56.50	61.50	3/2/2001	$ 283,456.00	$ 77,335.98	Russian River	46.55	-10.0	$ -	$ -	$ -	$ -	$ -	0.00
93	14991	Melody Av	Guernevil	38.51172	-122.98007	1 or 2 Story, with Basement	848	57.30	62.60	10/18/2000	$ 261,440.00	$ 78,956.47	Russian River	46.53	-10.8	$ -	$ -	$ -	$ -	$ -	0.00
94	15029	Foothill	Guernevil	38.51429	-122.98312	1 or 2 Story, with Basement	647	48.00	61.70	10/1/1999	$ 126,420.00	$ 88,260.49	Russian River	46.57	-1.4	$ 126,420.00	$ 3,572.63	$ -	$ 3,818.96	$ 133,811.59	1.52
95	15030	Old River	Guernevil	38.51427	-122.98268	1 Story, without Basement	885	52.60	61.00	3/31/2000	$ 152,220.00	$ 67,076.21	Russian River	46.55	-6.1	$ -	$ -	$ -	$ -	$ -	0.00
96	15076	Old River	Guernevil	38.51332	-122.98313	1 or 2 Story, with Basement	720	53.10	61.20	3/7/2003	$ 239,424.00	$ 77,436.15	Russian River	46.56	-6.5						
97	15083	Leasowe L	Guernevil	38.51092	-122.98076	1 Story, without Basement	890	58.90	61.50	3/29/2002	$ 153,080.00	$ 77,054.38	Russian River	46.50	-12.4						
98	15105	River Rd	Guernevil	38.51304	-122.98285	1 Story, without Basement	1064	51.40	60.50	7/1/2005	$ 183,008.00	$ 90,801.44	Russian River	46.56	-4.8						
99	15170	Drake Rd	Guernevil	38.50971	-122.98124	1 or 2 Story, with Basement	1026	56.20	61.30	11/1/2004	$ 352,944.00	$ 94,665.82	Russian River	46.46	-9.7						
100	15270	Old River	Guernevil	38.51086	-122.98450	2 Story, without Basement	1331	56.80	66.00	2/26/2004	$ 228,932.00	$ 60,843.59	Russian River	46.45	-10.4						
101	15280	Old River	Guernevil	38.51086	-122.98450	1 Story, without Basement	1105	57.50	64.90	7/30/1999	$ 190,060.00	$ 50,188.40	Russian River	46.45	-11.1	$ -	$ -	$ -	$ -	$ -	0.00
102	15410	Riverside	Guernevil	38.50895	-122.98567	1 Story, without Basement	912	55.60	61.40	5/5/2000	$ 156,864.00	$ 60,013.34	Russian River	46.32	-9.3	$ -	$ -	$ -	$ -	$ -	0.00
103	15437	Riverside	Guernevil	38.50879	-122.98592	1 Story, without Basement	1114	56.50	62.10	3/9/2001	$ 191,608.00	$ 98,776.64	Russian River	46.28	-10.2	$ -	$ -	$ -	$ -	$ -	0.00
104	15470	Riverside	Guernevil	38.50837	-122.98640	1 Story, without Basement	1160	55.10	61.30	3/5/1999	$ 199,520.00	$ 50,097.18	Russian River	46.22	-8.9	$ -	$ -	$ -	$ -	$ -	0.00
105	15486	River Rd	Guernevil	38.50859	-122.98705	1 Story, without Basement	582	52.00	61.20	5/27/2002	$ 100,104.00	$ 76,973.83	Russian River	46.20	-5.8						
106	15549	Riverside	Guernevil	38.50770	-122.98711	1 or 2 Story, with Basement	966	51.70	60.60	8/23/2002	$ 257,656.00	$ 89,748.32	Russian River	46.12	-5.6						
107	15555	Bonita Av	Guernevil	38.50774	-122.98819	2 Story, without Basement	1175	49.40	59.70	2/19/1999	$ 202,100.00	$ 53,547.22	Russian River	46.07	-3.3	$ -	$ -	$ -	$ -	$ -	0.00
108	15587	Bonita Av	Guernevil	38.50778	-122.98827	1 Story, without Basement	874	53.50	59.50	5/28/1999	$ 150,328.00	$ 49,109.87	Russian River	46.07	-7.4	$ -	$ -	$ -	$ -	$ -	0.00
109	15604	Riverside	Guernevil	38.50748	-122.98748	1 or 2 Story, with Basement	783	56.10	59.80	5/10/2002	$ 257,656.00	$ 66,733.48	Russian River	46.07	-10.0						
110	15619	Riverside	Guernevil	38.50754	-122.98788	1 Story, without Basement	592	49.00	60.20	11/20/1998	$ 101,824.00	$ 60,949.92	Russian River	46.04	-3.0	$ -	$ -	$ -	$ -	$ -	0.00
111	15623	Riverside	Guernevil	38.50708	-122.98816	1 or 2 Story, with Basement	1429	51.50	60.20	9/29/2000	$ 327,488.00	$ 73,936.53	Russian River	46.00	-5.5	$ -	$ -	$ -	$ -	$ -	0.00
112	15625	Riverside	Guernevil	38.50718	-122.98803	1 Story, without Basement	882	52.00	59.90	7/16/1999	$ 151,704.00	$ 66,559.56	Russian River	46.01	-6.0	$ -	$ -	$ -	$ -	$ -	0.00
113	15627	Riverside	Guernevil	38.50704	-122.98824	1 Story, without Basement	1058	60.80	50.50	9/4/1998	$ 181,976.00	$ 64,751.43	Russian River	45.99	-14.8						
114	15675	Riverside	Guernevil	38.50651	-122.98881	1 or 2 Story, with Basement	1020	54.00	62.00	2/26/1999	$ 350,880.00	$ 74,974.73	Russian River	45.91	-8.1	$ -	$ -	$ -	$ -	$ -	0.00
115	15850	Riverland	Guernevil	38.50458	-122.99016	1 or 2 Story, with Basement	1386	55.90	60.20	5/28/1999	$ 271,416.00	$ 75,005.68	Russian River	45.61	-10.3	$ -	$ -	$ -	$ -	$ -	0.00
116	15961	Riverland	Guernevil	38.50250	-122.99013	1 Story, without Basement	1817	53.70	62.10	3/14/2003	$ 312,524.00	$ 65,746.58	Russian River	45.57	-8.1						
117	15980	Drake Rd	Guernevil	38.50128	-122.99000	1 or 2 Story, with Basement	884	56.70	58.60	4/21/2005	$ 304,096.00	$ 73,562.31	Russian River	45.54	-11.2						
118	15991	Riverland	Guernevil	38.50292	-122.99100	1 Story, without Basement	992	55.70	60.20	3/8/2002	$ 170,624.00	$ 74,514.72	Russian River	45.54	-10.2						
119	16010	Drake Rd	Guernevil	38.50086	-122.99042	1 Story, without Basement	960	47.80	59.90	8/27/1999	$ 165,120.00	$ 100,770.85	Russian River	45.51	-2.3	$ -	$ -	$ -	$ -	$ -	0.00
120	16055	Riverland	Guernevil	38.50156	-122.99157	1 Story, without Basement	1050	56.40	62.20	7/17/1998	$ 180,600.00	$ 56,860.48	Russian River	45.51	-10.9	$ -	$ -	$ -	$ -	$ -	0.00

Table C.1 Part 5 of 7

Summary of Losses Avoided and ROI Calculations for January 2002 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	JAN 02 EVENT FLOOD ELEVATION	MP_x FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
121	16060	Riverland	Guernevil	38.50111	-122.99214	2 Story, without Basement	1296	55.60	59.50	3/12/1999	$ 222,912.00	$ 72,003.61	Russian River	45.49	-10.1	$ -	$ -	$ -	$ -	$ -	0.00
122	16117	Laughlin	Guernevil	38.51084	-122.99656	1 Story, without Basement	376	49.30	58.70	6/19/1998	$ 64,672.00	$ 49,514.60	Fife Creek	52.77	3.5	$ 18,069.36	$ 8,131.21	$ 6,240.97	$ 11,152.17	$ 43,593.70	0.88
123	16185	Neeley Rd	Guernevil	38.49835	-122.99420	1 Story, without Basement	960	59.30	49.80	11/20/1998	$ 165,120.00	$ 53,766.23	ocket Canyon Cre	45.44	-13.9						
124	16225	Drake Rd	Guernevil	38.49930	-122.99287	2 Story, without Basement	1887	49.10	58.00	11/6/1998	$ 324,564.00	$ 73,679.65	ocket Canyon Cre	45.44	-3.7	$ -	$ -	$ -	$ -	$ -	0.00
125	16325	4th ST	Guernevil	38.50320	-122.99808	1 Story, without Basement	1256	53.70	59.20	9/4/1998	$ 216,032.00	$ 51,014.90	Russian River	44.95	-8.8	$ -	$ -	$ -	$ -	$ -	0.00
126	16342	5th ST #A	Guernevil	38.50407	-122.99773	1 Story, without Basement	633	49.20	58.90	7/9/1999	$ 108,876.00	$ 72,278.23	Russian River	45.27	-3.9	$ -	$ -	$ -	$ -	$ -	0.00
127	16356	4th ST #1	Guernevil	38.50327	-122.99856	1 Story, without Basement	1500	54.00	58.60	1/7/2000	$ 258,000.00	$ 49,581.92	Russian River	44.95	-9.1	$ -	$ -	$ -	$ -	$ -	0.00
128	16356	4th ST #2	Guernevil	38.50327	-122.99856	1 Story, without Basement	1500	54.00	58.60	1/7/2000	$ 258,000.00	$ 46,260.92	Russian River	44.95	-9.1	$ -	$ -	$ -	$ -	$ -	0.00
129	16365	4th ST	Guernevil	38.50326	-122.99879	2 Story, without Basement	1250	55.50	59.40	9/8/2000	$ 215,000.00	$ 74,831.36	Russian River	44.72	-10.8	$ -	$ -	$ -	$ -	$ -	0.00
130	16451	4th ST	Guernevil	38.50336	-122.99838	1 Story, without Basement	672	51.50	59.20	10/8/1999	$ 115,584.00	$ 77,936.34	Russian River	45.00	-6.5	$ -	$ -	$ -	$ -	$ -	0.00
131	16451	Mill St	Guernevil	38.50375	-122.99927	2 Story, without Basement	1800	45.00	59.00	3/12/1999	$ 309,600.00	$ 73,060.29	Russian River	44.11	-0.9	$ 1,702.80	$ 766.26	$ -	$ 1,879.01	$ 4,348.07	0.06
132	16463	HWY 116	Guernevil	38.50188	-123.00095	1 Story, without Basement	988	50.80	58.40	1/5/1999	$ 169,936.00	$ 50,483.62	Russian River	43.88	-6.9	$ -	$ -	$ -	$ -	$ -	0.00
133	16465	HWY 116	Guernevil	38.50188	-123.00095	1 Story, without Basement	910	50.90	57.80	10/30/1998	$ 156,520.00	$ 49,027.25	Russian River	43.88	-7.0	$ -	$ -	$ -	$ -	$ -	0.00
134	16570	River Rd	Guernevil	38.50227	-123.00143	1 or 2 Story, with Basement	900	55.30	59.10	1/12/2001	$ 309,600.00	$ 62,629.18	Russian River	43.66	-11.6	$ -	$ -	$ -	$ -	$ -	0.00
135	16600	Laughlin	Guernevil	38.51346	-123.00310	2 Story, without Basement	2464	55.20	59.10	3/26/1999	$ 423,808.00	$ 51,022.09	Fife Creek	63.30	8.1						
136	16610	Neeley Rd	Guernevil	38.49827	-123.00121	1 or 2 Story, with Basement	642	52.60	57.00	7/14/2000	$ 206,400.00	$ 68,832.03	Russian River	43.30	-9.3	$ -	$ -	$ -	$ -	$ -	0.00
137	16635	Center Wa	Guernevil	38.49815	-123.00203	1 Story, without Basement	730	52.40	59.50	4/25/2001	$ 125,560.00	$ 95,921.18	Russian River	43.02	-9.4	$ -	$ -	$ -	$ -	$ -	0.00
138	16664	Center Wa	Guernevil	38.49778	-123.00238	1 Story, without Basement	872	50.20	57.30	5/21/1999	$ 149,984.00	$ 57,952.78	Russian River	42.91	-7.3	$ -	$ -	$ -	$ -	$ -	0.00
139	16686	Center Wa	Guernevil	38.49734	-123.00246	1 or 2 Story, with Basement	832	53.10	57.80	9/3/1999	$ 286,208.00	$ 65,200.02	Russian River	42.82	-10.3	$ -	$ -	$ -	$ -	$ -	0.00
140	16724	Center Wa	Guernevil	38.49696	-123.00261	1 Story, without Basement	1499	51.90	57.50	12/9/2002	$ 257,828.00	$ 84,465.60	Russian River	42.71	-9.2						
141	16725	Guernewoo	Guernevil	38.49750	-123.00326	1 Story, without Basement	764	51.30	60.30	2/4/2000	$ 131,408.00	$ 93,920.34	Russian River	42.77	-8.5	$ -	$ -	$ -	$ -	$ -	0.00
142	16751	Guernewoo	Guernevil	38.49704	-123.00336	1 Story, without Basement	640	51.50	58.00	12/24/1998	$ 110,080.00	$ 52,623.89	Russian River	42.71	-8.8	$ -	$ -	$ -	$ -	$ -	0.00
143	16755	Center Wa	Guernevil	38.49660	-123.02910	1 Story, without Basement	1144	53.40	57.70	1/29/1999	$ 196,768.00	$ 51,256.49	Russian River	42.55	-10.9	$ -	$ -	$ -	$ -	$ -	0.00
144	16775	Center Wa	Guernevil	38.49648	-123.00304	1 Story, without Basement	930	48.00	57.40	2/23/2001	$ 159,960.00	$ 72,121.18	Russian River	42.43	-5.6	$ -	$ -	$ -	$ -	$ -	0.00
145	16794	Center Wa	Guernevil	38.49598	-123.00330	1 or 2 Story, with Basement	1338	47.80	56.80	5/17/2002	$ 460,272.00	$ 117,439.73	Russian River	42.29	-5.5						
146	16811	Center Wa	Guernevil	38.49574	-123.00337	1 Story, without Basement	864	47.00	56.90	1/22/1999	$ 148,608.00	$ 81,389.55	Russian River	42.31	-4.7	$ -	$ -	$ -	$ -	$ -	0.00
147	16847	Center Wa	Guernevil	38.49523	-123.00364	1 Story, without Basement	760	51.70	56.20	6/28/2002	$ 130,720.00	$ 67,770.21	Russian River	42.25	-9.5						
148	17314	Riverside	Guernevil	38.49372	-123.00972	1 or 2 Story, with Basement	700	47.50	56.40	10/1/2002	$ 240,800.00	$ 61,843.37	Russian River	41.00	-6.5						
149	17325	Riverside	Guernevil	38.49373	-123.01006	1 Story, without Basement	603	51.50	56.10	9/21/2004	$ 103,716.00	$ 65,587.16	Russian River	41.25	-10.3						
150	17336	Riverside	Guernevil	38.49363	-123.00996	1 Story, without Basement	660	51.60	56.10	11/8/2002	$ 113,520.00	$ 80,376.36	Russian River	41.09	-10.5						

Table C.1 Part 6 of 7

Summary of Losses Avoided and ROI Calculations for January 2002 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	JAN 02 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
151	17351	HWY 116	Guernevil	38.49438	-123.00961	1 Story, without Basement	838	51.10	57.10	6/30/1998	$ 144,136.00	$ 51,014.90	Russian River	41.37	-9.7	$ -	$ -	$ -	$ -	$ -	0.00
152	17355	HWY 116	Guernevil	38.49421	-123.00988	1 Story, without Basement	729	48.90	56.40	7/17/1998	$ 125,388.00	$ 49,630.52	Russian River	41.35	-7.6	$ -	$ -	$ -	$ -	$ -	0.00
153	17385	HWY 116 (	Guernevil	38.49397	-123.01058	1 Story, without Basement	1442	49.50	56.90	8/18/2000	$ 363,608.00	$ 71,165.34	Russian River	41.48	-8.0	$ -	$ -	$ -	$ -	$ -	0.00
154	17388	Riverside	Guernevil	38.49368	-123.01049	1 Story, without Basement	1045	49.70	56.30	6/8/2001	$ 179,740.00	$ 63,296.03	Russian River	41.38	-8.3	$ -	$ -	$ -	$ -	$ -	0.00
155	17429	River Ln	Guernevil	38.48988	-123.01326	1 Story, without Basement	885	50.20	57.50	12/3/1999	$ 152,220.00	$ 68,496.40	Russian River	39.87	-10.3	$ -	$ -	$ -	$ -	$ -	0.00
156	17443	Riverside	Guernevil	38.49321	-123.01158	1 or 2 Story, with Basement	1866	50.20	56.40	11/1/2002	$ 532,856.00	$ 99,605.62	Russian River	41.32	-8.9						
157	17456	Orchard A	Guernevil	38.50560	-122.99640	1 Story, without Basement	894	52.60	60.00	6/19/2003	$ 153,768.00	$ 67,447.40	Russian River	40.25	-12.4						
158	17460	River Ln	Guernevil	38.49009	-123.01334	1 Story, without Basement	888	51.00	54.30	12/28/2001	$ 152,736.00	$ 59,122.98	Russian River	39.96	-11.0	$ -	$ -	$ -	$ -	$ -	0.00
159	17461	Riverside	Guernevil	38.49302	-123.01204	1 Story, without Basement	1313	46.30	56.10	6/9/2000	$ 225,836.00	$ 103,286.79	Russian River	41.41	-4.9	$ -	$ -	$ -	$ -	$ -	0.00
160	17485	Riverside	Guernevil	38.49283	-123.01257	2 Story, without Basement	1744	40.40	56.20	3/17/2000	$ 299,968.00	$ 106,455.89	Russian River	41.53	1.1	$ 28,556.95	$ 12,850.63	$ 1,151.61	$ 4,915.89	$ 47,475.08	0.45
161	17549	Orchard A	Guernevil	38.48898	-123.01251	1 Story, without Basement	936	51.70	59.10	2/19/1999	$ 160,992.00	$ 57,556.14	Russian River	39.50	-12.2	$ -	$ -	$ -	$ -	$ -	0.00
162	17570	Orchard A	Guernevil	38.48869	-123.01241	1 Story, without Basement	951	50.90	55.70	1/12/2001	$ 163,572.00	$ 66,260.73	Russian River	39.44	-11.5	$ -	$ -	$ -	$ -	$ -	0.00
163	17670	Neeley Rd	Guernevil	38.48727	-123.01067	1 Story, without Basement	1683	49.80	55.60	2/25/2000	$ 289,476.00	$ 89,061.84	Russian River	39.08	-10.7	$ -	$ -	$ -	$ -	$ -	0.00
164	17711	GreenTree	Guernevil	38.48649	-123.01075	1 Story, without Basement	768	51.10	56.40	5/12/2000	$ 132,096.00	$ 60,507.55	Russian River	38.90	-12.2	$ -	$ -	$ -	$ -	$ -	0.00
165	17765	GreenTree	Guernevil	38.48577	-123.01004	1 Story, without Basement	560	43.90	53.30	6/23/2000	$ 96,320.00	$ 75,827.66	Russian River	38.63	-5.3	$ -	$ -	$ -	$ -	$ -	0.00
166	17775	Orchard A	Guernevil	38.48530	-123.01025	1 Story, without Basement	834	49.50	57.00	12/3/1999	$ 143,448.00	$ 59,068.38	Russian River	38.62	-10.9	$ -	$ -	$ -	$ -	$ -	0.00
167	17777	Orchard A	Guernevil	38.48521	-123.01011	1 Story, without Basement	944	48.30	56.10	10/15/1999	$ 162,368.00	$ 61,294.50	Russian River	38.58	-9.7	$ -	$ -	$ -	$ -	$ -	0.00
168	17786	Orchard A	Guernevil	38.48512	-123.01002	1 Story, without Basement	1344	46.70	57.70	8/13/1999	$ 231,168.00	$ 61,162.09	Russian River	38.58	-8.1	$ -	$ -	$ -	$ -	$ -	0.00
169	17837	Orchard A	Guernevil	38.48459	-123.00937	1 Story, without Basement	1169	48.20	54.00	2/10/2003	$ 201,068.00	$ 79,015.36	Russian River	38.31	-9.9						
170	18063	Elm Ave	Monte Rio	38.47129	-123.00225	1 Story, without Basement	624	43.00	47.60	6/18/1999	$ 107,328.00	$ 52,047.93	Russian River	33.10	-9.9	$ -	$ -	$ -	$ -	$ -	0.00
171	18105	HWY 116	Guernevil	38.48509	-123.01335	1 Story, without Basement	264	50.10	51.60	12/8/2004	$ 45,408.00	$ 78,945.72	Russian River	38.74	-11.4						
172	19720	Redwood D	Monte Rio	38.47541	-122.99894	1 Story, without Basement	360	42.50	48.20	7/10/1998	$ 61,920.00	$ 45,950.36	Russian River	33.76	-8.7	$ -	$ -	$ -	$ -	$ -	0.00
173	19738	Crescent	Monte Rio	38.47550	-122.99913	1 Story, without Basement	936	44.50	48.50	3/17/2000	$ 160,992.00	$ 48,222.91	Russian River	33.76	-10.7	$ -	$ -	$ -	$ -	$ -	0.00
174	19821	Crescent	Monte Rio	38.47559	-123.00039	2 Story, without Basement	1317	45.60	48.20	4/20/2004	$ 226,524.00	$ 84,733.19	Russian River	33.65	-12.0						
175	20021	Beech Ave	Monte Rio	38.47004	-123.01294	1 Story, without Basement	780	40.10	47.10	11/26/2002	$ 134,160.00	$ 61,269.62	Russian River	31.55	-8.6						
176	20030	El Rancho	Monte Rio	38.47041	-123.01345	1 Story, without Basement	1154	42.00	48.70	6/27/2005	$ 198,488.00	$ 83,705.47	Russian River	31.48	-10.5						
177	20201	Willow Rd	Monte Rio	38.47251	-123.00133	1 Story, without Basement	877	40.90	47.40	8/27/1999	$ 150,844.00	$ 83,348.20	Russian River	33.29	-7.6	$ -	$ -	$ -	$ -	$ -	0.00
178	20217	Alder Rd	Monte Rio	38.47245	-123.00183	1 Story, without Basement	800	42.10	50.20	12/11/1998	$ 137,600.00	$ 88,778.35	Russian River	33.24	-8.9	$ -	$ -	$ -	$ -	$ -	0.00
179	20219	Alder Rd	Monte Rio	38.47227	-123.00205	1 Story, without Basement	1162	43.30	49.70	12/10/1999	$ 199,864.00	$ 88,091.34	Russian River	33.22	-10.1	$ -	$ -	$ -	$ -	$ -	0.00
180	20225	Willow Rd	Monte Rio	38.47193	-123.00161	1 Story, without Basement	1014	44.40	48.30	10/9/1998	$ 174,408.00	$ 60,041.98	Russian River	33.21	-11.2	$ -	$ -	$ -	$ -	$ -	0.00

Table C.1 Part 7 of 7

Summary of Losses Avoided and ROI Calculations for January 2002 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	JAN 02 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
181	20226	Willow Rd	Monte Rio	38.47193	-123.00161	1 Story, without Basement	816	41.40	47.60	8/21/1998	$ 140,352.00	$ 51,014.90	Russian River	33.20	-8.2	$ -	$ -	$ -	$ -	$ -	0.00
182	20240	Willow Rd	Monte Rio	38.47166	-123.00166	1 Story, without Basement	864	37.40	48.70	7/1/2005	$ 148,608.00	$ 95,543.05	Russian River	33.15	-4.3						
183	20251	Willow Rd	Monte Rio	38.47128	-123.00185	1 Story, without Basement	690	40.55	47.70	10/27/2004	$ 118,680.00	$ 70,571.73	Russian River	33.11	-7.4						
184	20274	Alder Rd	Monte Rio	38.47058	-123.00302	1 Story, without Basement	516	40.80	47.60	11/6/2003	$ 88,752.00	$ 57,044.87	Russian River	32.94	-7.9						
185	20290	Willow Rd	Monte Rio	38.46963	-123.00262	1 Story, without Basement	1010	35.10	47.80	11/5/2005	$ 173,720.00	$ 97,958.08	Russian River	32.82	-2.3						
186	20295	Alder Rd	Monte Rio	38.46974	-123.00342	1 Story, without Basement	701	38.00	47.50	12/8/2000	$ 120,572.00	$ 68,272.38	Russian River	32.79	-5.2	$ -	$ -	$ -	$ -	$ -	0.00
187	20309	River Blv	Monte Rio	38.47121	-123.00371	1 Story, without Basement	1100	39.50	48.00	7/2/1999	$ 189,200.00	$ 68,487.69	Russian River	32.99	-6.5	$ -	$ -	$ -	$ -	$ -	0.00
188	20357	HWY 116	Monte Rio	38.46845	-123.00808	1 Story, without Basement	1056	41.20	46.90	1/9/1999	$ 181,632.00	$ 56,129.37	Russian River	32.57	-8.6	$ -	$ -	$ -	$ -	$ -	0.00
189	20387	River Blv	Monte Rio	38.47021	-123.00403	1 Story, without Basement	775	43.50	49.50	7/27/2001	$ 13,175.00	$ 81,563.33	Russian River	32.86	-10.6	$ -	$ -	$ -	$ -	$ -	0.00
190	20399	River Blv	Monte Rio	38.47006	-123.00410	1 Story, without Basement	852	40.50	48.20	9/18/1998	$ 146,544.00	$ 42,575.43	Russian River	32.83	-7.7	$ -	$ -	$ -	$ -	$ -	0.00
191	20503	River Blv	Monte Rio	38.46926	-123.00457	2 Story, without Basement	1008	43.40	47.60	12/8/2000	$ 173,376.00	$ 67,066.98	Russian River	32.67	-10.7	$ -	$ -	$ -	$ -	$ -	0.00
192	20550	Alder Rd	Monte Rio	38.46901	-123.00390	1 Story, without Basement	752	38.60	47.70	9/10/1999	$ 129,344.00	$ 69,323.91	Russian River	32.60	-6.0	$ -	$ -	$ -	$ -	$ -	0.00
193	20790	Kingston	Monte Rio	38.46776	-123.00485	2 Story, without Basement	700	46.70	47.50	10/22/1999	$ 120,400.00	$ 53,633.38	Russian River	32.59	-14.1	$ -	$ -	$ -	$ -	$ -	0.00
194	20801	River Blv	Monte Rio	38.46781	-123.00557	1 or 2 Story, with Basement	780	42.50	57.40	3/4/2002	$ 264,880.00	$ 105,678.49	Russian River	32.58	-9.9						
195	20813	River Blv	Monte Rio	38.46762	-123.00582	2 Story, without Basement	1500	34.80	47.50	10/2/1998	$ 258,000.00	$ 71,247.45	Russian River	32.58	-2.2	$ -	$ -	$ -	$ -	$ -	0.00
196	21081	River Blv	Monte Rio	38.46545	-123.00781	1 Story, without Basement	1184	40.40	46.90	3/9/2001	$ 203,648.00	$ 72,345.65	Russian River	32.55	-7.9	$ -	$ -	$ -	$ -	$ -	0.00
197	21225	Petray Ln	Monte Rio	38.71720	-122.88650	2 Story, without Basement	840	209.10	212.40	12/11/2002	$ 144,480.00	$ 58,730.59			-209.1						
198	21330	Monte Cri	Monte Rio	38.47520	-123.01900	1 Story, without Basement	760	35.70	42.20	5/26/2000	$ 130,720.00	$ 54,088.22	Russian River	32.14	-3.6	$ -	$ -	$ -	$ -	$ -	0.00
199	21340	Monte Cri	Monte Rio	38.47546	-123.01919	1 Story, without Basement	768	36.03	42.10	10/2/1998	$ 132,096.00	$ 60,625.23	Russian River	32.59	-3.4	$ -	$ -	$ -	$ -	$ -	0.00
200	21608	Moscow Rd	Monte Rio	38.46794	-123.01399	1 Story, without Basement	750	38.30	45.70	12/17/1999	$ 129,000.00	$ 61,251.18	Russian River	31.87	-6.4	$ -	$ -	$ -	$ -	$ -	0.00
201	21610	Moscow Rd	Monte Rio	38.46799	-123.01410	1 Story, without Basement	750	38.30	45.70	12/17/1999	$ 129,000.00	$ 64,540.31	Russian River	31.87	-6.4	$ -	$ -	$ -	$ -	$ -	0.00
202	21616	Moscow Rd	Monte Rio	38.46817	-123.01437	1 Story, without Basement	1739	40.80	47.00	10/12/2001	$ 299,108.00	$ 105,774.07	Russian River	31.74	-9.1	$ -	$ -	$ -	$ -	$ -	0.00
203	25832	Freezeout	Monte Rio	38.44569	-123.05726	1 Story, without Basement	354	23.20	31.50	8/7/2003	$ 60,888.00	$ 56,869.76	Russian River	15.74	-7.5						
204	25832	Freezeout	Monte Rio	38.44569	-123.05726	1 Story, without Basement	1152	25.30	34.80	8/20/2004	$ 198,144.00	$ 125,093.85	Russian River	15.74	-9.6						
205	26709	Freezeout	Monte Rio	38.44266	-123.06462	1 Story, without Basement	656	24.70	27.90	5/11/2004	$ 112,832.00	$ 75,780.97	Russian River	14.72	-10.0						
																$ 316,474.12	$ 89,096.98	$ 31,745.00	$ 67,268.49	$ 504,584.58	

20 Finished Basements - used damage curve "with basement", although FFE should be measured at basement floor and curve adjusted to account for the elevation at which water enters the building. The "with basement" option provides more conservative values

5 Unknown if basement exists - to be more conservative, a "without basement" damage curve was used

9 structures eliminated from the analysis due to screening process

Structures not included in the loss calculations for the event because the construction to elevate the structure was not completed before the date of the event

Appendix D:

Summary of Losses Avoided and ROI Calculations for December 2002 Event

List of Tables

Table D.1: Summary of Losses Avoided and ROI Calculations for December 2002 Event D-1

Table D.1 Part 1 of 7

Summary of Losses Avoided and ROI Calculations for December 2002 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	DEC 02 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
1	645	Austin Cr	Cazadero	38.47660	-123.04763	1 Story, without Basement	1432	30.80	36.70	9/13/2002	$ 246,304.00	$ 74,310.44	Austin Creek	27.97	-2.8	$ -	$ -	$ -	$ -	$ -	0.00
2	1285	Willowsid	Santa Ros	38.44330	-122.75360	1 Story, without Basement	1100	70.40	79.80	8/14/1998	$ 189,200.00	$ 41,405.03			-70.4						
3	1285	Willowsid	Santa Ros	38.44330	-122.75360	1 Story, without Basement	1100	70.90	78.00	11/13/1998	$ 189,200.00	$ 53,996.70			-70.9						
4	2030	Cazadero	Cazadero	38.49101	-123.06134	1 Story, without Basement	648	47.00	53.20	7/19/2002	$ 111,456.00	$ 68,793.60	Austin Creek	32.72	-14.3	$ -	$ -	$ -	$ -	$ -	0.00
5	4928	Wilshire	Santa Ros	38.45420	-122.68790	1 Story, without Basement	0	65.50	71.00	4/27/2001	$ -	$ 75,834.52			-65.5						
6	5232	Odonnell	Glen Elle	38.36690	-122.51980	1 Story, without Basement	1664	226.30	229.90	12/23/1999	$ 286,208.00	$ 50,194.74			-226.3						
7	8647	Mirabel Rd	Forestville	38.34926	-122.89468	1 Story, without Basement	804	69.80	75.40	6/28/2002	$ 138,288.00	$ 76,231.49	Russian River	63.86	-5.9	$ -	$ -	$ -	$ -	$ -	0.00
8	8650	Mirabel R	Forestvil	38.49302	-122.89478	2 Story, without Basement	1280	70.30	75.70	11/6/1998	$ 220,160.00	$ 69,077.57	Russian River	63.75	-6.6	$ -	$ -	$ -	$ -	$ -	0.00
9	8656	Mirabel Rd	Forestville	38.49302	-122.89478	1 Story, without Basement	764	70.40	74.90	3/1/2002	$ 131,408.00	$ 75,190.70	Russian River	63.74	-6.7	$ -	$ -	$ -	$ -	$ -	0.00
10	8672	Trenton R	Forestvil	38.49042	-122.89674	1 Story, without Basement	784	70.00	78.00	6/19/1998	$ 134,848.00	$ 41,824.80	Russian River	63.58	-6.4	$ -	$ -	$ -	$ -	$ -	0.00
11	8706	Trenton R	Forestvil	38.49118	-122.89737	1 Story, without Basement	624	73.10	76.10	11/17/2000	$ 107,328.00	$ 67,569.74	Russian River	63.52	-9.6	$ -	$ -	$ -	$ -	$ -	0.00
12	8810	Trenton R	Forestvil	38.49231	-122.89778	1 Story, without Basement	780	71.00	77.10	11/9/2001	$ 134,160.00	$ 79,802.18	Russian River	63.46	-7.5	$ -	$ -	$ -	$ -	$ -	0.00
13	8894	Trenton R	Forestvil	38.49405	-122.89800	1 Story, without Basement	892	66.00	75.90	10/15/1999	$ 153,424.00	$ 74,009.90	Russian River	63.38	-2.6	$ -	$ -	$ -	$ -	$ -	0.00
14	8990	Trenton R	Forestvil	38.49428	-122.89801	1 Story, without Basement	780	65.40	76.50	11/5/1999	$ 134,160.00	$ 70,779.05	Russian River	63.38	-2.0	$ -	$ -	$ -	$ -	$ -	0.00
15	9425	Old River	Forestvil	38.50218	-122.90591	1 Story, without Basement	842	67.00	77.30	7/2/1999	$ 179,224.00	$ 70,054.80	Russian River	62.94	-4.1	$ -	$ -	$ -	$ -	$ -	0.00
16	9894	Bohemian	Monte Rio	38.46261	-123.00829	1 Story, without Basement	1200	40.90	48.90	10/6/2000	$ 412,800.00	$ 103,688.08	Dutch Bill Creek	35.82	-5.1	$ -	$ -	$ -	$ -	$ -	0.00
17	10006	Heller St	Monte Rio	38.46892	-123.00398	1 Story, without Basement	564	37.70	47.60	10/6/1998	$ 97,008.00	$ 49,414.40	Russian River	35.85	-1.9	$ -	$ -	$ -	$ -	$ -	0.00
18	10590	Grays Rd	Forestvil	38.50863	-122.92267	1 Story, without Basement	1008	67.40	72.50	12/13/2002	$ 173,376.00	$ 85,280.38	Russian River	60.10	-7.3	$ -	$ -	$ -	$ -	$ -	0.00
19	10599	Grays Rd	Forestvil	38.50856	-122.92287	1 Story, without Basement	880	69.20	72.60	6/18/1999	$ 186,448.00	$ 56,462.59	Russian River	60.06	-9.1	$ -	$ -	$ -	$ -	$ -	0.00
20	10670	Grays Ct	Forestvil	38.50848	-122.92344	1 Story, without Basement	792	67.30	71.60	8/25/2000	$ 294,464.00	$ 65,818.53	Russian River	59.98	-7.3	$ -	$ -	$ -	$ -	$ -	0.00
21	10696	Old River	Forestvil	38.50741	-122.92378	1 Story, without Basement	720	67.50	71.70	4/16/1999	$ 123,840.00	$ 55,637.15	Russian River	59.57	-7.9	$ -	$ -	$ -	$ -	$ -	0.00
22	10716	Old River	Forestvil	38.50744	-122.92415	1 Story, without Basement	600	66.70	71.00	12/24/1998	$ 103,200.00	$ 48,399.81	Russian River	59.20	-7.5	$ -	$ -	$ -	$ -	$ -	0.00
23	10770	Old River	Forestvil	38.50667	-122.92492	1 Story, without Basement	1180	67.40	72.10	7/10/1998	$ 202,960.00	$ 52,268.45	Russian River	58.94	-8.5	$ -	$ -	$ -	$ -	$ -	0.00
24	10840	Buena Vis	Forestvil	38.50648	-122.92594	1 Story, without Basement	600	63.40	71.50	12/8/2000	$ 103,200.00	$ 59,411.02	Russian River	58.91	-4.5	$ -	$ -	$ -	$ -	$ -	0.00
25	10841	Summerhom	Forestvil	38.50616	-122.92596	1 Story, without Basement	520	64.00	71.50	10/12/2001	$ 89,440.00	$ 61,124.72	Russian River	58.94	-5.1	$ -	$ -	$ -	$ -	$ -	0.00
26	10843	Summerhom	Forestvil	38.50607	-122.92607	2 Story, without Basement	960	67.20	75.40	5/19/2000	$ 165,120.00	$ 81,643.10	Russian River	58.96	-8.2	$ -	$ -	$ -	$ -	$ -	0.00
27	10870	Forest Hi	Forestvil	38.50711	-122.92462	1 Story, without Basement	3276	65.00	71.50	3/31/2000	$ 563,472.00	$ 74,274.78	Russian River	59.01	-6.0	$ -	$ -	$ -	$ -	$ -	0.00
28	10940	Sunset Av	Forestvil	38.50763	-122.92840	1 Story, without Basement	972	66.80	74.80	2/5/1999	$ 167,184.00	$ 76,896.13	Russian River	58.79	-8.0	$ -	$ -	$ -	$ -	$ -	0.00
29	10959	Sunset Av	Forestvil	38.50669	-122.92869	1 Story, without Basement	893	65.70	72.90	6/18/1999	$ 153,596.00	$ 57,708.87	Russian River	58.72	-7.0	$ -	$ -	$ -	$ -	$ -	0.00
30	11035	Sunset Av	Forestvil	38.50634	-122.92900	1 or 2 Story, with Basement	776	69.00	72.50	3/9/2004	$ 217,408.00	$ 103,397.80	Russian River	58.69	-10.3						

Table D.1 Part 2 of 7

Summary of Losses Avoided and ROI Calculations for December 2002 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	DEC 02 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
31	11880	Summerhom	Forestvil	38.49798	-122.93892	1 Story, without Basement	1260	73.20	66.90	12/14/1998	$ 216,720.00	$ 63,553.65	Russian River	57.03	-16.2						
32	14060	Church St	Guernevil	38.50294	-122.99777	1 Story, without Basement	1045	54.70	60.80	9/20/2002	$ 179,740.00	$ 63,777.73	Russian River	48.87	-5.8	$ -	$ -	$ -	$ -	$ -	0.00
33	14070	Mill St	Guernevil	38.50304	-122.99929	2 Story, without Basement	1390	53.00	59.20	7/15/2005	$ 239,080.00	$ 102,351.75	Russian River	48.44	-4.6						
34	14185	Old Cazad	Guernevil	38.49746	-123.00850	1 or 2 Story, with Basement	2070	44.90	56.80	2/25/2000	$ 356,040.00	$ 88,636.88	Hulbert Creek	46.09	1.2	$ 56,788.38	$ 25,554.77	$ 8,807.60	$ 7,092.83	$ 98,243.58	1.11
35	14216	Mill St	Guernevil	38.50473	-122.99923	1 Story, without Basement	935	53.10	59.50	1/15/1999	$ 160,820.00	$ 64,957.76	Russian River	48.07	-5.0	$ -	$ -	$ -	$ -	$ -	0.00
36	14226	Lovers Ln	Guernevil	38.49662	-123.00931	2 Story, without Basement	700	47.20	56.10	6/23/2000	$ 120,400.00	$ 55,068.33	Hulbert Creek	45.82	-1.4	$ -	$ -	$ -	$ -	$ -	0.00
37	14226	Mill St	Guernevil	38.50480	-122.99922	1 Story, without Basement	1190	49.70	59.00	1/16/2003	$ 204,680.00	$ 99,708.43	Russian River	48.47	-1.2						
38	14259	Mill Ct	Guernevil	38.50519	-122.99862	2 Story, without Basement	2264	49.60	59.10	10/18/2004	$ 389,408.00	$ 168,319.90	Fife Creek	47.58	-2.0						
39	14259	Old Cazad	Guernevil	38.49824	-123.01002	2 Story, without Basement	852	46.80	55.20	10/11/2002	$ 146,544.00	$ 121,875.80	Hulbert Creek	46.01	-0.8	$ 1,538.71	$ 692.42	$ -	$ 2,048.29	$ 4,279.42	0.04
40	14261	Lovers Ln	Guernevil	38.49679	-123.00987	1 Story, without Basement	986	54.10	56.50	5/31/2002	$ 169,592.00	$ 34,110.80	Hulbert Creek	45.92	-8.2	$ -	$ -	$ -	$ -	$ -	0.00
41	14263	Lovers Ln	Guernevil	38.49685	-123.01000	1 Story, without Basement	975	52.20	56.00	10/8/1999	$ 167,700.00	$ 64,076.62	Hulbert Creek	45.91	-6.3	$ -	$ -	$ -	$ -	$ -	0.00
42	14290	Old Cazad	Guernevil	38.49830	-123.01039	1 or 2 Story, with Basement	1265	53.10	56.30	4/15/2004	$ 473,000.00	$ 69,362.50	Hulbert Creek	45.94	-7.2						
43	14301	Mill Ct	Guernevil	38.50537	-122.99819	1 or 2 Story, with Basement	1764	50.70	59.00	1/23/2006	$ 545,584.00	$ 114,911.44	Fife Creek	46.64	-4.1						
44	14315	Lovers La	Guernevil	38.49700	-123.01078	1 Story, without Basement	780	49.90	55.60	1/12/2001	$ 134,160.00	$ 60,226.72	Hulbert Creek	45.86	-4.0	$ -	$ -	$ -	$ -	$ -	0.00
45	14420	Western A	Guernevil	38.51741	-122.97371	1 Story, without Basement	880	58.80	65.60	4/26/2002	$ 151,360.00	$ 71,233.30	Russian River	51.22	-7.6	$ -	$ -	$ -	$ -	$ -	0.00
46	14464	Western A	Guernevil	38.51691	-122.97393	1 Story, without Basement	656	53.40	61.20	4/15/2005	$ 112,832.00	$ 69,062.88	Russian River	51.22	-2.2						
47	14469	Western A	Guernevil	38.51690	-122.97383	1 Story, without Basement	841	56.50	65.90	11/3/2005	$ 144,652.00	$ 106,231.03	Russian River	51.26	-5.2						
48	14479	Western A	Guernevil	38.51681	-122.97386	1 Story, without Basement	728	57.40	66.70	1/10/2005	$ 125,216.00	$ 67,231.82	Russian River	51.25	-6.2						
49	14501	Armstrong	Guernevil	38.50999	-122.99431	1 Story, without Basement	564	49.90	59.50	11/3/2000	$ 97,008.00	$ 64,321.62	Fife Creek	52.91	3.0	$ 26,211.56	$ 11,795.20	$ 7,361.52	$ 10,840.69	$ 56,208.98	0.87
50	14501	Armstrong	Guernevil	38.51027	-122.99437	2 Story, without Basement	569	51.70	60.60	8/24/2001	$ 97,868.00	$ 83,085.68	Fife Creek	52.92	1.2	$ 9,669.36	$ 4,351.21	$ 993.17	$ 5,037.77	$ 20,051.52	0.24
51	14501	Armstrong	Guernevil	38.51014	-122.99429	1 Story, without Basement	564	51.80	60.60	11/3/2000	$ 97,008.00	$ 64,321.62	Fife Creek	52.91	1.1	$ 14,434.79	$ 6,495.66	$ 3,350.98	$ 6,730.57	$ 31,012.00	0.48
52	14501	Armstrong	Guernevil	38.50982	-122.99431	1 Story, without Basement	922	52.70	59.00	5/11/2001	$ 158,584.00	$ 63,688.56	Fife Creek	52.91	0.2	$ 15,937.69	$ 7,171.96	$ 1,241.19	$ 5,095.33	$ 29,446.18	0.46
53	14501	Armstrong	Guernevil	38.50961	-122.99432	1 Story, without Basement	890	54.10	58.40	11/9/2001	$ 153,080.00	$ 67,591.89	Fife Creek	52.91	-1.2	$ -	$ -	$ -	$ -	$ -	0.00
54	14501	Armstrong	Guernevil	38.50961	-122.99432	1 Story, without Basement	1310	54.10	58.40	4/19/2002	$ 225,320.00	$ 77,494.80	Fife Creek	52.91	-1.2	$ -	$ -	$ -	$ -	$ -	0.00
55	14501	Cherry St	Guernevil	38.49695	-123.01263	1 Story, without Basement	1350	50.10	56.00	12/10/1999	$ 232,200.00	$ 67,830.11	Hulbert Creek	46.37	-3.7	$ -	$ -	$ -	$ -	$ -	0.00
56	14509	Cherry St	Guernevil	38.49702	-123.01300	1 Story, without Basement	760	53.40	61.80	8/20/2004	$ 130,720.00	$ 75,780.97	Hulbert Creek	46.43	-7.0						
57	14530	Western A	Guernevil	38.51571	-122.97427	1 Story, without Basement	950	54.40	64.90	8/20/2004	$ 163,400.00	$ 95,250.58	Russian River	51.19	-3.2						
58	14536	Eastern A	Guernevil	38.51529	-122.97383	1 Story, without Basement	1617	55.90	64.70	9/24/1999	$ 278,124.00	$ 65,529.24	Russian River	51.24	-4.7	$ -	$ -	$ -	$ -	$ -	0.00
59	14549	Eastern A	Guernevil	38.51542	-122.97370	1 Story, without Basement	656	59.70	64.00	11/15/2002	$ 112,832.00	$ 60,626.85	Russian River	51.28	-8.4	$ -	$ -	$ -	$ -	$ -	0.00
60	14569	Eastern A	Guernevil	38.51567	-122.97344	2 Story, without Basement	1080	54.10	63.60	6/30/2001	$ 185,760.00	$ 128,679.77	Russian River	51.30	-2.8	$ -	$ -	$ -	$ -	$ -	0.00

Table D.1 Part 3 of 7

Summary of Losses Avoided and ROI Calculations for December 2002 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	DEC 02 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
61	14594	Eastern A	Guernevil	38.51580	-122.97331	1 Story, without Basement	1180	57.60	61.20	12/1/2000	$ 202,960.00	$ 89,649.78	Russian River	51.28	-6.3	$ -	$ -	$ -	$ -	$ -	0.00
62	14600	Rio Nido	Guernevil	38.51966	-122.97860	1 Story, without Basement	670	52.00	62.90	7/14/2000	$ 115,240.00	$ 59,283.88	Russian River	50.58	-1.4	$ -	$ -	$ -	$ -	$ -	0.00
63	14612	Eastern A	Guernevil	38.51611	-122.97301	1 Story, without Basement	640	60.30	66.80	11/8/2004	$ 110,080.00	$ 70,601.24	Russian River	51.29	-9.0						
64	14619	Eastern A	Guernevil	38.51618	-122.97296	1 Story, without Basement	928	59.70	64.10	10/25/1999	$ 159,616.00	$ 62,829.73	Russian River	51.34	-8.4	$ -	$ -	$ -	$ -	$ -	0.00
65	14620	Eastern A	Guernevil	38.51620	-122.97293	1 Story, without Basement	832	58.10	68.10	1/10/2005	$ 143,104.00	$ 66,807.99	Russian River	51.31	-6.8						
66	14630	Eastern A	Guernevil	38.51634	-122.97281	1 Story, without Basement	968	58.40	68.70	12/14/2004	$ 166,496.00	$ 74,827.87	Russian River	51.32	-7.1						
67	14650	Eastern A	Guernevil	38.51665	-122.97250	1 Story, without Basement	796	58.40	66.90	12/15/2000	$ 136,912.00	$ 73,044.78	Russian River	51.35	-7.1	$ -	$ -	$ -	$ -	$ -	0.00
68	14651	Carrier L	Guernevil	38.51139	-122.99755	1 Story, without Basement	663	53.10	62.00	5/18/2001	$ 114,036.00	$ 68,477.09	Fife Creek	54.04	0.9	$ 15,622.93	$ 7,030.32	$ 3,158.60	$ 6,331.07	$ 32,142.92	0.47
69	14652	Rio Nido	Guernevil	38.51959	-122.97867	1 Story, without Basement	572	50.90	63.80	10/11/2004	$ 98,384.00	$ 77,574.04	Russian River	50.57	-0.3						
70	14680	Orchard L	Guernevil	38.51677	-122.97294	1 Story, without Basement	686	59.00	63.90	3/30/2001	$ 117,992.00	$ 60,043.28	Russian River	51.30	-7.7	$ -	$ -	$ -	$ -	$ -	0.00
71	14687	Orchard L	Guernevil	38.51716	-122.97317	1 Story, without Basement	855	58.10	64.90	5/18/2001	$ 147,060.00	$ 67,436.82	Russian River	51.31	-6.8	$ -	$ -	$ -	$ -	$ -	0.00
72	14698	Orchard L	Guernevil	38.51696	-122.97305	1 Story, without Basement	384	59.30	64.40	9/29/2000	$ 66,048.00	$ 71,328.93	Russian River	51.29	-8.0	$ -	$ -	$ -	$ -	$ -	0.00
73	14706	Rio Nido	Guernevil	38.52020	-122.97882	1 Story, without Basement	1240	56.70	63.00	1/14/2000	$ 213,280.00	$ 59,697.31	Russian River	50.59	-6.1	$ -	$ -	$ -	$ -	$ -	0.00
74	14707	Willow Rd	Rio Nido	38.52095	-122.97822	1 Story, without Basement	960	58.80	63.70	5/4/2001	$ 165,120.00	$ 68,309.93	Russian River	50.73	-8.1	$ -	$ -	$ -	$ -	$ -	0.00
75	14709	Carrier L	Guernevil	38.51224	-122.99767	1 Story, without Basement	1301	56.20	60.70	9/8/2000	$ 223,772.00	$ 75,845.49	Fife Creek	57.25	1.1	$ 32,223.17	$ 14,500.43	$ 5,290.70	$ 6,568.06	$ 58,582.36	0.77
76	14710	Carrier L	Guernevil	38.51240	-122.99778	1 Story, without Basement	1356	56.50	65.20	8/11/2000	$ 233,232.00	$ 69,821.57	Fife Creek	57.63	1.1	$ 35,078.09	$ 15,785.14	$ 5,835.79	$ 6,784.74	$ 63,483.76	0.91
77	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	557	52.35	63.00	3/26/1999	$ 95,804.00	$ 62,100.52	Russian River	50.59	-1.8	$ -	$ -	$ -	$ -	$ -	0.00
78	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	557	53.02	63.00	2/19/1999	$ 95,804.00	$ 62,736.56	Russian River	50.59	-2.4	$ -	$ -	$ -	$ -	$ -	0.00
79	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	557	53.25	62.90	1/29/1999	$ 95,804.00	$ 98,680.08	Russian River	50.59	-2.7	$ -	$ -	$ -	$ -	$ -	0.00
80	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	563	56.70	63.00	2/5/1999	$ 96,836.00	$ 56,144.36	Russian River	50.59	-6.1	$ -	$ -	$ -	$ -	$ -	0.00
81	14717	Canyon 7	Rio Nido	38.52104	-122.97930	2 Story, without Basement	1491	53.50	64.90	4/27/2001	$ 256,452.00	$ 81,354.38	Russian River	50.67	-2.8	$ -	$ -	$ -	$ -	$ -	0.00
82	14723	Northern	Guernevil	38.51717	-122.97233	1 Story, without Basement	1672	61.20	64.20	6/29/2001	$ 287,584.00	$ 68,339.78	Russian River	51.35	-9.9	$ -	$ -	$ -	$ -	$ -	0.00
83	14726	Willow Rd	Rio Nido	38.52138	-122.97815	1 Story, without Basement	671	59.00	64.00	6/18/1999	$ 115,412.00	$ 67,866.22	Russian River	50.77	-8.2	$ -	$ -	$ -	$ -	$ -	0.00
84	14736	Rio Nido	Guernevil	38.52081	-122.97986	1 Story, without Basement	873	60.70	62.40	11/1/2002	$ 150,156.00	$ 78,361.15	Russian River	50.58	-10.1	$ -	$ -	$ -	$ -	$ -	0.00
85	14736	Willow Rd	Rio Nido	38.52162	-122.97804	2 Story, without Basement	1230	59.30	64.10	8/9/2002	$ 211,560.00	$ 91,892.47	Russian River	50.79	-8.5	$ -	$ -	$ -	$ -	$ -	0.00
86	14760	Rio Nido	Guernevil	38.52110	-122.98015	1 Story, without Basement	606	59.30	64.80	1/14/2000	$ 104,232.00	$ 54,569.52	Russian River	50.57	-8.7	$ -	$ -	$ -	$ -	$ -	0.00
87	14775	Northern	Guernevil	38.51763	-122.97264	1 Story, without Basement	856	60.20	68.40	4/17/1998	$ 147,232.00	$ 48,710.52	Russian River	51.32	-8.9	$ -	$ -	$ -	$ -	$ -	0.00
88	14821	Northern	Guernevil	38.51804	-122.97304	1 Story, without Basement	640	58.40	65.70	6/10/2004	$ 110,080.00	$ 81,807.74	Russian River	51.29	-7.1						
89	14902	Melody Av	Guernevil	38.51307	-122.97908	1 or 2 Story, with Basement	986	57.60	65.60	1/25/2002	$ 331,960.00	$ 114,965.27	Russian River	50.45	-7.2	$ -	$ -	$ -	$ -	$ -	0.00
90	14917	Melody Av	Guernevil	38.51291	-122.97993	1 or 2 Story, with Basement	760	60.90	61.50	6/8/2001	$ 261,440.00	$ 101,181.95	Russian River	50.44	-10.5	$ -	$ -	$ -	$ -	$ -	0.00

Table D.1 Part 4 of 7

Summary of Losses Avoided and ROI Calculations for December 2002 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	DEC 02 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
91	14918	Drake Roa	Guernevil	38.51260	-122.97935	1 Story, without Basement	564	56.80	61.30	4/2/1999	$ 97,008.00	$ 43,033.66	Russian River	50.43	-6.4	$ -	$ -	$ -	$ -	$ -	0.00
92	14991	Foothill	Guernevil	38.51503	-122.98273	1 or 2 Story, with Basement	824	56.50	61.50	3/2/2001	$ 283,456.00	$ 77,335.98	Russian River	50.41	-6.1	$ -	$ -	$ -	$ -	$ -	0.00
93	14991	Melody Av	Guernevil	38.51172	-122.98007	1 or 2 Story, with Basement	848	57.30	62.60	10/18/2000	$ 261,440.00	$ 78,956.47	Russian River	50.41	-6.9	$ -	$ -	$ -	$ -	$ -	0.00
94	15029	Foothill	Guernevil	38.51429	-122.98312	1 or 2 Story, with Basement	647	48.00	61.70	10/1/1999	$ 126,420.00	$ 88,260.49	Russian River	50.44	2.4	$ 126,420.00	$ 12,128.73	$ 6,378.71	$ 8,910.90	$ 153,838.34	1.74
95	15030	Old River	Guernevil	38.51427	-122.98268	1 Story, without Basement	885	52.60	61.00	3/31/2000	$ 152,220.00	$ 67,076.21	Russian River	50.40	-2.2	$ -	$ -	$ -	$ -	$ -	0.00
96	15076	Old River	Guernevil	38.51332	-122.98313	1 or 2 Story, with Basement	720	53.10	61.20	3/7/2003	$ 239,424.00	$ 77,436.15	Russian River	50.44	-2.7						
97	15083	Leasowe L	Guernevil	38.51092	-122.98076	1 Story, without Basement	890	58.90	61.50	3/29/2002	$ 153,080.00	$ 77,054.38	Russian River	50.38	-8.5	$ -	$ -	$ -	$ -	$ -	0.00
98	15105	River Rd	Guernevil	38.51304	-122.98285	1 Story, without Basement	1064	51.40	60.50	7/1/2005	$ 183,008.00	$ 90,801.44	Russian River	50.44	-1.0						
99	15170	Drake Rd	Guernevil	38.50971	-122.98124	1 or 2 Story, with Basement	1026	56.20	61.30	11/1/2004	$ 352,944.00	$ 94,665.82	Russian River	50.34	-5.9						
100	15270	Old River	Guernevil	38.51086	-122.98450	2 Story, without Basement	1331	56.80	66.00	2/26/2004	$ 228,932.00	$ 60,843.59	Russian River	50.33	-6.5						
101	15280	Old River	Guernevil	38.51086	-122.98450	1 Story, without Basement	1105	57.50	64.90	7/30/1999	$ 190,060.00	$ 50,188.40	Russian River	50.33	-7.2	$ -	$ -	$ -	$ -	$ -	0.00
102	15410	Riverside	Guernevil	38.50895	-122.98567	1 Story, without Basement	912	55.60	61.40	5/5/2000	$ 156,864.00	$ 60,013.34	Russian River	50.18	-5.4	$ -	$ -	$ -	$ -	$ -	0.00
103	15437	Riverside	Guernevil	38.50879	-122.98592	1 Story, without Basement	1114	56.50	62.10	3/9/2001	$ 191,608.00	$ 98,776.64	Russian River	50.15	-6.4	$ -	$ -	$ -	$ -	$ -	0.00
104	15470	Riverside	Guernevil	38.50837	-122.98640	1 Story, without Basement	1160	55.10	61.30	3/5/1999	$ 199,520.00	$ 50,097.18	Russian River	50.08	-5.0	$ -	$ -	$ -	$ -	$ -	0.00
105	15486	River Rd	Guernevil	38.50859	-122.98705	1 Story, without Basement	582	52.00	61.20	5/27/2002	$ 100,104.00	$ 76,973.83	Russian River	50.06	-1.9	$ -	$ -	$ -	$ -	$ -	0.00
106	15549	Riverside	Guernevil	38.50770	-122.98711	1 or 2 Story, with Basement	966	51.70	60.60	8/23/2002	$ 257,656.00	$ 89,748.32	Russian River	49.96	-1.7	$ 12,985.86	$ 5,843.64	$ -	$ 3,399.14	$ 22,228.64	0.25
107	15555	Bonita Av	Guernevil	38.50774	-122.98819	2 Story, without Basement	1175	49.40	59.70	2/19/1999	$ 202,100.00	$ 53,547.22	Russian River	49.90	0.5	$ 14,147.00	$ 6,366.15	$ -	$ 4,062.72	$ 24,575.87	0.46
108	15587	Bonita Av	Guernevil	38.50778	-122.98827	1 Story, without Basement	874	53.50	59.50	5/28/1999	$ 150,328.00	$ 49,109.87	Russian River	49.90	-3.6	$ -	$ -	$ -	$ -	$ -	0.00
109	15604	Riverside	Guernevil	38.50748	-122.98748	1 or 2 Story, with Basement	783	56.10	59.80	5/10/2002	$ 257,656.00	$ 66,733.48	Russian River	49.91	-6.2	$ -	$ -	$ -	$ -	$ -	0.00
110	15619	Riverside	Guernevil	38.50754	-122.98788	1 Story, without Basement	592	49.00	60.20	11/20/1998	$ 101,824.00	$ 60,949.92	Russian River	49.87	0.9	$ 13,593.50	$ 6,117.08	$ 2,793.38	$ 6,212.58	$ 28,716.54	0.47
111	15623	Riverside	Guernevil	38.50708	-122.98816	1 or 2 Story, with Basement	1429	51.50	60.20	9/29/2000	$ 327,488.00	$ 73,936.53	Russian River	49.83	-1.7	$ 17,422.36	$ 7,840.06	$ -	$ 3,493.94	$ 28,756.36	0.39
112	15625	Riverside	Guernevil	38.50718	-122.98803	1 Story, without Basement	882	52.00	59.90	7/16/1999	$ 151,704.00	$ 66,559.56	Russian River	49.84	-2.2	$ -	$ -	$ -	$ -	$ -	0.00
113	15627	Riverside	Guernevil	38.50704	-122.98824	1 Story, without Basement	1058	60.80	50.50	9/4/1998	$ 181,976.00	$ 64,751.43	Russian River	49.81	-11.0						
114	15675	Riverside	Guernevil	38.50651	-122.98881	1 or 2 Story, with Basement	1020	54.00	62.00	2/26/1999	$ 350,880.00	$ 74,974.73	Russian River	49.73	-4.3	$ -	$ -	$ -	$ -	$ -	0.00
115	15850	Riverland	Guernevil	38.50458	-122.99016	1 or 2 Story, with Basement	1386	55.90	60.20	5/28/1999	$ 271,416.00	$ 75,005.68	Russian River	49.40	-6.5	$ -	$ -	$ -	$ -	$ -	0.00
116	15961	Riverland	Guernevil	38.50250	-122.99013	1 Story, without Basement	1817	53.70	62.10	3/14/2003	$ 312,524.00	$ 65,746.58	Russian River	49.37	-4.3						
117	15980	Drake Rd	Guernevil	38.50128	-122.99000	1 or 2 Story, with Basement	884	56.70	58.60	4/21/2005	$ 304,096.00	$ 73,562.31	Russian River	49.34	-7.4						
118	15991	Riverland	Guernevil	38.50292	-122.99100	1 Story, without Basement	992	55.70	60.20	3/8/2002	$ 170,624.00	$ 74,514.72	Russian River	49.35	-6.4	$ -	$ -	$ -	$ -	$ -	0.00
119	16010	Drake Rd	Guernevil	38.50086	-122.99042	1 Story, without Basement	960	47.80	59.90	8/27/1999	$ 165,120.00	$ 100,770.85	Russian River	49.32	1.5	$ 29,985.79	$ 13,493.61	$ 6,082.14	$ 7,841.05	$ 57,402.59	0.57
120	16055	Riverland	Guernevil	38.50156	-122.99157	1 Story, without Basement	1050	56.40	62.20	7/17/1998	$ 180,600.00	$ 56,860.48	Russian River	49.32	-7.1	$ -	$ -	$ -	$ -	$ -	0.00

Table D.1 Part 5 of 7

Summary of Losses Avoided and ROI Calculations for December 2002 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	DEC 02 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
121	16060	Riverland	Guernevil	38.50111	-122.99214	2 Story, without Basement	1296	55.60	59.50	3/12/1999	$ 222,912.00	$ 72,003.61	Russian River	49.30	-6.3	$ -	$ -	$ -	$ -	$ -	0.00
122	16117	Laughlin	Guernevil	38.51084	-122.99656	1 Story, without Basement	376	49.30	58.70	6/19/1998	$ 64,672.00	$ 49,514.60	Fife Creek	52.96	3.7	$ 18,315.11	$ 8,241.80	$ 6,341.55	$ 11,280.82	$ 44,179.28	0.89
123	16185	Neeley Rd	Guernevil	38.49835	-122.99420	1 Story, without Basement	960	59.30	49.80	11/20/1998	$ 165,120.00	$ 53,766.23	ocket Canyon Cre	49.25	-10.1						
124	16225	Drake Rd	Guernevil	38.49930	-122.99287	2 Story, without Basement	1887	49.10	58.00	11/6/1998	$ 324,564.00	$ 73,679.65	ocket Canyon Cre	49.25	0.1	$ 18,175.58	$ 8,179.01	$ -	$ 3,588.74	$ 29,943.33	0.41
125	16325	4th ST	Guernevil	38.50320	-122.99808	1 Story, without Basement	1256	53.70	59.20	9/4/1998	$ 216,032.00	$ 51,014.90	Russian River	48.82	-4.9	$ -	$ -	$ -	$ -	$ -	0.00
126	16342	5th ST #A	Guernevil	38.50407	-122.99773	1 Story, without Basement	633	49.20	58.90	7/9/1999	$ 108,876.00	$ 72,278.23	Russian River	49.11	-0.1	$ 8,916.94	$ 4,012.62	$ -	$ 4,465.61	$ 17,395.18	0.24
127	16356	4th ST #1	Guernevil	38.50327	-122.99856	1 Story, without Basement	1500	54.00	58.60	1/7/2000	$ 258,000.00	$ 49,581.92	Russian River	48.82	-5.2	$ -	$ -	$ -	$ -	$ -	0.00
128	16356	4th ST #2	Guernevil	38.50327	-122.99856	1 Story, without Basement	1500	54.00	58.60	1/7/2000	$ 258,000.00	$ 46,260.92	Russian River	48.82	-5.2	$ -	$ -	$ -	$ -	$ -	0.00
129	16365	4th ST	Guernevil	38.50326	-122.99879	2 Story, without Basement	1250	55.50	59.40	9/8/2000	$ 215,000.00	$ 74,831.36	Russian River	48.61	-6.9	$ -	$ -	$ -	$ -	$ -	0.00
130	16451	4th ST	Guernevil	38.50336	-122.99838	1 Story, without Basement	672	51.50	59.20	10/8/1999	$ 115,584.00	$ 77,936.34	Russian River	48.86	-2.6	$ -	$ -	$ -	$ -	$ -	0.00
131	16451	Mill St	Guernevil	38.50375	-122.99927	2 Story, without Basement	1800	45.00	59.00	3/12/1999	$ 309,600.00	$ 73,060.29	Russian River	48.02	3.0	$ 55,851.84	$ 25,133.33	$ 9,485.55	$ 7,800.42	$ 98,271.14	1.35
132	16463	HWY 116	Guernevil	38.50188	-123.00095	1 Story, without Basement	988	50.80	58.40	1/5/1999	$ 169,936.00	$ 50,483.62	Russian River	47.79	-3.0	$ -	$ -	$ -	$ -	$ -	0.00
133	16465	HWY 116	Guernevil	38.50188	-123.00095	1 Story, without Basement	910	50.90	57.80	10/30/1998	$ 156,520.00	$ 49,027.25	Russian River	47.79	-3.1	$ -	$ -	$ -	$ -	$ -	0.00
134	16570	River Rd	Guernevil	38.50227	-123.00143	1 or 2 Story, with Basement	900	55.30	59.10	1/12/2001	$ 309,600.00	$ 62,629.18	Russian River	47.57	-7.7	$ -	$ -	$ -	$ -	$ -	0.00
135	16600	Laughlin	Guernevil	38.51346	-123.00310	2 Story, without Basement	2464	55.20	59.10	3/26/1999	$ 423,808.00	$ 51,022.09	Fife Creek	63.37	8.2						
136	16610	Neeley Rd	Guernevil	38.49827	-123.00121	1 or 2 Story, with Basement	642	52.60	57.00	7/14/2000	$ 206,400.00	$ 68,832.03	Russian River	47.21	-5.4	$ -	$ -	$ -	$ -	$ -	0.00
137	16635	Center Wa	Guernevil	38.49815	-123.00203	1 Story, without Basement	730	52.40	59.50	4/25/2001	$ 125,560.00	$ 95,921.18	Russian River	46.93	-5.5	$ -	$ -	$ -	$ -	$ -	0.00
138	16664	Center Wa	Guernevil	38.49778	-123.00238	1 Story, without Basement	872	50.20	57.30	5/21/1999	$ 149,984.00	$ 57,952.78	Russian River	46.82	-3.4	$ -	$ -	$ -	$ -	$ -	0.00
139	16686	Center Wa	Guernevil	38.49734	-123.00246	1 or 2 Story, with Basement	832	53.10	57.80	9/3/1999	$ 286,208.00	$ 65,200.02	Russian River	46.73	-6.4	$ -	$ -	$ -	$ -	$ -	0.00
140	16724	Center Wa	Guernevil	38.49696	-123.00261	1 Story, without Basement	1499	51.90	57.50	12/9/2002	$ 257,828.00	$ 84,465.60	Russian River	46.62	-5.3	$ -	$ -	$ -	$ -	$ -	0.00
141	16725	Guernewoo	Guernevil	38.49750	-123.00326	1 Story, without Basement	764	51.30	60.30	2/4/2000	$ 131,408.00	$ 93,920.34	Russian River	46.68	-4.6	$ -	$ -	$ -	$ -	$ -	0.00
142	16751	Guernewoo	Guernevil	38.49704	-123.00336	1 Story, without Basement	640	51.50	58.00	12/24/1998	$ 110,080.00	$ 52,623.89	Russian River	46.62	-4.9	$ -	$ -	$ -	$ -	$ -	0.00
143	16755	Center Wa	Guernevil	38.49660	-123.02910	1 Story, without Basement	1144	53.40	57.70	1/29/1999	$ 196,768.00	$ 51,256.49	Russian River	46.45	-7.0	$ -	$ -	$ -	$ -	$ -	0.00
144	16775	Center Wa	Guernevil	38.49648	-123.00304	1 Story, without Basement	930	48.00	57.40	2/23/2001	$ 159,960.00	$ 72,121.18	Russian River	46.33	-1.7	$ -	$ -	$ -	$ -	$ -	0.00
145	16794	Center Wa	Guernevil	38.49598	-123.00330	1 or 2 Story, with Basement	1338	47.80	56.80	5/17/2002	$ 460,272.00	$ 117,439.73	Russian River	46.18	-1.6	$ 25,407.01	$ 11,433.16	$ -	$ 3,561.65	$ 40,401.82	0.34
146	16811	Center Wa	Guernevil	38.49574	-123.00337	1 Story, without Basement	864	47.00	56.90	1/22/1999	$ 148,608.00	$ 81,389.55	Russian River	46.20	-0.8	$ 2,674.94	$ 1,203.72	$ -	$ 2,302.21	$ 6,180.88	0.08
147	16847	Center Wa	Guernevil	38.49523	-123.00364	1 Story, without Basement	760	51.70	56.20	6/28/2002	$ 130,720.00	$ 67,770.21	Russian River	46.14	-5.6	$ -	$ -	$ -	$ -	$ -	0.00
148	17314	Riverside	Guernevil	38.49372	-123.00972	1 or 2 Story, with Basement	700	47.50	56.40	10/1/2002	$ 240,800.00	$ 61,843.37	Russian River	44.70	-2.8	$ -	$ -	$ -	$ -	$ -	0.00
149	17325	Riverside	Guernevil	38.49373	-123.01006	1 Story, without Basement	603	51.50	56.10	9/21/2004	$ 103,716.00	$ 65,587.16	Russian River	44.83	-6.7						
150	17336	Riverside	Guernevil	38.49363	-123.00996	1 Story, without Basement	660	51.60	56.10	11/8/2002	$ 113,520.00	$ 80,376.36	Russian River	44.69	-6.9	$ -	$ -	$ -	$ -	$ -	0.00

Table D.1 Part 6 of 7

Summary of Losses Avoided and ROI Calculations for December 2002 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	DEC 02 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
151	17351	HWY 116	Guernevil	38.49438	-123.00961	1 Story, without Basement	838	51.10	57.10	6/30/1998	$ 144,136.00	$ 51,014.90	Russian River	44.91	-6.2	$ -	$ -	$ -	$ -	$ -	0.00
152	17355	HWY 116	Guernevil	38.49421	-123.00988	1 Story, without Basement	729	48.90	56.40	7/17/1998	$ 125,388.00	$ 49,630.52	Russian River	44.95	-4.0	$ -	$ -	$ -	$ -	$ -	0.00
153	17385	HWY 116 (	Guernevil	38.49397	-123.01058	1 Story, without Basement	1442	49.50	56.90	8/18/2000	$ 363,608.00	$ 71,165.34	Russian River	44.74	-4.8	$ -	$ -	$ -	$ -	$ -	0.00
154	17388	Riverside	Guernevil	38.49368	-123.01049	1 Story, without Basement	1045	49.70	56.30	6/8/2001	$ 179,740.00	$ 63,296.03	Russian River	44.81	-4.9	$ -	$ -	$ -	$ -	$ -	0.00
155	17429	River Ln	Guernevil	38.48988	-123.01326	1 Story, without Basement	885	50.20	57.50	12/3/1999	$ 152,220.00	$ 68,496.40	Russian River	43.44	-6.8	$ -	$ -	$ -	$ -	$ -	0.00
156	17443	Riverside	Guernevil	38.49321	-123.01158	1 or 2 Story, with Basement	1866	50.20	56.40	11/1/2002	$ 532,856.00	$ 99,605.62	Russian River	44.59	-5.6	$ -	$ -	$ -	$ -	$ -	0.00
157	17456	Orchard A	Guernevil	38.50560	-122.99640	1 Story, without Basement	894	52.60	60.00	6/19/2003	$ 153,768.00	$ 67,447.40	Russian River	43.69	-8.9						
158	17460	River Ln	Guernevil	38.49009	-123.01334	1 Story, without Basement	888	51.00	54.30	12/28/2001	$ 152,736.00	$ 59,122.98	Russian River	43.50	-7.5	$ -	$ -	$ -	$ -	$ -	0.00
159	17461	Riverside	Guernevil	38.49302	-123.01204	1 Story, without Basement	1313	46.30	56.10	6/9/2000	$ 225,836.00	$ 103,286.79	Russian River	44.61	-1.7	$ -	$ -	$ -	$ -	$ -	0.00
160	17485	Riverside	Guernevil	38.49283	-123.01257	2 Story, without Basement	1744	40.40	56.20	3/17/2000	$ 299,968.00	$ 106,455.89	Russian River	44.62	4.2	$ 61,313.46	$ 27,591.06	$ 11,037.08	$ 8,612.97	$ 108,554.56	1.02
161	17549	Orchard A	Guernevil	38.48898	-123.01251	1 Story, without Basement	936	51.70	59.10	2/19/1999	$ 160,992.00	$ 57,556.14	Russian River	43.16	-8.5	$ -	$ -	$ -	$ -	$ -	0.00
162	17570	Orchard A	Guernevil	38.48869	-123.01241	1 Story, without Basement	951	50.90	55.70	1/12/2001	$ 163,572.00	$ 66,260.73	Russian River	43.09	-7.8	$ -	$ -	$ -	$ -	$ -	0.00
163	17670	Neeley Rd	Guernevil	38.48727	-123.01067	1 Story, without Basement	1683	49.80	55.60	2/25/2000	$ 289,476.00	$ 89,061.84	Russian River	42.73	-7.1	$ -	$ -	$ -	$ -	$ -	0.00
164	17711	GreenTree	Guernevil	38.48649	-123.01075	1 Story, without Basement	768	51.10	56.40	5/12/2000	$ 132,096.00	$ 60,507.55	Russian River	42.55	-8.6	$ -	$ -	$ -	$ -	$ -	0.00
165	17765	GreenTree	Guernevil	38.48577	-123.01004	1 Story, without Basement	560	43.90	53.30	6/23/2000	$ 96,320.00	$ 75,827.66	Russian River	42.27	-1.6	$ -	$ -	$ -	$ -	$ -	0.00
166	17775	Orchard A	Guernevil	38.48530	-123.01025	1 Story, without Basement	834	49.50	57.00	12/3/1999	$ 143,448.00	$ 59,068.38	Russian River	42.26	-7.2	$ -	$ -	$ -	$ -	$ -	0.00
167	17777	Orchard A	Guernevil	38.48521	-123.01011	1 Story, without Basement	944	48.30	56.10	10/15/1999	$ 162,368.00	$ 61,294.50	Russian River	42.22	-6.1	$ -	$ -	$ -	$ -	$ -	0.00
168	17786	Orchard A	Guernevil	38.48512	-123.01002	1 Story, without Basement	1344	46.70	57.70	8/13/1999	$ 231,168.00	$ 61,162.09	Russian River	42.22	-4.5	$ -	$ -	$ -	$ -	$ -	0.00
169	17837	Orchard A	Guernevil	38.48459	-123.00937	1 Story, without Basement	1169	48.20	54.00	2/10/2003	$ 201,068.00	$ 79,015.36	Russian River	41.95	-6.3						
170	18063	Elm Ave	Monte Rio	38.47129	-123.00225	1 Story, without Basement	624	43.00	47.60	6/18/1999	$ 107,328.00	$ 52,047.93	Russian River	36.38	-6.6	$ -	$ -	$ -	$ -	$ -	0.00
171	18105	HWY 116	Guernevil	38.48509	-123.01335	1 Story, without Basement	264	50.10	51.60	12/8/2004	$ 45,408.00	$ 78,945.72	Russian River	42.39	-7.7						
172	19720	Redwood D	Monte Rio	38.47541	-122.99894	1 Story, without Basement	360	42.50	48.20	7/10/1998	$ 61,920.00	$ 45,950.36	Russian River	37.07	-5.4	$ -	$ -	$ -	$ -	$ -	0.00
173	19738	Crescent	Monte Rio	38.47550	-122.99913	1 Story, without Basement	936	44.50	48.50	3/17/2000	$ 160,992.00	$ 48,222.91	Russian River	37.07	-7.4	$ -	$ -	$ -	$ -	$ -	0.00
174	19821	Crescent	Monte Rio	38.47559	-123.00039	2 Story, without Basement	1317	45.60	48.20	4/20/2004	$ 226,524.00	$ 84,733.19	Russian River	36.95	-8.7						
175	20021	Beech Ave	Monte Rio	38.47004	-123.01294	1 Story, without Basement	780	40.10	47.10	11/26/2002	$ 134,160.00	$ 61,269.62	Russian River	34.61	-5.5	$ -	$ -	$ -	$ -	$ -	0.00
176	20030	El Rancho	Monte Rio	38.47041	-123.01345	1 Story, without Basement	1154	42.00	48.70	6/27/2005	$ 198,488.00	$ 83,705.47	Russian River	34.53	-7.5						
177	20201	Willow Rd	Monte Rio	38.47251	-123.00133	1 Story, without Basement	877	40.90	47.40	8/27/1999	$ 150,844.00	$ 83,348.20	Russian River	36.58	-4.3	$ -	$ -	$ -	$ -	$ -	0.00
178	20217	Alder Rd	Monte Rio	38.47245	-123.00183	1 Story, without Basement	800	42.10	50.20	12/11/1998	$ 137,600.00	$ 88,778.35	Russian River	36.53	-5.6	$ -	$ -	$ -	$ -	$ -	0.00
179	20219	Alder Rd	Monte Rio	38.47227	-123.00205	1 Story, without Basement	1162	43.30	49.70	12/10/1999	$ 199,864.00	$ 88,091.34	Russian River	36.51	-6.8	$ -	$ -	$ -	$ -	$ -	0.00
180	20225	Willow Rd	Monte Rio	38.47193	-123.00161	1 Story, without Basement	1014	44.40	48.30	10/9/1998	$ 174,408.00	$ 60,041.98	Russian River	36.50	-7.9	$ -	$ -	$ -	$ -	$ -	0.00

Table D.1 Part 7 of 7

Summary of Losses Avoided and ROI Calculations for December 2002 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	DEC 02 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
181	20226	Willow Rd	Monte Rio	38.47193	-123.00161	1 Story, without Basement	816	41.40	47.60	8/21/1998	$ 140,352.00	$ 51,014.90	Russian River	36.49	-4.9	$ -	$ -	$ -	$ -	$ -	0.00
182	20240	Willow Rd	Monte Rio	38.47166	-123.00166	1 Story, without Basement	864	37.40	48.70	7/1/2005	$ 148,608.00	$ 95,543.05	Russian River	36.43	-1.0						
183	20251	Willow Rd	Monte Rio	38.47128	-123.00185	1 Story, without Basement	690	40.55	47.70	10/27/2004	$ 118,680.00	$ 70,571.73	Russian River	36.39	-4.2						
184	20274	Alder Rd	Monte Rio	38.47058	-123.00302	1 Story, without Basement	516	40.80	47.60	11/6/2003	$ 88,752.00	$ 57,044.87	Russian River	36.19	-4.6						
185	20290	Willow Rd	Monte Rio	38.46963	-123.00262	1 Story, without Basement	1010	35.10	47.80	11/5/2005	$ 173,720.00	$ 97,958.08	Russian River	36.06	1.0						
186	20295	Alder Rd	Monte Rio	38.46974	-123.00342	1 Story, without Basement	701	38.00	47.50	12/8/2000	$ 120,572.00	$ 68,272.38	Russian River	36.04	-2.0	$ -	$ -	$ -	$ -	$ -	0.00
187	20309	River Blv	Monte Rio	38.47121	-123.00371	1 Story, without Basement	1100	39.50	48.00	7/2/1999	$ 189,200.00	$ 68,487.69	Russian River	36.26	-3.2	$ -	$ -	$ -	$ -	$ -	0.00
188	20357	HWY 116	Monte Rio	38.46845	-123.00808	1 Story, without Basement	1056	41.20	46.90	1/9/1999	$ 181,632.00	$ 56,129.37	Russian River	35.82	-5.4	$ -	$ -	$ -	$ -	$ -	0.00
189	20387	River Blv	Monte Rio	38.47021	-123.00403	1 Story, without Basement	775	43.50	49.50	7/27/2001	$ 13,175.00	$ 81,563.33	Russian River	36.11	-7.4	$ -	$ -	$ -	$ -	$ -	0.00
190	20399	River Blv	Monte Rio	38.47006	-123.00410	1 Story, without Basement	852	40.50	48.20	9/18/1998	$ 146,544.00	$ 42,575.43	Russian River	36.08	-4.4	$ -	$ -	$ -	$ -	$ -	0.00
191	20503	River Blv	Monte Rio	38.46926	-123.00457	2 Story, without Basement	1008	43.40	47.60	12/8/2000	$ 173,376.00	$ 67,066.98	Russian River	35.89	-7.5	$ -	$ -	$ -	$ -	$ -	0.00
192	20550	Alder Rd	Monte Rio	38.46901	-123.00390	1 Story, without Basement	752	38.60	47.70	9/10/1999	$ 129,344.00	$ 69,323.91	Russian River	35.82	-2.8	$ -	$ -	$ -	$ -	$ -	0.00
193	20790	Kingston	Monte Rio	38.46776	-123.00485	2 Story, without Basement	700	46.70	47.50	10/22/1999	$ 120,400.00	$ 53,633.38	Russian River	35.82	-10.9	$ -	$ -	$ -	$ -	$ -	0.00
194	20801	River Blv	Monte Rio	38.46781	-123.00557	1 or 2 Story, with Basement	780	42.50	57.40	3/4/2002	$ 264,880.00	$ 105,678.49	Russian River	35.82	-6.7	$ -	$ -	$ -	$ -	$ -	0.00
195	20813	River Blv	Monte Rio	38.46762	-123.00582	2 Story, without Basement	1500	34.80	47.50	10/2/1998	$ 258,000.00	$ 71,247.45	Russian River	35.82	1.0	$ 23,426.40	$ 10,541.88	$ 588.74	$ 4,766.92	$ 39,323.94	0.55
196	21081	River Blv	Monte Rio	38.46545	-123.00781	1 Story, without Basement	1184	40.40	46.90	3/9/2001	$ 203,648.00	$ 72,345.65	Russian River	35.82	-4.6	$ -	$ -	$ -	$ -	$ -	0.00
197	21225	Petray Ln	Monte Rio	38.71720	-122.88650	2 Story, without Basement	840	209.10	212.40	12/11/2002	$ 144,480.00	$ 58,730.59			-209.1						
198	21330	Monte Cri	Monte Rio	38.47520	-123.01900	1 Story, without Basement	760	35.70	42.20	5/26/2000	$ 130,720.00	$ 54,088.22	Russian River	35.04	-0.7	$ 4,000.03	$ 1,800.01	$ -	$ 2,728.79	$ 8,528.84	0.16
199	21340	Monte Cri	Monte Rio	38.47546	-123.01919	1 Story, without Basement	768	36.03	42.10	10/2/1998	$ 132,096.00	$ 60,625.23	Russian River	35.55	-0.5	$ 6,182.09	$ 2,781.94	$ -	$ 3,277.26	$ 12,241.30	0.20
200	21608	Moscow Rd	Monte Rio	38.46794	-123.01399	1 Story, without Basement	750	38.30	45.70	12/17/1999	$ 129,000.00	$ 61,251.18	Russian River	34.99	-3.3	$ -	$ -	$ -	$ -	$ -	0.00
201	21610	Moscow Rd	Monte Rio	38.46799	-123.01410	1 Story, without Basement	750	38.30	45.70	12/17/1999	$ 129,000.00	$ 64,540.31	Russian River	34.99	-3.3	$ -	$ -	$ -	$ -	$ -	0.00
202	21616	Moscow Rd	Monte Rio	38.46817	-123.01437	1 Story, without Basement	1739	40.80	47.00	10/12/2001	$ 299,108.00	$ 105,774.07	Russian River	34.83	-6.0	$ -	$ -	$ -	$ -	$ -	0.00
203	25832	Freezeout	Monte Rio	38.44569	-123.05726	1 Story, without Basement	354	23.20	31.50	8/7/2003	$ 60,888.00	$ 56,869.76	Russian River	18.16	-5.0						
204	25832	Freezeout	Monte Rio	38.44569	-123.05726	1 Story, without Basement	1152	25.30	34.80	8/20/2004	$ 198,144.00	$ 125,093.85	Russian River	18.16	-7.1						
205	26709	Freezeout	Monte Rio	38.44266	-123.06462	1 Story, without Basement	656	24.70	27.90	5/11/2004	$ 112,832.00	$ 75,780.97	Russian River	17.02	-7.7						
																$ 646,322.63	$ 246,084.92	$ 78,746.70	$ 142,835.08	$ 1,113,989.33	

20 Finished Basements - used damage curve "with basement", although FFE should be measured at basement floor and curve adjusted to account for the elevation at which water enters the building. The "with basement" option provides more conservative values

5 Unknown if basement exists - to be more conservative, a "without basement" damage curve was used

9 structures eliminated from the analysis due to screening process

Structures not included in the loss calculations for the event because the construction to elevate the structure was not completed before the date of the event

Appendix E:

Summary of Losses Avoided and ROI Calculations for December 2003 Event

List of Tables

Table E.1: Summary of Losses Avoided and ROI Calculations for December 2003 Event E-1

Table E.1 Part 1 of 7

Summary of Losses Avoided and ROI Calculations for December 2003 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	DEC 03 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
1	645	Austin Cr	Cazadero	38.47660	-123.04763	1 Story, without Basement	1432	30.80	36.70	9/13/2002	$ 246,304.00	$ 74,310.44	Austin Creek	24.32	-6.5	$ -	$ -	$ -	$ -	$ -	0.00
2	1285	Willowsid	Santa Ros	38.44330	-122.75360	1 Story, without Basement	1100	70.40	79.80	8/14/1998	$ 189,200.00	$ 41,405.03			-70.4						
3	1285	Willowsid	Santa Ros	38.44330	-122.75360	1 Story, without Basement	1100	70.90	78.00	11/13/1998	$ 189,200.00	$ 53,996.70			-70.9						
4	2030	Cazadero	Cazadero	38.49101	-123.06134	1 Story, without Basement	648	47.00	53.20	7/19/2002	$ 111,456.00	$ 68,793.60	Austin Creek	32.16	-14.8	$ -	$ -	$ -	$ -	$ -	0.00
5	4928	Wilshire	Santa Ros	38.45420	-122.68790	1 Story, without Basement	0	65.50	71.00	4/27/2001	$ -	$ 75,834.52			-65.5						
6	5232	Odonnell	Glen Elle	38.36690	-122.51980	1 Story, without Basement	1664	226.30	229.90	12/23/1999	$ 286,208.00	$ 50,194.74			-226.3						
7	8647	Mirabel Rd	Forestville	38.34926	-122.89468	1 Story, without Basement	804	69.80	75.40	6/28/2002	$ 138,288.00	$ 76,231.49	Russian River	56.71	-13.1	$ -	$ -	$ -	$ -	$ -	0.00
8	8650	Mirabel R	Forestvil	38.49302	-122.89478	2 Story, without Basement	1280	70.30	75.70	11/6/1998	$ 220,160.00	$ 69,077.57	Russian River	56.58	-13.7	$ -	$ -	$ -	$ -	$ -	0.00
9	8656	Mirabel Rd	Forestville	38.49302	-122.89478	1 Story, without Basement	764	70.40	74.90	3/1/2002	$ 131,408.00	$ 75,190.70	Russian River	56.57	-13.8	$ -	$ -	$ -	$ -	$ -	0.00
10	8672	Trenton R	Forestvil	38.49042	-122.89674	1 Story, without Basement	784	70.00	78.00	6/19/1998	$ 134,848.00	$ 41,824.80	Russian River	56.38	-13.6	$ -	$ -	$ -	$ -	$ -	0.00
11	8706	Trenton R	Forestvil	38.49118	-122.89737	1 Story, without Basement	624	73.10	76.10	11/17/2000	$ 107,328.00	$ 67,569.74	Russian River	56.31	-16.8	$ -	$ -	$ -	$ -	$ -	0.00
12	8810	Trenton R	Forestvil	38.49231	-122.89778	1 Story, without Basement	780	71.00	77.10	11/9/2001	$ 134,160.00	$ 79,802.18	Russian River	56.23	-14.8	$ -	$ -	$ -	$ -	$ -	0.00
13	8894	Trenton R	Forestvil	38.49405	-122.89800	1 Story, without Basement	892	66.00	75.90	10/15/1999	$ 153,424.00	$ 74,009.90	Russian River	56.15	-9.9	$ -	$ -	$ -	$ -	$ -	0.00
14	8990	Trenton R	Forestvil	38.49428	-122.89801	1 Story, without Basement	780	65.40	76.50	11/5/1999	$ 134,160.00	$ 70,779.05	Russian River	56.14	-9.3	$ -	$ -	$ -	$ -	$ -	0.00
15	9425	Old River	Forestvil	38.50218	-122.90591	1 Story, without Basement	842	67.00	77.30	7/2/1999	$ 179,224.00	$ 70,054.80	Russian River	55.41	-11.6	$ -	$ -	$ -	$ -	$ -	0.00
16	9894	Bohemian	Monte Rio	38.46261	-123.00829	1 Story, without Basement	1200	40.90	48.90	10/6/2000	$ 412,800.00	$ 103,688.08	Dutch Bill Creek	30.09	-10.8	$ -	$ -	$ -	$ -	$ -	0.00
17	10006	Heller St	Monte Rio	38.46892	-123.00398	1 Story, without Basement	564	37.70	47.60	10/6/1998	$ 97,008.00	$ 49,414.40	Russian River	30.18	-7.5	$ -	$ -	$ -	$ -	$ -	0.00
18	10590	Grays Rd	Forestvil	38.50863	-122.92267	1 Story, without Basement	1008	67.40	72.50	12/13/2002	$ 173,376.00	$ 85,280.38	Russian River	52.12	-15.3	$ -	$ -	$ -	$ -	$ -	0.00
19	10599	Grays Rd	Forestvil	38.50856	-122.92287	1 Story, without Basement	880	69.20	72.60	6/18/1999	$ 186,448.00	$ 56,462.59	Russian River	52.07	-17.1	$ -	$ -	$ -	$ -	$ -	0.00
20	10670	Grays Ct	Forestvil	38.50848	-122.92344	1 Story, without Basement	792	67.30	71.60	8/25/2000	$ 294,464.00	$ 65,818.53	Russian River	51.98	-15.3	$ -	$ -	$ -	$ -	$ -	0.00
21	10696	Old River	Forestvil	38.50741	-122.92378	1 Story, without Basement	720	67.50	71.70	4/16/1999	$ 123,840.00	$ 55,637.15	Russian River	51.66	-15.8	$ -	$ -	$ -	$ -	$ -	0.00
22	10716	Old River	Forestvil	38.50744	-122.92415	1 Story, without Basement	600	66.70	71.00	12/24/1998	$ 103,200.00	$ 48,399.81	Russian River	51.38	-15.3	$ -	$ -	$ -	$ -	$ -	0.00
23	10770	Old River	Forestvil	38.50667	-122.92492	1 Story, without Basement	1180	67.40	72.10	7/10/1998	$ 202,960.00	$ 52,268.45	Russian River	51.16	-16.2	$ -	$ -	$ -	$ -	$ -	0.00
24	10840	Buena Vis	Forestvil	38.50648	-122.92594	1 Story, without Basement	600	63.40	71.50	12/8/2000	$ 103,200.00	$ 59,411.02	Russian River	51.15	-12.3	$ -	$ -	$ -	$ -	$ -	0.00
25	10841	Summerhom	Forestvil	38.50616	-122.92596	1 Story, without Basement	520	64.00	71.50	10/12/2001	$ 89,440.00	$ 61,124.72	Russian River	51.19	-12.8	$ -	$ -	$ -	$ -	$ -	0.00
26	10843	Summerhom	Forestvil	38.50607	-122.92607	2 Story, without Basement	960	67.20	75.40	5/19/2000	$ 165,120.00	$ 81,643.10	Russian River	51.21	-16.0	$ -	$ -	$ -	$ -	$ -	0.00
27	10870	Forest Hi	Forestvil	38.50711	-122.92462	1 Story, without Basement	3276	65.00	71.50	3/31/2000	$ 563,472.00	$ 74,274.78	Russian River	51.21	-13.8	$ -	$ -	$ -	$ -	$ -	0.00
28	10940	Sunset Av	Forestvil	38.50763	-122.92840	1 Story, without Basement	972	66.80	74.80	2/5/1999	$ 167,184.00	$ 76,896.13	Russian River	51.03	-15.8	$ -	$ -	$ -	$ -	$ -	0.00
29	10959	Sunset Av	Forestvil	38.50669	-122.92869	1 Story, without Basement	893	65.70	72.90	6/18/1999	$ 153,596.00	$ 57,708.87	Russian River	50.97	-14.7	$ -	$ -	$ -	$ -	$ -	0.00
30	11035	Sunset Av	Forestvil	38.50634	-122.92900	1 or 2 Story, with Basement	776	69.00	72.50	3/9/2004	$ 217,408.00	$ 103,397.80	Russian River	50.94	-18.1						

Table E.1 Part 2 of 7

Summary of Losses Avoided and ROI Calculations for December 2003 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	DEC 03 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
31	11880	Summerhom	Forestvil	38.49798	-122.93892	1 Story, without Basement	1260	73.20	66.90	12/14/1998	$ 216,720.00	$ 63,553.65	Russian River	49.57	-23.6						
32	14060	Church St	Guernevil	38.50294	-122.99777	1 Story, without Basement	1045	54.70	60.80	9/20/2002	$ 179,740.00	$ 63,777.73	Russian River	41.86	-12.8	$ -	$ -	$ -	$ -	$ -	0.00
33	14070	Mill St	Guernevil	38.50304	-122.99929	2 Story, without Basement	1390	53.00	59.20	7/15/2005	$ 239,080.00	$ 102,351.75	Russian River	41.40	-11.6						
34	14185	Old Cazad	Guernevil	38.49746	-123.00850	1 or 2 Story, with Basement	2070	44.90	56.80	2/25/2000	$ 356,040.00	$ 88,636.88	Hulbert Creek	39.49	-5.4	$ -	$ -	$ -	$ -	$ -	0.00
35	14216	Mill St	Guernevil	38.50473	-122.99923	1 Story, without Basement	935	53.10	59.50	1/15/1999	$ 160,820.00	$ 64,957.76	Russian River	41.04	-12.1	$ -	$ -	$ -	$ -	$ -	0.00
36	14226	Lovers Ln	Guernevil	38.49662	-123.00931	2 Story, without Basement	700	47.20	56.10	6/23/2000	$ 120,400.00	$ 55,068.33	Hulbert Creek	39.19	-8.0	$ -	$ -	$ -	$ -	$ -	0.00
37	14226	Mill St	Guernevil	38.50480	-122.99922	1 Story, without Basement	1190	49.70	59.00	1/16/2003	$ 204,680.00	$ 99,708.43	Russian River	41.43	-8.3	$ -	$ -	$ -	$ -	$ -	0.00
38	14259	Mill Ct	Guernevil	38.50519	-122.99862	2 Story, without Basement	2264	49.60	59.10	10/18/2004	$ 389,408.00	$ 168,319.90	Fife Creek	40.58	-9.0						
39	14259	Old Cazad	Guernevil	38.49824	-123.01002	2 Story, without Basement	852	46.80	55.20	10/11/2002	$ 146,544.00	$ 121,875.80	Hulbert Creek	40.05	-6.8	$ -	$ -	$ -	$ -	$ -	0.00
40	14261	Lovers Ln	Guernevil	38.49679	-123.00987	1 Story, without Basement	986	54.10	56.50	5/31/2002	$ 169,592.00	$ 34,110.80	Hulbert Creek	40.30	-13.8	$ -	$ -	$ -	$ -	$ -	0.00
41	14263	Lovers Ln	Guernevil	38.49685	-123.01000	1 Story, without Basement	975	52.20	56.00	10/8/1999	$ 167,700.00	$ 64,076.62	Hulbert Creek	40.31	-11.9	$ -	$ -	$ -	$ -	$ -	0.00
42	14290	Old Cazad	Guernevil	38.49830	-123.01039	1 or 2 Story, with Basement	1265	53.10	56.30	4/15/2004	$ 473,000.00	$ 69,362.50	Hulbert Creek	40.18	-12.9						
43	14301	Mill Ct	Guernevil	38.50537	-122.99819	1 or 2 Story, with Basement	1764	50.70	59.00	1/23/2006	$ 545,584.00	$ 114,911.44	Fife Creek	40.82	-9.9						
44	14315	Lovers La	Guernevil	38.49700	-123.01078	1 Story, without Basement	780	49.90	55.60	1/12/2001	$ 134,160.00	$ 60,228.72	Hulbert Creek	40.59	-9.3	$ -	$ -	$ -	$ -	$ -	0.00
45	14420	Western A	Guernevil	38.51741	-122.97371	1 Story, without Basement	880	58.80	65.60	4/26/2002	$ 151,360.00	$ 71,233.30	Russian River	44.00	-14.8	$ -	$ -	$ -	$ -	$ -	0.00
46	14464	Western A	Guernevil	38.51691	-122.97393	1 Story, without Basement	656	53.40	61.20	4/15/2005	$ 112,832.00	$ 69,062.88	Russian River	44.00	-9.4						
47	14469	Western A	Guernevil	38.51690	-122.97383	1 Story, without Basement	841	56.50	65.90	11/3/2005	$ 144,652.00	$ 106,231.03	Russian River	44.03	-12.5						
48	14479	Western A	Guernevil	38.51681	-122.97386	1 Story, without Basement	728	57.40	66.70	1/10/2005	$ 125,216.00	$ 67,231.82	Russian River	44.03	-13.4						
49	14501	Armstrong	Guernevil	38.50999	-122.99431	1 Story, without Basement	564	49.90	59.50	11/3/2000	$ 97,008.00	$ 64,321.62	Fife Creek	52.65	2.8	$ 24,979.56	$ 11,240.80	$ 6,941.97	$ 10,410.72	$ 53,573.05	0.83
50	14501	Armstrong	Guernevil	38.51027	-122.99437	2 Story, without Basement	569	51.70	60.60	8/24/2001	$ 97,868.00	$ 83,085.68	Fife Creek	52.66	1.0	$ 8,651.53	$ 3,893.19	$ -	$ 4,685.67	$ 17,230.39	0.21
51	14501	Armstrong	Guernevil	38.51014	-122.99429	1 Story, without Basement	564	51.80	60.60	11/3/2000	$ 97,008.00	$ 64,321.62	Fife Creek	52.65	0.9	$ 12,853.56	$ 5,784.10	$ 2,676.23	$ 6,178.72	$ 27,492.61	0.43
52	14501	Armstrong	Guernevil	38.50982	-122.99431	1 Story, without Basement	922	52.70	59.00	5/11/2001	$ 158,584.00	$ 63,688.56	Fife Creek	52.65	-0.1	$ 13,558.93	$ 6,101.52	$ -	$ 4,587.49	$ 24,247.94	0.38
53	14501	Armstrong	Guernevil	38.50961	-122.99432	1 Story, without Basement	890	54.10	58.40	11/9/2001	$ 153,080.00	$ 67,591.89	Fife Creek	52.65	-1.5	$ -	$ -	$ -	$ -	$ -	0.00
54	14501	Armstrong	Guernevil	38.50961	-122.99432	1 Story, without Basement	1310	54.10	58.40	4/19/2002	$ 225,320.00	$ 77,494.80	Fife Creek	52.65	-1.5	$ -	$ -	$ -	$ -	$ -	0.00
55	14501	Cherry St	Guernevil	38.49695	-123.01263	1 Story, without Basement	1350	50.10	56.00	12/10/1999	$ 232,200.00	$ 67,830.11	Hulbert Creek	42.31	-7.8	$ -	$ -	$ -	$ -	$ -	0.00
56	14509	Cherry St	Guernevil	38.49702	-123.01300	1 Story, without Basement	760	53.40	61.80	8/20/2004	$ 130,720.00	$ 75,780.97	Hulbert Creek	42.48	-10.9						
57	14530	Western A	Guernevil	38.51571	-122.97427	1 Story, without Basement	950	54.40	64.90	8/20/2004	$ 163,400.00	$ 95,250.58	Russian River	43.97	-10.4						
58	14536	Eastern A	Guernevil	38.51529	-122.97383	1 Story, without Basement	1617	55.90	64.70	9/24/1999	$ 278,124.00	$ 65,529.24	Russian River	44.02	-11.9	$ -	$ -	$ -	$ -	$ -	0.00
59	14549	Eastern A	Guernevil	38.51542	-122.97370	1 Story, without Basement	656	59.70	64.00	11/15/2002	$ 112,832.00	$ 60,626.85	Russian River	44.06	-15.6	$ -	$ -	$ -	$ -	$ -	0.00
60	14569	Eastern A	Guernevil	38.51567	-122.97344	2 Story, without Basement	1080	54.10	63.60	6/30/2001	$ 185,760.00	$ 128,679.77	Russian River	44.07	-10.0	$ -	$ -	$ -	$ -	$ -	0.00

Table E.1 Part 3 of 7

Summary of Losses Avoided and ROI Calculations for December 2003 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	DEC 03 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
61	14594	Eastern A	Guernevil	38.51580	-122.97331	1 Story, without Basement	1180	57.60	61.20	12/1/2000	$ 202,960.00	$ 89,649.78	Russian River	44.05	-13.6	$ -	$ -	$ -	$ -	$ -	0.00
62	14600	Rio Nido	Guernevil	38.51966	-122.97860	1 Story, without Basement	670	52.00	62.90	7/14/2000	$ 115,240.00	$ 59,283.88	Russian River	43.53	-8.5	$ -	$ -	$ -	$ -	$ -	0.00
63	14612	Eastern A	Guernevil	38.51611	-122.97301	1 Story, without Basement	640	60.30	66.80	11/8/2004	$ 110,080.00	$ 70,601.24	Russian River	44.06	-16.2						
64	14619	Eastern A	Guernevil	38.51618	-122.97296	1 Story, without Basement	928	59.70	64.10	10/25/1999	$ 159,616.00	$ 62,829.73	Russian River	44.11	-15.6	$ -	$ -	$ -	$ -	$ -	0.00
65	14620	Eastern A	Guernevil	38.51620	-122.97293	1 Story, without Basement	832	58.10	68.10	1/10/2005	$ 143,104.00	$ 66,807.99	Russian River	44.08	-14.0						
66	14630	Eastern A	Guernevil	38.51634	-122.97281	1 Story, without Basement	968	58.40	68.70	12/14/2004	$ 166,496.00	$ 74,827.87	Russian River	44.09	-14.3						
67	14650	Eastern A	Guernevil	38.51665	-122.97250	1 Story, without Basement	796	58.40	66.90	12/15/2000	$ 136,912.00	$ 73,044.78	Russian River	44.11	-14.3	$ -	$ -	$ -	$ -	$ -	0.00
68	14651	Carrier L	Guernevil	38.51139	-122.99755	1 Story, without Basement	663	53.10	62.00	5/18/2001	$ 114,036.00	$ 68,477.09	Fife Creek	53.87	0.8	$ 14,653.63	$ 6,594.13	$ 2,677.79	$ 6,043.30	$ 29,968.84	0.44
69	14652	Rio Nido	Guernevil	38.51959	-122.97867	1 Story, without Basement	572	50.90	63.80	10/11/2004	$ 98,384.00	$ 77,574.04	Russian River	43.52	-7.4						
70	14680	Orchard L	Guernevil	38.51677	-122.97294	1 Story, without Basement	686	59.00	63.90	3/30/2001	$ 117,992.00	$ 60,043.28	Russian River	44.08	-14.9	$ -	$ -	$ -	$ -	$ -	0.00
71	14687	Orchard L	Guernevil	38.51716	-122.97317	1 Story, without Basement	855	58.10	64.90	5/18/2001	$ 147,060.00	$ 67,436.82	Russian River	44.08	-14.0	$ -	$ -	$ -	$ -	$ -	0.00
72	14698	Orchard L	Guernevil	38.51696	-122.97305	1 Story, without Basement	384	59.30	64.40	9/29/2000	$ 66,048.00	$ 71,328.93	Russian River	44.07	-15.2	$ -	$ -	$ -	$ -	$ -	0.00
73	14706	Rio Nido	Guernevil	38.52020	-122.97882	1 Story, without Basement	1240	56.70	63.00	1/14/2000	$ 213,280.00	$ 59,697.31	Russian River	43.53	-13.2	$ -	$ -	$ -	$ -	$ -	0.00
74	14707	Willow Rd	Rio Nido	38.52095	-122.97822	1 Story, without Basement	960	58.80	63.70	5/4/2001	$ 165,120.00	$ 68,309.93	Russian River	43.63	-15.2	$ -	$ -	$ -	$ -	$ -	0.00
75	14709	Carrier L	Guernevil	38.51224	-122.99767	1 Story, without Basement	1301	56.20	60.70	9/8/2000	$ 223,772.00	$ 75,845.49	Fife Creek	57.15	0.9	$ 30,768.65	$ 13,845.89	$ 4,827.80	$ 6,348.00	$ 55,790.34	0.74
76	14710	Carrier L	Guernevil	38.51240	-122.99778	1 Story, without Basement	1356	56.50	65.20	8/11/2000	$ 233,232.00	$ 69,821.57	Fife Creek	57.52	1.0	$ 33,025.65	$ 14,861.54	$ 5,301.60	$ 6,486.81	$ 59,675.61	0.85
77	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	557	52.35	63.00	3/26/1999	$ 95,804.00	$ 62,100.52	Russian River	43.54	-8.8	$ -	$ -	$ -	$ -	$ -	0.00
78	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	557	53.02	63.00	2/19/1999	$ 95,804.00	$ 62,736.56	Russian River	43.53	-9.5	$ -	$ -	$ -	$ -	$ -	0.00
79	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	557	53.25	62.90	1/29/1999	$ 95,804.00	$ 98,680.08	Russian River	43.53	-9.7	$ -	$ -	$ -	$ -	$ -	0.00
80	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	563	56.70	63.00	2/5/1999	$ 96,836.00	$ 56,144.36	Russian River	43.53	-13.2	$ -	$ -	$ -	$ -	$ -	0.00
81	14717	Canyon 7	Rio Nido	38.52104	-122.97930	2 Story, without Basement	1491	53.50	64.90	4/27/2001	$ 256,452.00	$ 81,354.38	Russian River	43.59	-9.9	$ -	$ -	$ -	$ -	$ -	0.00
82	14723	Northern	Guernevil	38.51717	-122.97233	1 Story, without Basement	1672	61.20	64.20	6/29/2001	$ 287,584.00	$ 68,339.78	Russian River	44.12	-17.1	$ -	$ -	$ -	$ -	$ -	0.00
83	14726	Willow Rd	Rio Nido	38.52138	-122.97815	1 Story, without Basement	671	59.00	64.00	6/18/1999	$ 115,412.00	$ 67,866.22	Russian River	43.67	-15.3	$ -	$ -	$ -	$ -	$ -	0.00
84	14736	Rio Nido	Guernevil	38.52081	-122.97986	1 Story, without Basement	873	60.70	62.40	11/1/2002	$ 150,156.00	$ 78,361.15	Russian River	43.52	-17.2	$ -	$ -	$ -	$ -	$ -	0.00
85	14736	Willow Rd	Rio Nido	38.52162	-122.97804	2 Story, without Basement	1230	59.30	64.10	8/9/2002	$ 211,560.00	$ 91,892.47	Russian River	43.68	-15.6	$ -	$ -	$ -	$ -	$ -	0.00
86	14760	Rio Nido	Guernevil	38.52110	-122.98015	1 Story, without Basement	606	59.30	64.80	1/14/2000	$ 104,232.00	$ 54,569.52	Russian River	43.52	-15.8	$ -	$ -	$ -	$ -	$ -	0.00
87	14775	Northern	Guernevil	38.51763	-122.97264	1 Story, without Basement	856	60.20	68.40	4/17/1998	$ 147,232.00	$ 48,710.52	Russian River	44.09	-16.1	$ -	$ -	$ -	$ -	$ -	0.00
88	14821	Northern	Guernevil	38.51804	-122.97304	1 Story, without Basement	640	58.40	65.70	6/10/2004	$ 110,080.00	$ 81,807.74	Russian River	44.06	-14.3						
89	14902	Melody Av	Guernevil	38.51307	-122.97908	1 or 2 Story, with Basement	986	57.60	65.60	1/25/2002	$ 331,960.00	$ 114,965.27	Russian River	43.35	-14.3	$ -	$ -	$ -	$ -	$ -	0.00
90	14917	Melody Av	Guernevil	38.51291	-122.97993	1 or 2 Story, with Basement	760	60.90	61.50	6/8/2001	$ 261,440.00	$ 101,181.95	Russian River	43.35	-17.6	$ -	$ -	$ -	$ -	$ -	0.00

Table E.1 Part 4 of 7

Summary of Losses Avoided and ROI Calculations for December 2003 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	DEC 03 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
91	14918	Drake Roa	Guernevil	38.51260	-122.97935	1 Story, without Basement	564	56.80	61.30	4/2/1999	$ 97,008.00	$ 43,033.66	Russian River	43.34	-13.5	$ -	$ -	$ -	$ -	$ -	0.00
92	14991	Foothill	Guernevil	38.51503	-122.98273	1 or 2 Story, with Basement	824	56.50	61.50	3/2/2001	$ 283,456.00	$ 77,335.98	Russian River	43.36	-13.1	$ -	$ -	$ -	$ -	$ -	0.00
93	14991	Melody Av	Guernevil	38.51172	-122.98007	1 or 2 Story, with Basement	848	57.30	62.60	10/18/2000	$ 261,440.00	$ 78,956.47	Russian River	43.31	-14.0	$ -	$ -	$ -	$ -	$ -	0.00
94	15029	Foothill	Guernevil	38.51429	-122.98312	1 or 2 Story, with Basement	647	48.00	61.70	10/1/1999	$ 126,420.00	$ 88,260.49	Russian River	43.37	-4.6	$ 126,420.00	$ -	$ -	$ -	$ 126,420.00	1.43
95	15030	Old River	Guernevil	38.51427	-122.98268	1 Story, without Basement	885	52.60	61.00	3/31/2000	$ 152,220.00	$ 67,076.21	Russian River	43.36	-9.2	$ -	$ -	$ -	$ -	$ -	0.00
96	15076	Old River	Guernevil	38.51332	-122.98313	1 or 2 Story, with Basement	720	53.10	61.20	3/7/2003	$ 239,424.00	$ 77,436.15	Russian River	43.35	-9.8	$ -	$ -	$ -	$ -	$ -	0.00
97	15083	Leasowe L	Guernevil	38.51092	-122.98076	1 Story, without Basement	890	58.90	61.50	3/29/2002	$ 153,080.00	$ 77,054.38	Russian River	43.28	-15.6	$ -	$ -	$ -	$ -	$ -	0.00
98	15105	River Rd	Guernevil	38.51304	-122.98285	1 Story, without Basement	1064	51.40	60.50	7/1/2005	$ 183,008.00	$ 90,801.44	Russian River	43.35	-8.1						
99	15170	Drake Rd	Guernevil	38.50971	-122.98124	1 or 2 Story, with Basement	1026	56.20	61.30	11/1/2004	$ 352,944.00	$ 94,665.82	Russian River	43.24	-13.0						
100	15270	Old River	Guernevil	38.51086	-122.98450	2 Story, without Basement	1331	56.80	66.00	2/26/2004	$ 228,932.00	$ 60,843.59	Russian River	43.23	-13.6						
101	15280	Old River	Guernevil	38.51086	-122.98450	1 Story, without Basement	1105	57.50	64.90	7/30/1999	$ 190,060.00	$ 50,188.40	Russian River	43.23	-14.3	$ -	$ -	$ -	$ -	$ -	0.00
102	15410	Riverside	Guernevil	38.50895	-122.98567	1 Story, without Basement	912	55.60	61.40	5/5/2000	$ 156,864.00	$ 60,013.34	Russian River	43.11	-12.5	$ -	$ -	$ -	$ -	$ -	0.00
103	15437	Riverside	Guernevil	38.50879	-122.98592	1 Story, without Basement	1114	56.50	62.10	3/9/2001	$ 191,608.00	$ 98,776.64	Russian River	43.08	-13.4	$ -	$ -	$ -	$ -	$ -	0.00
104	15470	Riverside	Guernevil	38.50837	-122.98640	1 Story, without Basement	1160	55.10	61.30	3/5/1999	$ 199,520.00	$ 50,097.18	Russian River	43.02	-12.1	$ -	$ -	$ -	$ -	$ -	0.00
105	15486	River Rd	Guernevil	38.50859	-122.98705	1 Story, without Basement	582	52.00	61.20	5/27/2002	$ 100,104.00	$ 76,973.83	Russian River	43.01	-9.0	$ -	$ -	$ -	$ -	$ -	0.00
106	15549	Riverside	Guernevil	38.50770	-122.98711	1 or 2 Story, with Basement	966	51.70	60.60	8/23/2002	$ 257,656.00	$ 89,748.32	Russian River	42.93	-8.8	$ -	$ -	$ -	$ -	$ -	0.00
107	15555	Bonita Av	Guernevil	38.50774	-122.98819	2 Story, without Basement	1175	49.40	59.70	2/19/1999	$ 202,100.00	$ 53,547.22	Russian River	42.88	-6.5	$ -	$ -	$ -	$ -	$ -	0.00
108	15587	Bonita Av	Guernevil	38.50778	-122.98827	1 Story, without Basement	874	53.50	59.50	5/28/1999	$ 150,328.00	$ 49,109.87	Russian River	42.88	-10.6	$ -	$ -	$ -	$ -	$ -	0.00
109	15604	Riverside	Guernevil	38.50748	-122.98748	1 or 2 Story, with Basement	783	56.10	59.80	5/10/2002	$ 257,656.00	$ 66,733.48	Russian River	42.89	-13.2	$ -	$ -	$ -	$ -	$ -	0.00
110	15619	Riverside	Guernevil	38.50754	-122.98788	1 Story, without Basement	592	49.00	60.20	11/20/1998	$ 101,824.00	$ 60,949.92	Russian River	42.86	-6.1	$ -	$ -	$ -	$ -	$ -	0.00
111	15623	Riverside	Guernevil	38.50708	-122.98816	1 or 2 Story, with Basement	1429	51.50	60.20	9/29/2000	$ 327,488.00	$ 73,936.53	Russian River	42.82	-8.7	$ -	$ -	$ -	$ -	$ -	0.00
112	15625	Riverside	Guernevil	38.50718	-122.98803	1 Story, without Basement	882	52.00	59.90	7/16/1999	$ 151,704.00	$ 66,559.56	Russian River	42.83	-9.2	$ -	$ -	$ -	$ -	$ -	0.00
113	15627	Riverside	Guernevil	38.50704	-122.98824	1 Story, without Basement	1058	60.80	50.50	9/4/1998	$ 181,976.00	$ 64,751.43	Russian River	42.81	-18.0						
114	15675	Riverside	Guernevil	38.50651	-122.98881	1 or 2 Story, with Basement	1020	54.00	62.00	2/26/1999	$ 350,880.00	$ 74,974.73	Russian River	42.74	-11.3	$ -	$ -	$ -	$ -	$ -	0.00
115	15850	Riverland	Guernevil	38.50458	-122.99016	1 or 2 Story, with Basement	1386	55.90	60.20	5/28/1999	$ 271,416.00	$ 75,005.68	Russian River	42.46	-13.4	$ -	$ -	$ -	$ -	$ -	0.00
116	15961	Riverland	Guernevil	38.50250	-122.99013	1 Story, without Basement	1817	53.70	62.10	3/14/2003	$ 312,524.00	$ 65,746.58	Russian River	42.42	-11.3	$ -	$ -	$ -	$ -	$ -	0.00
117	15980	Drake Rd	Guernevil	38.50128	-122.99000	1 or 2 Story, with Basement	884	56.70	58.60	4/21/2005	$ 304,096.00	$ 73,562.31	Russian River	42.39	-14.3						
118	15991	Riverland	Guernevil	38.50292	-122.99100	1 Story, without Basement	992	55.70	60.20	3/8/2002	$ 170,624.00	$ 74,514.72	Russian River	42.39	-13.3	$ -	$ -	$ -	$ -	$ -	0.00
119	16010	Drake Rd	Guernevil	38.50086	-122.99042	1 Story, without Basement	960	47.80	59.90	8/27/1999	$ 165,120.00	$ 100,770.85	Russian River	42.36	-5.4	$ -	$ -	$ -	$ -	$ -	0.00
120	16055	Riverland	Guernevil	38.50156	-122.99157	1 Story, without Basement	1050	56.40	62.20	7/17/1998	$ 180,600.00	$ 56,860.48	Russian River	42.35	-14.1	$ -	$ -	$ -	$ -	$ -	0.00

Table E.1 Part 5 of 7

Summary of Losses Avoided and ROI Calculations for December 2003 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	DEC 03 EVENT FLOOD ELEVATION	MP_4 FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
121	16060	Riverland	Guernevil	38.50111	-122.99214	2 Story, without Basement	1296	55.60	59.50	3/12/1999	$ 222,912.00	$ 72,003.61	Russian River	42.34	-13.3	$ -	$ -	$ -	$ -	$ -	0.00
122	16117	Laughlin	Guernevil	38.51084	-122.99656	1 Story, without Basement	376	49.30	58.70	6/19/1998	$ 64,672.00	$ 49,514.60	Fife Creek	52.71	3.4	$ 17,991.75	$ 8,096.29	$ 6,209.21	$ 11,111.54	$ 43,408.78	0.88
123	16185	Neeley Rd	Guernevil	38.49835	-122.99420	1 Story, without Basement	960	59.30	49.80	11/20/1998	$ 165,120.00	$ 53,766.23	ocket Canyon Cre	42.28	-17.0						
124	16225	Drake Rd	Guernevil	38.49930	-122.99287	2 Story, without Basement	1887	49.10	58.00	11/6/1998	$ 324,564.00	$ 73,679.65	ocket Canyon Cre	42.28	-6.8	$ -	$ -	$ -	$ -	$ -	0.00
125	16325	4th ST	Guernevil	38.50320	-122.99808	1 Story, without Basement	1256	53.70	59.20	9/4/1998	$ 216,032.00	$ 51,014.90	Russian River	41.81	-11.9	$ -	$ -	$ -	$ -	$ -	0.00
126	16342	5th ST #A	Guernevil	38.50407	-122.99773	1 Story, without Basement	633	49.20	58.90	7/9/1999	$ 108,876.00	$ 72,278.23	Russian River	42.12	-7.1	$ -	$ -	$ -	$ -	$ -	0.00
127	16356	4th ST #1	Guernevil	38.50327	-122.99856	1 Story, without Basement	1500	54.00	58.60	1/7/2000	$ 258,000.00	$ 49,581.92	Russian River	41.81	-12.2	$ -	$ -	$ -	$ -	$ -	0.00
128	16356	4th ST #2	Guernevil	38.50327	-122.99856	1 Story, without Basement	1500	54.00	58.60	1/7/2000	$ 258,000.00	$ 46,260.92	Russian River	41.81	-12.2	$ -	$ -	$ -	$ -	$ -	0.00
129	16365	4th ST	Guernevil	38.50326	-122.99879	2 Story, without Basement	1250	55.50	59.40	9/8/2000	$ 215,000.00	$ 74,831.36	Russian River	41.58	-13.9	$ -	$ -	$ -	$ -	$ -	0.00
130	16451	4th ST	Guernevil	38.50336	-122.99838	1 Story, without Basement	672	51.50	59.20	10/8/1999	$ 115,584.00	$ 77,936.34	Russian River	41.85	-9.7	$ -	$ -	$ -	$ -	$ -	0.00
131	16451	Mill St	Guernevil	38.50375	-122.99927	2 Story, without Basement	1800	45.00	59.00	3/12/1999	$ 309,600.00	$ 73,060.29	Russian River	41.00	-4.0	$ -	$ -	$ -	$ -	$ -	0.00
132	16463	HWY 116	Guernevil	38.50188	-123.00095	1 Story, without Basement	988	50.80	58.40	1/5/1999	$ 169,936.00	$ 50,483.62	Russian River	40.77	-10.0	$ -	$ -	$ -	$ -	$ -	0.00
133	16465	HWY 116	Guernevil	38.50188	-123.00095	1 Story, without Basement	910	50.90	57.80	10/30/1998	$ 156,520.00	$ 49,027.25	Russian River	40.77	-10.1	$ -	$ -	$ -	$ -	$ -	0.00
134	16570	River Rd	Guernevil	38.50227	-123.00143	1 or 2 Story, with Basement	900	55.30	59.10	1/12/2001	$ 309,600.00	$ 62,629.18	Russian River	40.56	-14.7	$ -	$ -	$ -	$ -	$ -	0.00
135	16600	Laughlin	Guernevil	38.51346	-123.00310	2 Story, without Basement	2464	55.20	59.10	3/26/1999	$ 423,808.00	$ 51,022.09	Fife Creek	63.25	8.1						
136	16610	Neeley Rd	Guernevil	38.49827	-123.00121	1 or 2 Story, with Basement	642	52.60	57.00	7/14/2000	$ 206,400.00	$ 68,832.03	Russian River	40.21	-12.4	$ -	$ -	$ -	$ -	$ -	0.00
137	16635	Center Wa	Guernevil	38.49815	-123.00203	1 Story, without Basement	730	52.40	59.50	4/25/2001	$ 125,560.00	$ 95,921.18	Russian River	39.94	-12.5	$ -	$ -	$ -	$ -	$ -	0.00
138	16664	Center Wa	Guernevil	38.49778	-123.00238	1 Story, without Basement	872	50.20	57.30	5/21/1999	$ 149,984.00	$ 57,952.78	Russian River	39.83	-10.4	$ -	$ -	$ -	$ -	$ -	0.00
139	16686	Center Wa	Guernevil	38.49734	-123.00246	1 or 2 Story, with Basement	832	53.10	57.80	9/3/1999	$ 286,208.00	$ 65,200.02	Russian River	39.75	-13.4	$ -	$ -	$ -	$ -	$ -	0.00
140	16724	Center Wa	Guernevil	38.49696	-123.00261	1 Story, without Basement	1499	51.90	57.50	12/9/2002	$ 257,828.00	$ 84,465.60	Russian River	39.64	-12.3	$ -	$ -	$ -	$ -	$ -	0.00
141	16725	Guernewoo	Guernevil	38.49750	-123.00326	1 Story, without Basement	764	51.30	60.30	2/4/2000	$ 131,408.00	$ 93,920.34	Russian River	39.70	-11.6	$ -	$ -	$ -	$ -	$ -	0.00
142	16751	Guernewoo	Guernevil	38.49704	-123.00336	1 Story, without Basement	640	51.50	58.00	12/24/1998	$ 110,080.00	$ 52,623.89	Russian River	39.64	-11.9	$ -	$ -	$ -	$ -	$ -	0.00
143	16755	Center Wa	Guernevil	38.49660	-123.02910	1 Story, without Basement	1144	53.40	57.70	1/29/1999	$ 196,768.00	$ 51,256.49	Russian River	39.50	-13.9	$ -	$ -	$ -	$ -	$ -	0.00
144	16775	Center Wa	Guernevil	38.49648	-123.00304	1 Story, without Basement	930	48.00	57.40	2/23/2001	$ 159,960.00	$ 72,121.18	Russian River	39.39	-8.6	$ -	$ -	$ -	$ -	$ -	0.00
145	16794	Center Wa	Guernevil	38.49598	-123.00330	1 or 2 Story, with Basement	1338	47.80	56.80	5/17/2002	$ 460,272.00	$ 117,439.73	Russian River	39.26	-8.5	$ -	$ -	$ -	$ -	$ -	0.00
146	16811	Center Wa	Guernevil	38.49574	-123.00337	1 Story, without Basement	864	47.00	56.90	1/22/1999	$ 148,608.00	$ 81,389.55	Russian River	39.28	-7.7	$ -	$ -	$ -	$ -	$ -	0.00
147	16847	Center Wa	Guernevil	38.49523	-123.00364	1 Story, without Basement	760	51.70	56.20	6/28/2002	$ 130,720.00	$ 67,770.21	Russian River	39.23	-12.5	$ -	$ -	$ -	$ -	$ -	0.00
148	17314	Riverside	Guernevil	38.49372	-123.00972	1 or 2 Story, with Basement	700	47.50	56.40	10/1/2002	$ 240,800.00	$ 61,843.37	Russian River	38.17	-9.3	$ -	$ -	$ -	$ -	$ -	0.00
149	17325	Riverside	Guernevil	38.49373	-123.01006	1 Story, without Basement	603	51.50	56.10	9/21/2004	$ 103,716.00	$ 65,587.16	Russian River	38.55	-13.0						
150	17336	Riverside	Guernevil	38.49363	-123.00996	1 Story, without Basement	660	51.60	56.10	11/8/2002	$ 113,520.00	$ 80,376.36	Russian River	38.35	-13.3	$ -	$ -	$ -	$ -	$ -	0.00

Table E.1 Part 6 of 7

Summary of Losses Avoided and ROI Calculations for December 2003 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	DEC 03 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
151	17351	HWY 116	Guernevil	38.49438	-123.00961	1 Story, without Basement	838	51.10	57.10	6/30/1998	$ 144,136.00	$ 51,014.90	Russian River	38.71	-12.4	$ -	$ -	$ -	$ -	$ -	0.00
152	17355	HWY 116	Guernevil	38.49421	-123.00988	1 Story, without Basement	729	48.90	56.40	7/17/1998	$ 125,388.00	$ 49,630.52	Russian River	38.63	-10.3	$ -	$ -	$ -	$ -	$ -	0.00
153	17385	HWY 116 (	Guernevil	38.49397	-123.01058	1 Story, without Basement	1442	49.50	56.90	8/18/2000	$ 363,608.00	$ 71,165.34	Russian River	39.08	-10.4	$ -	$ -	$ -	$ -	$ -	0.00
154	17388	Riverside	Guernevil	38.49368	-123.01049	1 Story, without Basement	1045	49.70	56.30	6/8/2001	$ 179,740.00	$ 63,296.03	Russian River	38.83	-10.9	$ -	$ -	$ -	$ -	$ -	0.00
155	17429	River Ln	Guernevil	38.48988	-123.01326	1 Story, without Basement	885	50.20	57.50	12/3/1999	$ 152,220.00	$ 68,496.40	Russian River	37.12	-13.1	$ -	$ -	$ -	$ -	$ -	0.00
156	17443	Riverside	Guernevil	38.49321	-123.01158	1 or 2 Story, with Basement	1866	50.20	56.40	11/1/2002	$ 532,856.00	$ 99,605.62	Russian River	38.89	-11.3	$ -	$ -	$ -	$ -	$ -	0.00
157	17456	Orchard A	Guernevil	38.50560	-122.99640	1 Story, without Basement	894	52.60	60.00	6/19/2003	$ 153,768.00	$ 67,447.40	Russian River	37.62	-15.0	$ -	$ -	$ -	$ -	$ -	0.00
158	17460	River Ln	Guernevil	38.49009	-123.01334	1 Story, without Basement	888	51.00	54.30	12/28/2001	$ 152,736.00	$ 59,122.98	Russian River	37.24	-13.8	$ -	$ -	$ -	$ -	$ -	0.00
159	17461	Riverside	Guernevil	38.49302	-123.01204	1 Story, without Basement	1313	46.30	56.10	6/9/2000	$ 225,836.00	$ 103,286.79	Russian River	39.04	-7.3	$ -	$ -	$ -	$ -	$ -	0.00
160	17485	Riverside	Guernevil	38.49283	-123.01257	2 Story, without Basement	1744	40.40	56.20	3/17/2000	$ 299,968.00	$ 106,455.89	Russian River	39.26	-1.1	$ -	$ -	$ -	$ -	$ -	0.00
161	17549	Orchard A	Guernevil	38.48898	-123.01251	1 Story, without Basement	936	51.70	59.10	2/19/1999	$ 160,992.00	$ 57,556.14	Russian River	36.67	-15.0	$ -	$ -	$ -	$ -	$ -	0.00
162	17570	Orchard A	Guernevil	38.48869	-123.01241	1 Story, without Basement	951	50.90	55.70	1/12/2001	$ 163,572.00	$ 66,260.73	Russian River	36.60	-14.3	$ -	$ -	$ -	$ -	$ -	0.00
163	17670	Neeley Rd	Guernevil	38.48727	-123.01067	1 Story, without Basement	1683	49.80	55.60	2/25/2000	$ 289,476.00	$ 89,061.84	Russian River	36.24	-13.6	$ -	$ -	$ -	$ -	$ -	0.00
164	17711	GreenTree	Guernevil	38.48649	-123.01075	1 Story, without Basement	768	51.10	56.40	5/12/2000	$ 132,096.00	$ 60,507.55	Russian River	36.06	-15.0	$ -	$ -	$ -	$ -	$ -	0.00
165	17765	GreenTree	Guernevil	38.48577	-123.01004	1 Story, without Basement	560	43.90	53.30	6/23/2000	$ 96,320.00	$ 75,827.66	Russian River	35.79	-8.1	$ -	$ -	$ -	$ -	$ -	0.00
166	17775	Orchard A	Guernevil	38.48530	-123.01025	1 Story, without Basement	834	49.50	57.00	12/3/1999	$ 143,448.00	$ 59,068.38	Russian River	35.78	-13.7	$ -	$ -	$ -	$ -	$ -	0.00
167	17777	Orchard A	Guernevil	38.48521	-123.01011	1 Story, without Basement	944	48.30	56.10	10/15/1999	$ 162,368.00	$ 61,294.50	Russian River	35.74	-12.6	$ -	$ -	$ -	$ -	$ -	0.00
168	17786	Orchard A	Guernevil	38.48512	-123.01002	1 Story, without Basement	1344	46.70	57.70	8/13/1999	$ 231,168.00	$ 61,162.09	Russian River	35.74	-11.0	$ -	$ -	$ -	$ -	$ -	0.00
169	17837	Orchard A	Guernevil	38.48459	-123.00937	1 Story, without Basement	1169	48.20	54.00	2/10/2003	$ 201,068.00	$ 79,015.36	Russian River	35.46	-12.7	$ -	$ -	$ -	$ -	$ -	0.00
170	18063	Elm Ave	Monte Rio	38.47129	-123.00225	1 Story, without Basement	624	43.00	47.60	6/18/1999	$ 107,328.00	$ 52,047.93	Russian River	30.61	-12.4	$ -	$ -	$ -	$ -	$ -	0.00
171	18105	HWY 116	Guernevil	38.48509	-123.01335	1 Story, without Basement	264	50.10	51.60	12/8/2004	$ 45,408.00	$ 78,945.72	Russian River	35.90	-14.2						
172	19720	Redwood D	Monte Rio	38.47541	-122.99894	1 Story, without Basement	360	42.50	48.20	7/10/1998	$ 61,920.00	$ 45,950.36	Russian River	31.27	-11.2	$ -	$ -	$ -	$ -	$ -	0.00
173	19738	Crescent	Monte Rio	38.47550	-122.99913	1 Story, without Basement	936	44.50	48.50	3/17/2000	$ 160,992.00	$ 48,222.91	Russian River	31.27	-13.2	$ -	$ -	$ -	$ -	$ -	0.00
174	19821	Crescent	Monte Rio	38.47559	-123.00039	2 Story, without Basement	1317	45.60	48.20	4/20/2004	$ 226,524.00	$ 84,733.19	Russian River	31.16	-14.4						
175	20021	Beech Ave	Monte Rio	38.47004	-123.01294	1 Story, without Basement	780	40.10	47.10	11/26/2002	$ 134,160.00	$ 61,269.62	Russian River	29.23	-10.9	$ -	$ -	$ -	$ -	$ -	0.00
176	20030	El Rancho	Monte Rio	38.47041	-123.01345	1 Story, without Basement	1154	42.00	48.70	6/27/2005	$ 198,488.00	$ 83,705.47	Russian River	29.17	-12.8						
177	20201	Willow Rd	Monte Rio	38.47251	-123.00133	1 Story, without Basement	877	40.90	47.40	8/27/1999	$ 150,844.00	$ 83,348.20	Russian River	30.79	-10.1	$ -	$ -	$ -	$ -	$ -	0.00
178	20217	Alder Rd	Monte Rio	38.47245	-123.00183	1 Story, without Basement	800	42.10	50.20	12/11/1998	$ 137,600.00	$ 88,778.35	Russian River	30.74	-11.4	$ -	$ -	$ -	$ -	$ -	0.00
179	20219	Alder Rd	Monte Rio	38.47227	-123.00205	1 Story, without Basement	1162	43.30	49.70	12/10/1999	$ 199,864.00	$ 88,091.34	Russian River	30.72	-12.6	$ -	$ -	$ -	$ -	$ -	0.00
180	20225	Willow Rd	Monte Rio	38.47193	-123.00161	1 Story, without Basement	1014	44.40	48.30	10/9/1998	$ 174,408.00	$ 60,041.98	Russian River	30.71	-13.7	$ -	$ -	$ -	$ -	$ -	0.00

Table E.1 Part 7 of 7

Summary of Losses Avoided and ROI Calculations for December 2003 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	DEC 03 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
181	20226	Willow Rd	Monte Rio	38.47193	-123.00161	1 Story, without Basement	816	41.40	47.60	8/21/1998	$ 140,352.00	$ 51,014.90	Russian River	30.70	-10.7	$ -	$ -	$ -	$ -	$ -	0.00
182	20240	Willow Rd	Monte Rio	38.47166	-123.00166	1 Story, without Basement	864	37.40	48.70	7/1/2005	$ 148,608.00	$ 95,543.05	Russian River	30.66	-6.7						
183	20251	Willow Rd	Monte Rio	38.47128	-123.00185	1 Story, without Basement	690	40.55	47.70	10/27/2004	$ 118,680.00	$ 70,571.73	Russian River	30.62	-9.9						
184	20274	Alder Rd	Monte Rio	38.47058	-123.00302	1 Story, without Basement	516	40.80	47.60	11/6/2003	$ 88,752.00	$ 57,044.87	Russian River	30.46	-10.3	$ -	$ -	$ -	$ -	$ -	0.00
185	20290	Willow Rd	Monte Rio	38.46963	-123.00262	1 Story, without Basement	1010	35.10	47.80	11/5/2005	$ 173,720.00	$ 97,958.08	Russian River	30.35	-4.8						
186	20295	Alder Rd	Monte Rio	38.46974	-123.00342	1 Story, without Basement	701	38.00	47.50	12/8/2000	$ 120,572.00	$ 68,272.38	Russian River	30.33	-7.7	$ -	$ -	$ -	$ -	$ -	0.00
187	20309	River Blv	Monte Rio	38.47121	-123.00371	1 Story, without Basement	1100	39.50	48.00	7/2/1999	$ 189,200.00	$ 68,487.69	Russian River	30.52	-9.0	$ -	$ -	$ -	$ -	$ -	0.00
188	20357	HWY 116	Monte Rio	38.46845	-123.00808	1 Story, without Basement	1056	41.20	46.90	1/9/1999	$ 181,632.00	$ 56,129.37	Russian River	30.12	-11.1	$ -	$ -	$ -	$ -	$ -	0.00
189	20387	River Blv	Monte Rio	38.47021	-123.00403	1 Story, without Basement	775	43.50	49.50	7/27/2001	$ 13,175.00	$ 81,563.33	Russian River	30.39	-13.1	$ -	$ -	$ -	$ -	$ -	0.00
190	20399	River Blv	Monte Rio	38.47006	-123.00410	1 Story, without Basement	852	40.50	48.20	9/18/1998	$ 146,544.00	$ 42,575.43	Russian River	30.37	-10.1	$ -	$ -	$ -	$ -	$ -	0.00
191	20503	River Blv	Monte Rio	38.46926	-123.00457	2 Story, without Basement	1008	43.40	47.60	12/8/2000	$ 173,376.00	$ 67,066.98	Russian River	30.22	-13.2	$ -	$ -	$ -	$ -	$ -	0.00
192	20550	Alder Rd	Monte Rio	38.46901	-123.00390	1 Story, without Basement	752	38.60	47.70	9/10/1999	$ 129,344.00	$ 69,323.91	Russian River	30.16	-8.4	$ -	$ -	$ -	$ -	$ -	0.00
193	20790	Kingston	Monte Rio	38.46776	-123.00485	2 Story, without Basement	700	46.70	47.50	10/22/1999	$ 120,400.00	$ 53,633.38	Russian River	30.15	-16.6	$ -	$ -	$ -	$ -	$ -	0.00
194	20801	River Blv	Monte Rio	38.46781	-123.00557	1 or 2 Story, with Basement	780	42.50	57.40	3/4/2002	$ 264,880.00	$ 105,678.49	Russian River	30.14	-12.4	$ -	$ -	$ -	$ -	$ -	0.00
195	20813	River Blv	Monte Rio	38.46762	-123.00582	2 Story, without Basement	1500	34.80	47.50	10/2/1998	$ 258,000.00	$ 71,247.45	Russian River	30.14	-4.7	$ -	$ -	$ -	$ -	$ -	0.00
196	21081	River Blv	Monte Rio	38.46545	-123.00781	1 Story, without Basement	1184	40.40	46.90	3/9/2001	$ 203,648.00	$ 72,345.65	Russian River	30.09	-10.3	$ -	$ -	$ -	$ -	$ -	0.00
197	21225	Petray Ln	Monte Rio	38.71720	-122.88650	2 Story, without Basement	840	209.10	212.40	12/11/2002	$ 144,480.00	$ 58,730.59			-209.1						
198	21330	Monte Cri	Monte Rio	38.47520	-123.01900	1 Story, without Basement	760	35.70	42.20	5/26/2000	$ 130,720.00	$ 54,088.22	Russian River	29.90	-5.8	$ -	$ -	$ -	$ -	$ -	0.00
199	21340	Monte Cri	Monte Rio	38.47546	-123.01919	1 Story, without Basement	768	36.03	42.10	10/2/1998	$ 132,096.00	$ 60,625.23	Russian River	30.30	-5.7	$ -	$ -	$ -	$ -	$ -	0.00
200	21608	Moscow Rd	Monte Rio	38.46794	-123.01399	1 Story, without Basement	750	38.30	45.70	12/17/1999	$ 129,000.00	$ 61,251.18	Russian River	29.50	-8.8	$ -	$ -	$ -	$ -	$ -	0.00
201	21610	Moscow Rd	Monte Rio	38.46799	-123.01410	1 Story, without Basement	750	38.30	45.70	12/17/1999	$ 129,000.00	$ 64,540.31	Russian River	29.50	-8.8	$ -	$ -	$ -	$ -	$ -	0.00
202	21616	Moscow Rd	Monte Rio	38.46817	-123.01437	1 Story, without Basement	1739	40.80	47.00	10/12/2001	$ 299,108.00	$ 105,774.07	Russian River	29.39	-11.4	$ -	$ -	$ -	$ -	$ -	0.00
203	25832	Freezeout	Monte Rio	38.44569	-123.05726	1 Story, without Basement	354	23.20	31.50	8/7/2003	$ 60,888.00	$ 56,869.76	Russian River	13.98	-9.2	$ -	$ -	$ -	$ -	$ -	0.00
204	25832	Freezeout	Monte Rio	38.44569	-123.05726	1 Story, without Basement	1152	25.30	34.80	8/20/2004	$ 198,144.00	$ 125,093.85	Russian River	13.98	-11.3						
205	26709	Freezeout	Monte Rio	38.44266	-123.06462	1 Story, without Basement	656	24.70	27.90	5/11/2004	$ 112,832.00	$ 75,780.97	Russian River	13.05	-11.7						
																$ 282,903.26	$ 70,417.47	$ 28,634.59	$ 55,852.24	$ 437,807.56	

20 Finished Basements - used damage curve "with basement", although FFE should be measured at basement floor and curve adjusted to account for the elevation at which water enters the building. The "with basement" option provides more conservative values

5 Unknown if basement exists - to be more conservative, a "without basement" damage curve was used

9 structures eliminated from the analysis due to screening process

Structures not included in the loss calculations for the event because the construction to elevate the structure was not completed before the date of the event

Appendix F:

Summary of Losses Avoided and ROI Calculations for February 2004 Event

List of Tables

Table F.1: Summary of Losses Avoided and ROI Calculations for February 2004 Event . F-1

Table F.1 Part 1 of 7

Summary of Losses Avoided and ROI Calculations for February 2004 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	FEB 04 EVENT FLOOD ELEVATION	MP_4 FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
1	645	Austin Cr	Cazadero	38.47660	-123.04763	1 Story, without Basement	1432	30.80	36.70	9/13/2002	$ 246,304.00	$ 74,310.44	Austin Creek	28.75	-2.1	$ -	$ -	$ -	$ -	$ -	0.00
2	1285	Willowsid	Santa Ros	38.44330	-122.75360	1 Story, without Basement	1100	70.40	79.80	8/14/1998	$ 189,200.00	$ 41,405.03			-70.4						
3	1285	Willowsid	Santa Ros	38.44330	-122.75360	1 Story, without Basement	1100	70.90	78.00	11/13/1998	$ 189,200.00	$ 53,996.70			-70.9						
4	2030	Cazadero	Cazadero	38.49101	-123.06134	1 Story, without Basement	648	47.00	53.20	7/19/2002	$ 111,456.00	$ 68,793.60	Austin Creek	32.94	-14.1	$ -	$ -	$ -	$ -	$ -	0.00
5	4928	Wilshire	Santa Ros	38.45420	-122.68790	1 Story, without Basement	0	65.50	71.00	4/27/2001	$ -	$ 75,834.52			-65.5						
6	5232	Odonnell	Glen Elle	38.36690	-122.51980	1 Story, without Basement	1664	226.30	229.90	12/23/1999	$ 286,208.00	$ 50,194.74			-226.3						
7	8647	Mirabel Rd	Forestville	38.34926	-122.89468	1 Story, without Basement	804	69.80	75.40	6/28/2002	$ 138,288.00	$ 76,231.49	Russian River	65.52	-4.3	$ -	$ -	$ -	$ -	$ -	0.00
8	8650	Mirabel R	Forestvil	38.49302	-122.89478	2 Story, without Basement	1280	70.30	75.70	11/6/1998	$ 220,160.00	$ 69,077.57	Russian River	65.41	-4.9	$ -	$ -	$ -	$ -	$ -	0.00
9	8656	Mirabel Rd	Forestville	38.49302	-122.89478	1 Story, without Basement	764	70.40	74.90	3/1/2002	$ 131,408.00	$ 75,190.70	Russian River	65.41	-5.0	$ -	$ -	$ -	$ -	$ -	0.00
10	8672	Trenton R	Forestvil	38.49042	-122.89674	1 Story, without Basement	784	70.00	78.00	6/19/1998	$ 134,848.00	$ 41,824.80	Russian River	65.24	-4.8	$ -	$ -	$ -	$ -	$ -	0.00
11	8706	Trenton R	Forestvil	38.49118	-122.89737	1 Story, without Basement	624	73.10	76.10	11/17/2000	$ 107,328.00	$ 67,569.74	Russian River	65.18	-7.9	$ -	$ -	$ -	$ -	$ -	0.00
12	8810	Trenton R	Forestvil	38.49231	-122.89778	1 Story, without Basement	780	71.00	77.10	11/9/2001	$ 134,160.00	$ 79,802.18	Russian River	65.11	-5.9	$ -	$ -	$ -	$ -	$ -	0.00
13	8894	Trenton R	Forestvil	38.49405	-122.89800	1 Story, without Basement	892	66.00	75.90	10/15/1999	$ 153,424.00	$ 74,009.90	Russian River	65.04	-1.0	$ 552.33	$ 248.55	$ -	$ 1,814.68	$ 2,615.55	0.04
14	8990	Trenton R	Forestvil	38.49428	-122.89801	1 Story, without Basement	780	65.40	76.50	11/5/1999	$ 134,160.00	$ 70,779.05	Russian River	65.04	-0.4	$ 7,727.62	$ 3,477.43	$ -	$ 3,642.91	$ 14,847.95	0.21
15	9425	Old River	Forestvil	38.50218	-122.90591	1 Story, without Basement	842	67.00	77.30	7/2/1999	$ 179,224.00	$ 70,054.80	Russian River	64.63	-2.4	$ -	$ -	$ -	$ -	$ -	0.00
16	9894	Bohemian	Monte Rio	38.46261	-123.00829	1 Story, without Basement	1200	40.90	48.90	10/6/2000	$ 412,800.00	$ 103,688.08	Dutch Bill Creek	37.07	-3.8	$ -	$ -	$ -	$ -	$ -	0.00
17	10006	Heller St	Monte Rio	38.46892	-123.00398	1 Story, without Basement	564	37.70	47.60	10/6/1998	$ 97,008.00	$ 49,414.40	Russian River	37.08	-0.6	$ 3,317.67	$ 1,492.95	$ -	$ 2,850.68	$ 7,661.30	0.16
18	10590	Grays Rd	Forestvil	38.50863	-122.92267	1 Story, without Basement	1008	67.40	72.50	12/13/2002	$ 173,376.00	$ 85,280.38	Russian River	61.80	-5.6	$ -	$ -	$ -	$ -	$ -	0.00
19	10599	Grays Rd	Forestvil	38.50856	-122.92287	1 Story, without Basement	880	69.20	72.60	6/18/1999	$ 186,448.00	$ 56,462.59	Russian River	61.75	-7.5	$ -	$ -	$ -	$ -	$ -	0.00
20	10670	Grays Ct	Forestvil	38.50848	-122.92344	1 Story, without Basement	792	67.30	71.60	8/25/2000	$ 294,464.00	$ 65,818.53	Russian River	61.68	-5.6	$ -	$ -	$ -	$ -	$ -	0.00
21	10696	Old River	Forestvil	38.50741	-122.92378	1 Story, without Basement	720	67.50	71.70	4/16/1999	$ 123,840.00	$ 55,637.15	Russian River	61.24	-6.3	$ -	$ -	$ -	$ -	$ -	0.00
22	10716	Old River	Forestvil	38.50744	-122.92415	1 Story, without Basement	600	66.70	71.00	12/24/1998	$ 103,200.00	$ 48,399.81	Russian River	60.84	-5.9	$ -	$ -	$ -	$ -	$ -	0.00
23	10770	Old River	Forestvil	38.50667	-122.92492	1 Story, without Basement	1180	67.40	72.10	7/10/1998	$ 202,960.00	$ 52,268.45	Russian River	60.58	-6.8	$ -	$ -	$ -	$ -	$ -	0.00
24	10840	Buena Vis	Forestvil	38.50648	-122.92594	1 Story, without Basement	600	63.40	71.50	12/8/2000	$ 103,200.00	$ 59,411.02	Russian River	60.54	-2.9	$ -	$ -	$ -	$ -	$ -	0.00
25	10841	Summerhon	Forestvil	38.50616	-122.92596	1 Story, without Basement	520	64.00	71.50	10/12/2001	$ 89,440.00	$ 61,124.72	Russian River	60.57	-3.4	$ -	$ -	$ -	$ -	$ -	0.00
26	10843	Summerhon	Forestvil	38.50607	-122.92607	2 Story, without Basement	960	67.20	75.40	5/19/2000	$ 165,120.00	$ 81,643.10	Russian River	60.59	-6.6	$ -	$ -	$ -	$ -	$ -	0.00
27	10870	Forest Hi	Forestvil	38.50711	-122.92462	1 Story, without Basement	3276	65.00	71.50	3/31/2000	$ 563,472.00	$ 74,274.78	Russian River	60.65	-4.4	$ -	$ -	$ -	$ -	$ -	0.00
28	10940	Sunset Av	Forestvil	38.50763	-122.92840	1 Story, without Basement	972	66.80	74.80	2/5/1999	$ 167,184.00	$ 76,896.13	Russian River	60.42	-6.4	$ -	$ -	$ -	$ -	$ -	0.00
29	10959	Sunset Av	Forestvil	38.50669	-122.92869	1 Story, without Basement	893	65.70	72.90	6/18/1999	$ 153,596.00	$ 57,708.87	Russian River	60.35	-5.4	$ -	$ -	$ -	$ -	$ -	0.00
30	11035	Sunset Av	Forestvil	38.50634	-122.92900	1 or 2 Story, with Basement	776	69.00	72.50	3/9/2004	$ 217,408.00	$ 103,397.80	Russian River	60.32	-8.7						

Table F.1 Part 2 of 7

Summary of Losses Avoided and ROI Calculations for February 2004 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	FEB 04 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
31	11880	Summerhon	Forestvil	38.49798	-122.93892	1 Story, without Basement	1260	73.20	66.90	12/14/1998	$ 216,720.00	$ 63,553.65	Russian River	58.60	-14.6						
32	14060	Church St	Guernevil	38.50294	-122.99777	1 Story, without Basement	1045	54.70	60.80	9/20/2002	$ 179,740.00	$ 63,777.73	Russian River	50.35	-4.4	$ -	$ -	$ -	$ -	$ -	0.00
33	14070	Mill St	Guernevil	38.50304	-122.99929	2 Story, without Basement	1390	53.00	59.20	7/15/2005	$ 239,080.00	$ 102,351.75	Russian River	49.94	-3.1						
34	14185	Old Cazad	Guernevil	38.49746	-123.00850	1 or 2 Story, with Basement	2070	44.90	56.80	2/25/2000	$ 356,040.00	$ 88,636.88	Hulbert Creek	47.55	2.7	$ 78,150.78	$ 35,167.85	$ 13,946.32	$ 9,124.19	$ 136,389.14	1.54
35	14216	Mill St	Guernevil	38.50473	-122.99923	1 Story, without Basement	935	53.10	59.50	1/15/1999	$ 160,820.00	$ 64,957.76	Russian River	49.57	-3.5	$ -	$ -	$ -	$ -	$ -	0.00
36	14226	Lovers Ln	Guernevil	38.49662	-123.00931	1 Story, without Basement	700	47.20	56.10	6/23/2000	$ 120,400.00	$ 55,068.33	Russian River	47.28	0.1	$ 11,317.60	$ 5,092.92	$ 734.28	$ 4,875.26	$ 22,020.06	0.40
37	14226	Mill St	Guernevil	38.50480	-122.99922	2 Story, without Basement	1190	49.70	59.00	1/16/2003	$ 204,680.00	$ 99,708.43	Hulbert Creek	49.97	0.3	$ 12,444.54	$ 5,600.04	$ -	$ 3,751.24	$ 21,795.83	0.22
38	14259	Mill Ct	Guernevil	38.50519	-122.99862	2 Story, without Basement	2264	49.60	59.10	10/18/2004	$ 389,408.00	$ 168,319.90	Fife Creek	49.08	-0.5						
39	14259	Old Cazad	Guernevil	38.49824	-123.01002	2 Story, without Basement	852	46.80	55.20	10/11/2002	$ 146,544.00	$ 121,875.80	Hulbert Creek	47.42	0.6	$ 10,961.49	$ 4,932.67	$ -	$ 4,225.23	$ 20,119.39	0.17
40	14261	Lovers Ln	Guernevil	38.49679	-123.00987	1 Story, without Basement	986	54.10	56.50	5/31/2002	$ 169,592.00	$ 34,110.80	Hulbert Creek	47.30	-6.8	$ -	$ -	$ -	$ -	$ -	0.00
41	14263	Lovers Ln	Guernevil	38.49685	-123.01000	1 Story, without Basement	975	52.20	56.00	10/8/1999	$ 167,700.00	$ 64,076.62	Hulbert Creek	47.30	-4.9	$ -	$ -	$ -	$ -	$ -	0.00
42	14290	Old Cazad	Guernevil	38.49830	-123.01039	1 or 2 Story, with Basement	1265	53.10	56.30	4/15/2004	$ 473,000.00	$ 69,362.50	Hulbert Creek	47.33	-5.8						
43	14301	Mill Ct	Guernevil	38.50537	-122.99819	1 or 2 Story, with Basement	1764	50.70	59.00	1/23/2006	$ 545,584.00	$ 114,911.44	Fife Creek	48.13	-2.6						
44	14315	Lovers La	Guernevil	38.49700	-123.01078	1 Story, without Basement	780	49.90	55.60	1/12/2001	$ 134,160.00	$ 60,228.72	Hulbert Creek	47.22	-2.7	$ -	$ -	$ -	$ -	$ -	0.00
45	14420	Western A	Guernevil	38.51741	-122.97371	1 Story, without Basement	880	58.80	65.60	4/26/2002	$ 151,360.00	$ 71,233.30	Russian River	52.69	-6.1	$ -	$ -	$ -	$ -	$ -	0.00
46	14464	Western A	Guernevil	38.51691	-122.97393	1 Story, without Basement	656	53.40	61.20	4/15/2005	$ 112,832.00	$ 69,062.88	Russian River	52.69	-0.7						
47	14469	Western A	Guernevil	38.51690	-122.97383	1 Story, without Basement	841	56.50	65.90	11/3/2005	$ 144,652.00	$ 106,231.03	Russian River	52.73	-3.8						
48	14479	Western A	Guernevil	38.51681	-122.97386	1 Story, without Basement	728	57.40	66.70	1/10/2005	$ 125,216.00	$ 67,231.82	Russian River	52.73	-4.7						
49	14501	Armstrong	Guernevil	38.50999	-122.99431	1 Story, without Basement	564	49.90	59.50	11/3/2000	$ 97,008.00	$ 64,321.62	Fife Creek	53.02	3.1	$ 26,424.98	$ 11,891.24	$ 7,434.20	$ 10,915.17	$ 56,665.59	0.88
50	14501	Armstrong	Guernevil	38.51027	-122.99437	1 Story, without Basement	569	51.70	60.60	8/24/2001	$ 97,868.00	$ 83,085.68	Fife Creek	53.03	1.3	$ 16,285.24	$ 7,328.36	$ 3,950.56	$ 7,326.44	$ 34,890.59	0.42
51	14501	Armstrong	Guernevil	38.51014	-122.99429	1 Story, without Basement	564	51.80	60.60	11/3/2000	$ 97,008.00	$ 64,321.62	Fife Creek	53.02	1.2	$ 15,288.46	$ 6,879.81	$ 3,641.70	$ 7,028.51	$ 32,838.47	0.51
52	14501	Armstrong	Guernevil	38.50982	-122.99431	1 Story, without Basement	922	52.70	59.00	5/11/2001	$ 158,584.00	$ 63,688.56	Fife Creek	53.02	0.3	$ 16,809.90	$ 7,564.46	$ 1,629.44	$ 5,281.54	$ 31,285.34	0.49
53	14501	Armstrong	Guernevil	38.50961	-122.99432	1 Story, without Basement	890	54.10	58.40	11/9/2001	$ 153,080.00	$ 67,591.89	Fife Creek	53.02	-1.1	$ -	$ -	$ -	$ -	$ -	0.00
54	14501	Armstrong	Guernevil	38.50961	-122.99432	1 Story, without Basement	1310	54.10	58.40	4/19/2002	$ 225,320.00	$ 77,494.80	Hulbert Creek	53.02	-1.1	$ -	$ -	$ -	$ -	$ -	0.00
55	14501	Cherry St	Guernevil	38.49695	-123.01263	2 Story, without Basement	1350	50.10	56.00	12/10/1999	$ 232,200.00	$ 67,830.11	Fife Creek	47.52	-2.6	$ -	$ -	$ -	$ -	$ -	0.00
56	14509	Cherry St	Guernevil	38.49702	-123.01300	1 Story, without Basement	760	53.40	61.80	8/20/2004	$ 130,720.00	$ 75,780.97	Hulbert Creek	47.56	-5.8						
57	14530	Western A	Guernevil	38.51571	-122.97427	1 Story, without Basement	950	54.40	64.90	8/20/2004	$ 163,400.00	$ 95,250.58	Russian River	52.66	-1.7						
58	14536	Eastern A	Guernevil	38.51529	-122.97383	1 Story, without Basement	1617	55.90	64.70	9/24/1999	$ 278,124.00	$ 65,529.24	Russian River	52.71	-3.2	$ -	$ -	$ -	$ -	$ -	0.00
59	14549	Eastern A	Guernevil	38.51542	-122.97370	1 Story, without Basement	656	59.70	64.00	11/15/2002	$ 112,832.00	$ 60,626.85	Russian River	52.76	-6.9	$ -	$ -	$ -	$ -	$ -	0.00
60	14569	Eastern A	Guernevil	38.51567	-122.97344	2 Story, without Basement	1080	54.10	63.60	6/30/2001	$ 185,760.00	$ 128,679.77	Russian River	52.77	-1.3	$ -	$ -	$ -	$ -	$ -	0.00

Table F.1 Part 3 of 7

Summary of Losses Avoided and ROI Calculations for February 2004 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	FEB 04 EVENT FLOOD ELEVATION	MP_4 FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
61	14594	Eastern A	Guernevil	38.51580	-122.97331	1 Story, without Basement	1180	57.60	61.20	12/1/2000	$ 202,960.00	$ 89,649.78	Russian River	52.75	-4.9	$ -	$ -	$ -	$ -	$ -	0.00
62	14600	Rio Nido	Guernevil	38.51966	-122.97860	1 Story, without Basement	670	52.00	62.90	7/14/2000	$ 115,240.00	$ 59,283.88	Russian River	52.02	0.0	$ 10,486.84	$ 4,719.08	$ 556.94	$ 4,773.70	$ 20,536.56	0.35
63	14612	Eastern A	Guernevil	38.51611	-122.97301	1 Story, without Basement	640	60.30	66.80	11/8/2004	$ 110,080.00	$ 70,601.24	Russian River	52.76	-7.5						
64	14619	Eastern A	Guernevil	38.51618	-122.97296	1 Story, without Basement	928	59.70	64.10	10/25/1999	$ 159,616.00	$ 62,829.73	Russian River	52.82	-6.9	$ -	$ -	$ -	$ -	$ -	0.00
65	14620	Eastern A	Guernevil	38.51620	-122.97293	1 Story, without Basement	832	58.10	68.10	1/10/2005	$ 143,104.00	$ 66,807.99	Russian River	52.79	-5.3						
66	14630	Eastern A	Guernevil	38.51634	-122.97281	1 Story, without Basement	968	58.40	68.70	12/14/2004	$ 166,496.00	$ 74,827.87	Russian River	52.80	-5.6						
67	14650	Eastern A	Guernevil	38.51665	-122.97250	1 Story, without Basement	796	58.40	66.90	12/15/2000	$ 136,912.00	$ 73,044.78	Russian River	52.82	-5.6	$ -	$ -	$ -	$ -	$ -	0.00
68	14651	Carrier L	Guernevil	38.51139	-122.99755	1 Story, without Basement	663	53.10	62.00	5/18/2001	$ 114,036.00	$ 68,477.09	Fife Creek	54.08	1.0	$ 15,851.00	$ 7,132.95	$ 3,271.73	$ 6,398.78	$ 32,654.47	0.48
69	14652	Rio Nido	Guernevil	38.51959	-122.97867	1 Story, without Basement	572	50.90	63.80	10/11/2004	$ 98,384.00	$ 77,574.04	Russian River	52.01	1.1						
70	14680	Orchard L	Guernevil	38.51677	-122.97294	1 Story, without Basement	686	59.00	63.90	3/30/2001	$ 117,992.00	$ 60,043.28	Russian River	52.78	-6.2	$ -	$ -	$ -	$ -	$ -	0.00
71	14687	Orchard L	Guernevil	38.51716	-122.97317	1 Story, without Basement	855	58.10	64.90	5/18/2001	$ 147,060.00	$ 67,436.82	Russian River	52.79	-5.3	$ -	$ -	$ -	$ -	$ -	0.00
72	14698	Orchard L	Guernevil	38.51696	-122.97305	1 Story, without Basement	384	59.30	64.40	9/29/2000	$ 66,048.00	$ 71,328.93	Russian River	52.77	-6.5	$ -	$ -	$ -	$ -	$ -	0.00
73	14706	Rio Nido	Guernevil	38.52020	-122.97882	1 Story, without Basement	1240	56.70	63.00	1/14/2000	$ 213,280.00	$ 59,697.31	Russian River	52.03	-4.7	$ -	$ -	$ -	$ -	$ -	0.00
74	14707	Willow Rd	Rio Nido	38.52095	-122.97822	1 Story, without Basement	960	58.80	63.70	5/4/2001	$ 165,120.00	$ 68,309.93	Russian River	52.18	-6.6	$ -	$ -	$ -	$ -	$ -	0.00
75	14709	Carrier L	Guernevil	38.51224	-122.99767	1 Story, without Basement	1301	56.20	60.70	9/8/2000	$ 223,772.00	$ 75,845.49	Fife Creek	57.28	1.1	$ 32,760.22	$ 14,742.10	$ 5,431.78	$ 6,649.32	$ 59,583.41	0.79
76	14710	Carrier L	Guernevil	38.51240	-122.99778	1 Story, without Basement	1356	56.50	65.20	8/11/2000	$ 233,232.00	$ 69,821.57	Fife Creek	57.66	1.2	$ 35,637.85	$ 16,037.03	$ 5,981.47	$ 6,866.00	$ 64,522.35	0.92
77	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	557	52.35	63.00	3/26/1999	$ 95,804.00	$ 62,100.52	Russian River	52.04	-0.3	$ 5,949.43	$ 2,677.24	$ -	$ 3,795.26	$ 12,421.93	0.20
78	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	557	53.02	63.00	2/19/1999	$ 95,804.00	$ 62,736.56	Russian River	52.03	-1.0	$ 86.22	$ 38.80	$ -	$ 1,723.27	$ 1,848.29	0.03
79	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	557	53.25	62.90	1/29/1999	$ 95,804.00	$ 98,680.08	Russian River	52.03	-1.2	$ -	$ -	$ -	$ -	$ -	0.00
80	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	563	56.70	63.00	2/5/1999	$ 96,836.00	$ 56,144.36	Russian River	52.03	-4.7	$ -	$ -	$ -	$ -	$ -	0.00
81	14717	Canyon 7	Rio Nido	38.52104	-122.97930	2 Story, without Basement	1491	53.50	64.90	4/27/2001	$ 256,452.00	$ 81,354.38	Russian River	52.11	-1.4	$ -	$ -	$ -	$ -	$ -	0.00
82	14723	Northern	Guernevil	38.51717	-122.97233	1 Story, without Basement	1672	61.20	64.20	6/29/2001	$ 287,584.00	$ 68,339.78	Russian River	52.83	-8.4	$ -	$ -	$ -	$ -	$ -	0.00
83	14726	Willow Rd	Rio Nido	38.52138	-122.97815	1 Story, without Basement	671	59.00	64.00	6/18/1999	$ 115,412.00	$ 67,866.22	Russian River	52.22	-6.8	$ -	$ -	$ -	$ -	$ -	0.00
84	14736	Rio Nido	Guernevil	38.52081	-122.97986	1 Story, without Basement	873	60.70	62.40	11/1/2002	$ 150,156.00	$ 78,361.15	Russian River	52.02	-8.7	$ -	$ -	$ -	$ -	$ -	0.00
85	14736	Willow Rd	Rio Nido	38.52162	-122.97804	2 Story, without Basement	1230	59.30	64.10	8/9/2002	$ 211,560.00	$ 91,892.47	Russian River	52.25	-7.1	$ -	$ -	$ -	$ -	$ -	0.00
86	14760	Rio Nido	Guernevil	38.52110	-122.98015	1 Story, without Basement	606	59.30	64.80	1/14/2000	$ 104,232.00	$ 54,569.52	Russian River	52.01	-7.3	$ -	$ -	$ -	$ -	$ -	0.00
87	14775	Northern	Guernevil	38.51763	-122.97264	1 Story, without Basement	856	60.20	68.40	4/17/1998	$ 147,232.00	$ 48,710.52	Russian River	52.80	-7.4	$ -	$ -	$ -	$ -	$ -	0.00
88	14821	Northern	Guernevil	38.51804	-122.97304	1 Story, without Basement	640	58.40	65.70	6/10/2004	$ 110,080.00	$ 81,807.74	Russian River	52.76	-5.6						
89	14902	Melody Av	Guernevil	38.51307	-122.97908	1 or 2 Story, with Basement	986	57.60	65.60	1/25/2002	$ 331,960.00	$ 114,965.27	Russian River	51.90	-5.7	$ -	$ -	$ -	$ -	$ -	0.00
90	14917	Melody Av	Guernevil	38.51291	-122.97993	1 or 2 Story, with Basement	760	60.90	61.50	6/8/2001	$ 261,440.00	$ 101,181.95	Russian River	51.90	-9.0	$ -	$ -	$ -	$ -	$ -	0.00

Table F.1 Part 4 of 7

Summary of Losses Avoided and ROI Calculations for February 2004 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	FEB 04 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
91	14918	Drake Roa	Guernevil	38.51260	-122.97935	1 Story, without Basement	564	56.80	61.30	4/2/1999	$ 97,008.00	$ 43,033.66	Russian River	51.89	-4.9	$ -	$ -	$ -	$ -	$ -	0.00
92	14991	Foothill	Guernevil	38.51503	-122.98273	1 or 2 Story, with Basement	824	56.50	61.50	3/2/2001	$ 283,456.00	$ 77,335.98	Russian River	51.85	-4.7	$ -	$ -	$ -	$ -	$ -	0.00
93	14991	Melody Av	Guernevil	38.51172	-122.98007	1 or 2 Story, with Basement	848	57.30	62.60	10/18/2000	$ 261,440.00	$ 78,956.47	Russian River	51.86	-5.4	$ -	$ -	$ -	$ -	$ -	0.00
94	15029	Foothill	Guernevil	38.51429	-122.98312	1 or 2 Story, with Basement	647	48.00	61.70	10/1/1999	$ 126,420.00	$ 88,260.49	Russian River	51.89	3.9	$ 126,420.00	$ 15,616.03	$ 8,769.98	$ 10,986.27	$ 161,792.28	1.83
95	15030	Old River	Guernevil	38.51427	-122.98268	1 Story, without Basement	885	52.60	61.00	3/31/2000	$ 152,220.00	$ 67,076.21	Russian River	51.85	-0.8	$ 3,424.95	$ 1,541.23	$ -	$ 2,454.56	$ 7,420.74	0.11
96	15076	Old River	Guernevil	38.51332	-122.98313	1 or 2 Story, with Basement	720	53.10	61.20	3/7/2003	$ 239,424.00	$ 77,436.15	Russian River	51.90	-1.2	$ 17,238.53	$ 7,757.34	$ -	$ 4,130.43	$ 29,126.30	0.38
97	15083	Leasowe L	Guernevil	38.51092	-122.98076	1 Story, without Basement	890	58.90	61.50	3/29/2002	$ 153,080.00	$ 77,054.38	Russian River	51.83	-7.1	$ -	$ -	$ -	$ -	$ -	0.00
98	15105	River Rd	Guernevil	38.51304	-122.98285	1 Story, without Basement	1064	51.40	60.50	7/1/2005	$ 183,008.00	$ 90,801.44	Russian River	51.90	0.5						
99	15170	Drake Rd	Guernevil	38.50971	-122.98124	1 or 2 Story, with Basement	1026	56.20	61.30	11/1/2004	$ 352,944.00	$ 94,665.82	Russian River	51.79	-4.4						
100	15270	Old River	Guernevil	38.51086	-122.98450	2 Story, without Basement	1331	56.80	66.00	2/26/2004	$ 228,932.00	$ 60,843.59	Russian River	51.78	-5.0						
101	15280	Old River	Guernevil	38.51086	-122.98450	1 Story, without Basement	1105	57.50	64.90	7/30/1999	$ 190,060.00	$ 50,188.40	Russian River	51.78	-5.7	$ -	$ -	$ -	$ -	$ -	0.00
102	15410	Riverside	Guernevil	38.50895	-122.98567	1 Story, without Basement	912	55.60	61.40	5/5/2000	$ 156,864.00	$ 60,013.34	Russian River	51.63	-4.0	$ -	$ -	$ -	$ -	$ -	0.00
103	15437	Riverside	Guernevil	38.50879	-122.98592	1 Story, without Basement	1114	56.50	62.10	3/9/2001	$ 191,608.00	$ 98,776.64	Russian River	51.59	-4.9	$ -	$ -	$ -	$ -	$ -	0.00
104	15470	Riverside	Guernevil	38.50837	-122.98640	1 Story, without Basement	1160	55.10	61.30	3/5/1999	$ 199,520.00	$ 50,097.18	Russian River	51.52	-3.6	$ -	$ -	$ -	$ -	$ -	0.00
105	15486	River Rd	Guernevil	38.50859	-122.98705	1 Story, without Basement	582	52.00	61.20	5/27/2002	$ 100,104.00	$ 76,973.83	Russian River	51.49	-0.5	$ 4,414.59	$ 1,986.56	$ -	$ 3,185.85	$ 9,587.00	0.12
106	15549	Riverside	Guernevil	38.50770	-122.98711	1 or 2 Story, with Basement	966	51.70	60.60	8/23/2002	$ 257,656.00	$ 89,748.32	Russian River	51.40	-0.3	$ 26,023.26	$ 11,710.47	$ 2,683.31	$ 5,112.26	$ 45,529.29	0.51
107	15555	Bonita Av	Guernevil	38.50774	-122.98819	2 Story, without Basement	1175	49.40	59.70	2/19/1999	$ 202,100.00	$ 53,547.22	Russian River	51.33	1.9	$ 25,707.12	$ 11,568.20	$ 3,913.70	$ 5,999.28	$ 47,188.31	0.88
108	15587	Bonita Av	Guernevil	38.50778	-122.98827	1 Story, without Basement	874	53.50	59.50	5/28/1999	$ 150,328.00	$ 49,109.87	Russian River	51.33	-2.2	$ -	$ -	$ -	$ -	$ -	0.00
109	15604	Riverside	Guernevil	38.50748	-122.98748	1 or 2 Story, with Basement	783	56.10	59.80	5/10/2002	$ 257,656.00	$ 66,733.48	Russian River	51.34	-4.8	$ -	$ -	$ -	$ -	$ -	0.00
110	15619	Riverside	Guernevil	38.50754	-122.98788	1 Story, without Basement	592	49.00	60.20	11/20/1998	$ 101,824.00	$ 60,949.92	Russian River	51.30	2.3	$ 23,928.64	$ 10,767.89	$ 6,367.39	$ 9,648.96	$ 50,712.88	0.83
111	15623	Riverside	Guernevil	38.50708	-122.98816	1 or 2 Story, with Basement	1429	51.50	60.20	9/29/2000	$ 327,488.00	$ 73,936.53	Russian River	51.26	-0.2	$ 33,665.77	$ 15,149.59	$ 3,382.46	$ 5,173.20	$ 57,371.01	0.78
112	15625	Riverside	Guernevil	38.50718	-122.98803	1 Story, without Basement	882	52.00	59.90	7/16/1999	$ 151,704.00	$ 66,559.56	Russian River	51.27	-0.7	$ 3,686.41	$ 1,658.88	$ -	$ 2,515.50	$ 7,860.79	0.12
113	15627	Riverside	Guernevil	38.50704	-122.98824	1 Story, without Basement	1058	60.80	50.50	9/4/1998	$ 181,976.00	$ 64,751.43	Russian River	51.24	-9.6						
114	15675	Riverside	Guernevil	38.50651	-122.98881	1 or 2 Story, with Basement	1020	54.00	62.00	2/26/1999	$ 350,880.00	$ 74,974.73	Russian River	51.16	-2.8	$ -	$ -	$ -	$ -	$ -	0.00
115	15850	Riverland	Guernevil	38.50458	-122.99016	1 or 2 Story, with Basement	1386	55.90	60.20	5/28/1999	$ 271,416.00	$ 75,005.68	Russian River	50.84	-5.1	$ -	$ -	$ -	$ -	$ -	0.00
116	15961	Riverland	Guernevil	38.50250	-122.99013	1 Story, without Basement	1817	53.70	62.10	3/14/2003	$ 312,524.00	$ 65,746.58	Russian River	50.81	-2.9	$ -	$ -	$ -	$ -	$ -	0.00
117	15980	Drake Rd	Guernevil	38.50128	-122.99000	1 or 2 Story, with Basement	884	56.70	58.60	4/21/2005	$ 304,096.00	$ 73,562.31	Russian River	50.79	-5.9						
118	15991	Riverland	Guernevil	38.50292	-122.99100	1 Story, without Basement	992	55.70	60.20	3/8/2002	$ 170,624.00	$ 74,514.72	Russian River	50.79	-4.9	$ -	$ -	$ -	$ -	$ -	0.00
119	16010	Drake Rd	Guernevil	38.50086	-122.99042	1 Story, without Basement	960	47.80	59.90	8/27/1999	$ 165,120.00	$ 100,770.85	Russian River	50.77	3.0	$ 44,334.72	$ 19,950.62	$ 10,155.08	$ 10,783.14	$ 85,223.56	0.85
120	16055	Riverland	Guernevil	38.50156	-122.99157	1 Story, without Basement	1050	56.40	62.20	7/17/1998	$ 180,600.00	$ 56,860.48	Russian River	50.76	-5.6	$ -	$ -	$ -	$ -	$ -	0.00

Table F.1 Part 5 of 7

Summary of Losses Avoided and ROI Calculations for February 2004 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	FEB 04 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
121	16060	Riverland	Guernevil	38.50111	-122.99214	2 Story, without Basement	1296	55.60	59.50	3/12/1999	$ 222,912.00	$ 72,003.61	Russian River	50.75	-4.9	$ -	$ -	$ -	$ -	$ -	0.00
122	16117	Laughlin	Guernevil	38.51084	-122.99656	1 Story, without Basement	376	49.30	58.70	6/19/1998	$ 64,672.00	$ 49,514.60	Fife Creek	53.07	3.8	$ 18,457.39	$ 8,305.82	$ 6,399.78	$ 11,355.30	$ 44,518.29	0.90
123	16185	Neeley Rd	Guernevil	38.49835	-122.99420	1 Story, without Basement	960	59.30	49.80	11/20/1998	$ 165,120.00	$ 53,766.23	ocket Canyon Cr	50.70	-8.6						
124	16225	Drake Rd	Guernevil	38.49930	-122.99287	2 Story, without Basement	1887	49.10	58.00	11/6/1998	$ 324,564.00	$ 73,679.65	ocket Canyon Cr	50.70	1.6	$ 37,000.30	$ 16,650.13	$ 3,709.73	$ 5,552.38	$ 62,912.54	0.85
125	16325	4th ST	Guernevil	38.50320	-122.99808	1 Story, without Basement	1256	53.70	59.20	9/4/1998	$ 216,032.00	$ 51,014.90	Russian River	50.30	-3.4	$ -	$ -	$ -	$ -	$ -	0.00
126	16342	5th ST #A	Guernevil	38.50407	-122.99773	1 Story, without Basement	633	49.20	58.90	7/9/1999	$ 108,876.00	$ 72,278.23	Russian River	50.57	1.4	$ 18,465.37	$ 8,309.42	$ 4,296.28	$ 7,434.78	$ 38,505.84	0.53
127	16356	4th ST #1	Guernevil	38.50327	-122.99856	1 Story, without Basement	1500	54.00	58.60	1/7/2000	$ 258,000.00	$ 49,581.92	Russian River	50.30	-3.7	$ -	$ -	$ -	$ -	$ -	0.00
128	16356	4th ST #2	Guernevil	38.50327	-122.99856	1 Story, without Basement	1500	54.00	58.60	1/7/2000	$ 258,000.00	$ 46,260.92	Russian River	50.30	-3.7	$ -	$ -	$ -	$ -	$ -	0.00
129	16365	4th ST	Guernevil	38.50326	-122.99879	2 Story, without Basement	1250	55.50	59.40	9/8/2000	$ 215,000.00	$ 74,831.36	Russian River	50.11	-5.4	$ -	$ -	$ -	$ -	$ -	0.00
130	16451	4th ST	Guernevil	38.50336	-122.99838	1 Story, without Basement	672	51.50	59.20	10/8/1999	$ 115,584.00	$ 77,936.34	Russian River	50.34	-1.2	$ -	$ -	$ -	$ -	$ -	0.00
131	16451	Mill St	Guernevil	38.50375	-122.99927	2 Story, without Basement	1800	45.00	59.00	3/12/1999	$ 309,600.00	$ 73,060.29	Russian River	49.52	4.5	$ 65,139.84	$ 29,312.93	$ 11,771.95	$ 8,816.10	$ 115,040.82	1.57
132	16463	HWY 116	Guernevil	38.50188	-123.00095	1 Story, without Basement	988	50.80	58.40	1/5/1999	$ 169,936.00	$ 50,483.62	Russian River	49.29	-1.5	$ -	$ -	$ -	$ -	$ -	0.00
133	16465	HWY 116	Guernevil	38.50188	-123.00095	1 Story, without Basement	910	50.90	57.80	10/30/1998	$ 156,520.00	$ 49,027.25	Russian River	49.29	-1.6	$ -	$ -	$ -	$ -	$ -	0.00
134	16570	River Rd	Guernevil	38.50227	-123.00143	1 or 2 Story, with Basement	900	55.30	59.10	1/12/2001	$ 309,600.00	$ 62,629.18	Russian River	49.07	-6.2	$ -	$ -	$ -	$ -	$ -	0.00
135	16600	Laughlin	Guernevil	38.51346	-123.00310	2 Story, without Basement	2464	55.20	59.10	3/26/1999	$ 423,808.00	$ 51,022.09	Fife Creek	63.39	8.2						
136	16610	Neeley Rd	Guernevil	38.49827	-123.00121	1 or 2 Story, with Basement	642	52.60	57.00	7/14/2000	$ 206,400.00	$ 68,832.03	Russian River	48.71	-3.9	$ -	$ -	$ -	$ -	$ -	0.00
137	16635	Center Wa	Guernevil	38.49815	-123.00203	1 Story, without Basement	730	52.40	59.50	4/25/2001	$ 125,560.00	$ 95,921.18	Russian River	48.43	-4.0	$ -	$ -	$ -	$ -	$ -	0.00
138	16664	Center Wa	Guernevil	38.49778	-123.00238	1 Story, without Basement	872	50.20	57.30	5/21/1999	$ 149,984.00	$ 57,952.78	Russian River	48.32	-1.9	$ -	$ -	$ -	$ -	$ -	0.00
139	16686	Center Wa	Guernevil	38.49734	-123.00246	1 or 2 Story, with Basement	832	53.10	57.80	9/3/1999	$ 286,208.00	$ 65,200.02	Russian River	48.23	-4.9	$ -	$ -	$ -	$ -	$ -	0.00
140	16724	Center Wa	Guernevil	38.49696	-123.00261	1 Story, without Basement	1499	51.90	57.50	12/9/2002	$ 257,828.00	$ 84,465.60	Russian River	48.12	-3.8	$ -	$ -	$ -	$ -	$ -	0.00
141	16725	Guernewoo	Guernevil	38.49750	-123.00326	1 Story, without Basement	764	51.30	60.30	2/4/2000	$ 131,408.00	$ 93,920.34	Russian River	48.18	-3.1	$ -	$ -	$ -	$ -	$ -	0.00
142	16751	Guernewoo	Guernevil	38.49704	-123.00336	1 Story, without Basement	640	51.50	58.00	12/24/1998	$ 110,080.00	$ 52,623.89	Russian River	48.12	-3.4	$ -	$ -	$ -	$ -	$ -	0.00
143	16755	Center Wa	Guernevil	38.49660	-123.02910	1 Story, without Basement	1144	53.40	57.70	1/29/1999	$ 196,768.00	$ 51,256.49	Russian River	47.95	-5.5	$ -	$ -	$ -	$ -	$ -	0.00
144	16775	Center Wa	Guernevil	38.49648	-123.00304	1 Story, without Basement	930	48.00	57.40	2/23/2001	$ 159,960.00	$ 72,121.18	Russian River	47.82	-0.2	$ 11,805.05	$ 5,312.27	$ -	$ 4,191.37	$ 21,308.69	0.30
145	16794	Center Wa	Guernevil	38.49598	-123.00330	1 or 2 Story, with Basement	1338	47.80	56.80	5/17/2002	$ 460,272.00	$ 117,439.73	Russian River	47.67	-0.1	$ 48,834.86	$ 21,975.69	$ 4,914.13	$ 5,284.92	$ 81,009.59	0.69
146	16811	Center Wa	Guernevil	38.49574	-123.00337	1 Story, without Basement	864	47.00	56.90	1/22/1999	$ 148,608.00	$ 81,389.55	Russian River	47.69	0.7	$ 18,501.70	$ 8,325.76	$ 2,827.00	$ 5,907.87	$ 35,562.34	0.44
147	16847	Center Wa	Guernevil	38.49523	-123.00364	1 Story, without Basement	760	51.70	56.20	6/28/2002	$ 130,720.00	$ 67,770.21	Russian River	47.63	-4.1	$ -	$ -	$ -	$ -	$ -	0.00
148	17314	Riverside	Guernevil	38.49372	-123.00972	1 or 2 Story, with Basement	700	47.50	56.40	10/1/2002	$ 240,800.00	$ 61,843.37	Russian River	46.12	-1.4	$ 15,603.84	$ 7,021.73	$ -	$ 3,886.67	$ 26,512.24	0.43
149	17325	Riverside	Guernevil	38.49373	-123.01006	1 Story, without Basement	603	51.50	56.10	9/21/2004	$ 103,716.00	$ 65,587.16	Russian River	46.23	-5.3						
150	17336	Riverside	Guernevil	38.49363	-123.00996	1 Story, without Basement	660	51.60	56.10	11/8/2002	$ 113,520.00	$ 80,376.36	Russian River	46.10	-5.5	$ -	$ -	$ -	$ -	$ -	0.00

Table F.1 Part 6 of 7

Summary of Losses Avoided and ROI Calculations for February 2004 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	FEB 04 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
151	17351	HWY 116	Guernevil	38.49438	-123.00961	1 Story, without Basement	838	51.10	57.10	6/30/1998	$ 144,136.00	$ 51,014.90	Russian River	46.31	-4.8	$ -	$ -	$ -	$ -	$ -	0.00
152	17355	HWY 116	Guernevil	38.49421	-123.00988	1 Story, without Basement	729	48.90	56.40	7/17/1998	$ 125,388.00	$ 49,630.52	Russian River	46.36	-2.5	$ -	$ -	$ -	$ -	$ -	0.00
153	17385	HWY 116 (	Guernevil	38.49397	-123.01058	1 Story, without Basement	1442	49.50	56.90	8/18/2000	$ 363,608.00	$ 71,165.34	Russian River	46.08	-3.4	$ -	$ -	$ -	$ -	$ -	0.00
154	17388	Riverside	Guernevil	38.49368	-123.01049	1 Story, without Basement	1045	49.70	56.30	6/8/2001	$ 179,740.00	$ 63,296.03	Russian River	46.19	-3.5	$ -	$ -	$ -	$ -	$ -	0.00
155	17429	River Ln	Guernevil	38.48988	-123.01326	1 Story, without Basement	885	50.20	57.50	12/3/1999	$ 152,220.00	$ 68,496.40	Russian River	44.79	-5.4	$ -	$ -	$ -	$ -	$ -	0.00
156	17443	Riverside	Guernevil	38.49321	-123.01158	1 or 2 Story, with Basement	1866	50.20	56.40	11/1/2002	$ 532,856.00	$ 99,605.62	Russian River	45.93	-4.3	$ -	$ -	$ -	$ -	$ -	0.00
157	17456	Orchard A	Guernevil	38.50560	-122.99640	1 Story, without Basement	894	52.60	60.00	6/19/2003	$ 153,768.00	$ 67,447.40	Russian River	45.01	-7.6	$ -	$ -	$ -	$ -	$ -	0.00
158	17460	River Ln	Guernevil	38.49009	-123.01334	1 Story, without Basement	888	51.00	54.30	12/28/2001	$ 152,736.00	$ 59,122.98	Russian River	44.85	-6.2	$ -	$ -	$ -	$ -	$ -	0.00
159	17461	Riverside	Guernevil	38.49302	-123.01204	1 Story, without Basement	1313	46.30	56.10	6/9/2000	$ 225,836.00	$ 103,286.79	Russian River	45.91	-0.4	$ 12,398.40	$ 5,579.28	$ -	$ 3,551.49	$ 21,529.17	0.21
160	17485	Riverside	Guernevil	38.49283	-123.01257	2 Story, without Basement	1744	40.40	56.20	3/17/2000	$ 299,968.00	$ 106,455.89	Russian River	45.87	5.5	$ 68,812.66	$ 30,965.70	$ 12,893.50	$ 9,459.37	$ 122,131.23	1.15
161	17549	Orchard A	Guernevil	38.48898	-123.01251	1 Story, without Basement	936	51.70	59.10	2/19/1999	$ 160,992.00	$ 57,556.14	Russian River	44.53	-7.2	$ -	$ -	$ -	$ -	$ -	0.00
162	17570	Orchard A	Guernevil	38.48869	-123.01241	1 Story, without Basement	951	50.90	55.70	1/12/2001	$ 163,572.00	$ 66,260.73	Russian River	44.46	-6.4	$ -	$ -	$ -	$ -	$ -	0.00
163	17670	Neeley Rd	Guernevil	38.48727	-123.01067	1 Story, without Basement	1683	49.80	55.60	2/25/2000	$ 289,476.00	$ 89,061.84	Russian River	44.09	-5.7	$ -	$ -	$ -	$ -	$ -	0.00
164	17711	GreenTree	Guernevil	38.48649	-123.01075	1 Story, without Basement	768	51.10	56.40	5/12/2000	$ 132,096.00	$ 60,507.55	Russian River	43.91	-7.2	$ -	$ -	$ -	$ -	$ -	0.00
165	17765	GreenTree	Guernevil	38.48577	-123.01004	1 Story, without Basement	560	43.90	53.30	6/23/2000	$ 96,320.00	$ 75,827.66	Russian River	43.63	-0.3	$ 6,328.22	$ 2,847.70	$ -	$ 3,917.14	$ 13,093.06	0.17
166	17775	Orchard A	Guernevil	38.48530	-123.01025	1 Story, without Basement	834	49.50	57.00	12/3/1999	$ 143,448.00	$ 59,068.38	Russian River	43.62	-5.9	$ -	$ -	$ -	$ -	$ -	0.00
167	17777	Orchard A	Guernevil	38.48521	-123.01011	1 Story, without Basement	944	48.30	56.10	10/15/1999	$ 162,368.00	$ 61,294.50	Russian River	43.58	-4.7	$ -	$ -	$ -	$ -	$ -	0.00
168	17786	Orchard A	Guernevil	38.48512	-123.01002	1 Story, without Basement	1344	46.70	57.70	8/13/1999	$ 231,168.00	$ 61,162.09	Russian River	43.58	-3.1	$ -	$ -	$ -	$ -	$ -	0.00
169	17837	Orchard A	Guernevil	38.48459	-123.00937	1 Story, without Basement	1169	48.20	54.00	2/10/2003	$ 201,068.00	$ 79,015.36	Russian River	43.31	-4.9	$ -	$ -	$ -	$ -	$ -	0.00
170	18063	Elm Ave	Monte Rio	38.47129	-123.00225	1 Story, without Basement	624	43.00	47.60	6/18/1999	$ 107,328.00	$ 52,047.93	Russian River	37.63	-5.4	$ -	$ -	$ -	$ -	$ -	0.00
171	18105	HWY 116	Guernevil	38.48509	-123.01335	1 Story, without Basement	264	50.10	51.60	12/8/2004	$ 45,408.00	$ 78,945.72	Russian River	43.75	-6.4						
172	19720	Redwood D	Monte Rio	38.47541	-122.99894	1 Story, without Basement	360	42.50	48.20	7/10/1998	$ 61,920.00	$ 45,950.36	Russian River	38.33	-4.2	$ -	$ -	$ -	$ -	$ -	0.00
173	19738	Crescent	Monte Rio	38.47550	-122.99913	1 Story, without Basement	936	44.50	48.50	3/17/2000	$ 160,992.00	$ 48,222.91	Russian River	38.33	-6.2	$ -	$ -	$ -	$ -	$ -	0.00
174	19821	Crescent	Monte Rio	38.47559	-123.00039	2 Story, without Basement	1317	45.60	48.20	4/20/2004	$ 226,524.00	$ 84,733.19	Russian River	38.21	-7.4						
175	20021	Beech Ave	Monte Rio	38.47004	-123.01294	1 Story, without Basement	780	40.10	47.10	11/26/2002	$ 134,160.00	$ 61,269.62	Russian River	35.78	-4.3	$ -	$ -	$ -	$ -	$ -	0.00
176	20030	El Rancho	Monte Rio	38.47041	-123.01345	1 Story, without Basement	1154	42.00	48.70	6/27/2005	$ 198,488.00	$ 83,705.47	Russian River	35.70	-6.3						
177	20201	Willow Rd	Monte Rio	38.47251	-123.00133	1 Story, without Basement	877	40.90	47.40	8/27/1999	$ 150,844.00	$ 83,348.20	Russian River	37.83	-3.1	$ -	$ -	$ -	$ -	$ -	0.00
178	20217	Alder Rd	Monte Rio	38.47245	-123.00183	1 Story, without Basement	800	42.10	50.20	12/11/1998	$ 137,600.00	$ 88,778.35	Russian River	37.78	-4.3	$ -	$ -	$ -	$ -	$ -	0.00
179	20219	Alder Rd	Monte Rio	38.47227	-123.00205	1 Story, without Basement	1162	43.30	49.70	12/10/1999	$ 199,864.00	$ 88,091.34	Russian River	37.76	-5.5	$ -	$ -	$ -	$ -	$ -	0.00
180	20225	Willow Rd	Monte Rio	38.47193	-123.00161	1 Story, without Basement	1014	44.40	48.30	10/9/1998	$ 174,408.00	$ 60,041.98	Russian River	37.75	-6.7	$ -	$ -	$ -	$ -	$ -	0.00

Table F.1 Part 7 of 7

Summary of Losses Avoided and ROI Calculations for February 2004 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	FEB 04 EVENT FLOOD ELEVATION	MP_4 FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
181	20226	Willow Rd	Monte Rio	38.47193	-123.00161	1 Story, without Basement	816	41.40	47.60	8/21/1998	$ 140,352.00	$ 51,014.90	Russian River	37.74	-3.7	$ -	$ -	$ -	$ -	$ -	0.00
182	20240	Willow Rd	Monte Rio	38.47166	-123.00166	1 Story, without Basement	864	37.40	48.70	7/1/2005	$ 148,608.00	$ 95,543.05	Russian River	37.68	0.3						
183	20251	Willow Rd	Monte Rio	38.47128	-123.00185	1 Story, without Basement	690	40.55	47.70	10/27/2004	$ 118,680.00	$ 70,571.73	Russian River	37.64	-2.9						
184	20274	Alder Rd	Monte Rio	38.47058	-123.00302	1 Story, without Basement	516	40.80	47.60	11/6/2003	$ 88,752.00	$ 57,044.87	Russian River	37.44	-3.4	$ -	$ -	$ -	$ -	$ -	0.00
185	20290	Willow Rd	Monte Rio	38.46963	-123.00262	1 Story, without Basement	1010	35.10	47.80	11/5/2005	$ 173,720.00	$ 97,958.08	Russian River	37.30	2.2						
186	20295	Alder Rd	Monte Rio	38.46974	-123.00342	1 Story, without Basement	701	38.00	47.50	12/8/2000	$ 120,572.00	$ 68,272.38	Russian River	37.27	-0.7	$ 2,929.90	$ 1,318.45	$ -	$ 2,515.50	$ 6,763.86	0.10
187	20309	River Blv	Monte Rio	38.47121	-123.00371	1 Story, without Basement	1100	39.50	48.00	7/2/1999	$ 189,200.00	$ 68,487.69	Russian River	37.50	-2.0	$ -	$ -	$ -	$ -	$ -	0.00
188	20357	HWY 116	Monte Rio	38.46845	-123.00808	1 Story, without Basement	1056	41.20	46.90	1/9/1999	$ 181,632.00	$ 56,129.37	Russian River	37.06	-4.1	$ -	$ -	$ -	$ -	$ -	0.00
189	20387	River Blv	Monte Rio	38.47021	-123.00403	1 Story, without Basement	775	43.50	49.50	7/27/2001	$ 13,175.00	$ 81,563.33	Russian River	37.35	-6.2	$ -	$ -	$ -	$ -	$ -	0.00
190	20399	River Blv	Monte Rio	38.47006	-123.00410	1 Story, without Basement	852	40.50	48.20	9/18/1998	$ 146,544.00	$ 42,575.43	Russian River	37.32	-3.2	$ -	$ -	$ -	$ -	$ -	0.00
191	20503	River Blv	Monte Rio	38.46926	-123.00457	2 Story, without Basement	1008	43.40	47.60	12/8/2000	$ 173,376.00	$ 67,066.98	Russian River	37.13	-6.3	$ -	$ -	$ -	$ -	$ -	0.00
192	20550	Alder Rd	Monte Rio	38.46901	-123.00390	1 Story, without Basement	752	38.60	47.70	9/10/1999	$ 129,344.00	$ 69,323.91	Russian River	37.05	-1.6	$ -	$ -	$ -	$ -	$ -	0.00
193	20790	Kingston	Monte Rio	38.46776	-123.00485	2 Story, without Basement	700	46.70	47.50	10/22/1999	$ 120,400.00	$ 53,633.38	Russian River	37.05	-9.7	$ -	$ -	$ -	$ -	$ -	0.00
194	20801	River Blv	Monte Rio	38.46781	-123.00557	1 or 2 Story, with Basement	780	42.50	57.40	3/4/2002	$ 264,880.00	$ 105,678.49	Russian River	37.05	-5.5	$ -	$ -	$ -	$ -	$ -	0.00
195	20813	River Blv	Monte Rio	38.46762	-123.00582	2 Story, without Basement	1500	34.80	47.50	10/2/1998	$ 258,000.00	$ 71,247.45	Russian River	37.05	2.3	$ 36,765.00	$ 16,544.25	$ 5,758.67	$ 6,517.28	$ 65,585.20	0.92
196	21081	River Blv	Monte Rio	38.46545	-123.00781	1 Story, without Basement	1184	40.40	46.90	3/9/2001	$ 203,648.00	$ 72,345.65	Russian River	37.06	-3.3	$ -	$ -	$ -	$ -	$ -	0.00
197	21225	Petray Ln	Monte Rio	38.71720	-122.88650	2 Story, without Basement	840	209.10	212.40	12/11/2002	$ 144,480.00	$ 58,730.59			-209.1						
198	21330	Monte Cri	Monte Rio	38.47520	-123.01900	1 Story, without Basement	760	35.70	42.20	5/26/2000	$ 130,720.00	$ 54,088.22	Russian River	36.15	0.4	$ 14,706.00	$ 6,617.70	$ 1,890.91	$ 5,501.60	$ 28,716.21	0.53
199	21340	Monte Cri	Monte Rio	38.47546	-123.01919	1 Story, without Basement	768	36.03	42.10	10/2/1998	$ 132,096.00	$ 60,625.23	Russian River	36.68	0.6	$ 16,181.76	$ 7,281.79	$ 2,523.17	$ 5,840.16	$ 31,826.88	0.52
200	21608	Moscow Rd	Monte Rio	38.46794	-123.01399	1 Story, without Basement	750	38.30	45.70	12/17/1999	$ 129,000.00	$ 61,251.18	Russian River	36.18	-2.1	$ -	$ -	$ -	$ -	$ -	0.00
201	21610	Moscow Rd	Monte Rio	38.46799	-123.01410	1 Story, without Basement	750	38.30	45.70	12/17/1999	$ 129,000.00	$ 64,540.31	Russian River	36.18	-2.1	$ -	$ -	$ -	$ -	$ -	0.00
202	21616	Moscow Rd	Monte Rio	38.46817	-123.01437	1 Story, without Basement	1739	40.80	47.00	10/12/2001	$ 299,108.00	$ 105,774.07	Russian River	36.01	-4.8	$ -	$ -	$ -	$ -	$ -	0.00
203	25832	Freezeout	Monte Rio	38.44569	-123.05726	1 Story, without Basement	354	23.20	31.50	8/7/2003	$ 60,888.00	$ 56,869.76	Russian River	19.12	-4.1	$ -	$ -	$ -	$ -	$ -	0.00
204	25832	Freezeout	Monte Rio	38.44569	-123.05726	1 Story, without Basement	1152	25.30	34.80	8/20/2004	$ 198,144.00	$ 125,093.85	Russian River	19.12	-6.2						
205	26709	Freezeout	Monte Rio	38.44266	-123.06462	1 Story, without Basement	656	24.70	27.90	5/11/2004	$ 112,832.00	$ 75,780.97	Russian River	17.95	-6.8						
																$ 1,000,826.43	$ 409,098.92	$ 138,835.46	$ 240,763.56	$ 1,789,524.36	

20 Finished Basements - used damage curve "with basement", although FFE should be measured at basement floor and curve adjusted to account for the elevation at which water enters the building. The "with basement" option provides more conservative values

5 Unknown if basement exists - to be more conservative, a "without basement" damage curve was used

9 structures eliminated from the analysis due to screening process

Structures not included in the loss calculations for the event because the construction to elevate the structure was not completed before the date of the event

Appendix G:

Summary of Losses Avoided and ROI Calculations for January 2006 Event

List of Tables

Table G.1: Summary of Losses Avoided and ROI Calculations for January 2006 Event . . G-1

Table G.1 Part 1 of 7

Summary of Losses Avoided and ROI Calculations for January 2006 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	JAN 06 EVENT FLOOD ELEVATION	MP$_a$ FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
1	645	Austin Cr	Cazadero	38.4766	-123.04763	1 Story, without Basement	1432	30.8	36.7	9/13/2002	$ 246,304.00	$ 74,310.44	Austin Creek	31.68	0.9	$ 33,004.74	$ 14,852.13	$ 4,821.01	$ 6,229.50	$ 58,907.38	0.79
2	1285	Willowsid	Santa Ros	38.4433	-122.7536	1 Story, without Basement	1100	70.4	79.8	8/14/1998	$ 189,200.00	$ 41,405.03			-70.4						
3	1285	Willowsid	Santa Ros	38.4433	-122.7536	1 Story, without Basement	1100	70.9	78	11/13/1998	$ 189,200.00	$ 53,996.70			-70.9						
4	2030	Cazadero	Cazadero	38.49101	-123.06134	1 Story, without Basement	648	47	53.2	7/19/2002	$ 111,456.00	$ 68,793.60	Austin Creek	34.92	-12.1	$ -	$ -	$ -	$ -	$ -	0.00
5	4928	Wilshire	Santa Ros	38.4542	-122.6879	1 Story, without Basement	0	65.5	71	4/27/2001	$ -	$ 75,834.52			-65.5						
6	5232	Odonnell	Glen Elle	38.3869	-122.5198	1 Story, without Basement	1664	226.3	229.9	12/23/1999	$ 286,208.00	$ 50,194.74			-226.3						
7	8647	Mirabel Rd	Forestville	38.349259	-122.89468	1 Story, without Basement	804	69.8	75.4	6/28/2002	$ 138,288.00	$ 76,231.49	Russian River	70.94	1.1	$ 20,909.15	$ 9,409.12	$ 6,665.19	$ 6,811.83	$ 43,795.28	0.57
8	8650	Mirabel R	Forestvil	38.49302	-122.89478	2 Story, without Basement	1280	70.3	75.7	11/6/1998	$ 220,160.00	$ 69,077.57	Russian River	70.84	0.5	$ 15,763.46	$ 7,093.56	$ -	$ 4,116.89	$ 26,973.90	0.39
9	8656	Mirabel Rd	Forestville	38.49302	-122.89478	1 Story, without Basement	764	70.4	74.9	3/1/2002	$ 131,408.00	$ 75,190.70	Russian River	70.83	0.4	$ 14,651.99	$ 6,593.40	$ 2,723.16	$ 5,467.74	$ 29,436.29	0.39
10	8672	Trenton R	Forestvil	38.49042	-122.89674	1 Story, without Basement	784	70	78	6/19/1998	$ 134,848.00	$ 41,824.80	Russian River	70.67	0.7	$ 16,653.73	$ 7,494.18	$ 2,614.44	$ 5,874.02	$ 32,636.36	0.78
11	8706	Trenton R	Forestvil	38.49118	-122.89737	1 Story, without Basement	624	73.1	76.1	11/17/2000	$ 107,328.00	$ 67,569.74	Russian River	70.61	-2.5	$ -	$ -	$ -	$ -	$ -	0.00
12	8810	Trenton R	Forestvil	38.49231	-122.89778	1 Story, without Basement	780	71	77.1	11/9/2001	$ 134,160.00	$ 79,802.18	Russian River	70.55	-0.5	$ 6,640.92	$ 2,988.41	$ -	$ 3,368.67	$ 12,998.01	0.16
13	8894	Trenton R	Forestvil	38.49405	-122.898	1 Story, without Basement	892	66	75.9	10/15/1999	$ 153,424.00	$ 74,009.90	Russian River	70.47	4.5	$ 45,214.05	$ 20,346.32	$ 10,831.48	$ 11,670.16	$ 88,062.02	1.19
14	8990	Trenton R	Forestvil	38.49428	-122.89801	1 Story, without Basement	780	65.4	76.5	11/5/1999	$ 134,160.00	$ 70,779.05	Russian River	70.47	5.1	$ 41,187.12	$ 18,534.20	$ 10,422.14	$ 12,086.59	$ 82,230.05	1.16
15	9425	Old River	Forestvil	38.50218	-122.90591	1 Story, without Basement	842	67	77.3	7/2/1999	$ 179,224.00	$ 70,054.80	Russian River	70.12	3.1	$ 48,820.62	$ 21,969.28	$ 10,939.14	$ 10,915.17	$ 92,644.21	1.32
16	9894	Bohemian	Monte Rio	38.46261	-123.00829	1 Story, without Basement	1200	40.9	48.9	10/6/2000	$ 412,800.00	$ 103,688.08	Dutch Bill Creek	41.69	0.8	$ 53,457.60	$ 24,055.92	$ 6,449.44	$ 6,077.15	$ 90,040.11	0.87
17	10006	Heller St	Monte Rio	38.46892	-123.00398	1 Story, without Basement	564	37.7	47.6	10/6/1998	$ 97,008.00	$ 49,414.40	Russian River	41.67	4.0	$ 28,074.12	$ 12,633.35	$ 7,995.81	$ 11,490.73	$ 60,194.00	1.22
18	10590	Grays Rd	Forestvil	38.50863	-122.92267	1 Story, without Basement	1008	67.4	72.5	12/13/2002	$ 173,376.00	$ 85,280.38	Russian River	67.43	0.0	$ 15,863.90	$ 7,138.76	$ 612.87	$ 4,790.62	$ 28,406.15	0.33
19	10599	Grays Rd	Forestvil	38.50856	-122.92287	1 Story, without Basement	880	69.2	72.6	6/18/1999	$ 186,448.00	$ 56,462.59	Russian River	67.38	-1.8	$ -	$ -	$ -	$ -	$ -	0.00
20	10670	Grays Ct	Forestvil	38.50848	-122.92344	1 Story, without Basement	792	67.3	71.6	8/25/2000	$ 294,464.00	$ 65,818.53	Russian River	67.31	0.0	$ 26,648.99	$ 11,992.05	$ 556.68	$ 4,756.77	$ 43,954.49	0.67
21	10696	Old River	Forestvil	38.50741	-122.92378	1 Story, without Basement	720	67.5	71.7	4/16/1999	$ 123,840.00	$ 55,637.15	Russian River	66.83	-0.7	$ 3,678.05	$ 1,655.12	$ -	$ 2,698.32	$ 8,031.49	0.14
22	10716	Old River	Forestvil	38.50744	-122.92415	1 Story, without Basement	600	66.7	71	12/24/1998	$ 103,200.00	$ 48,399.81	Russian River	66.37	-0.3	$ 6,222.96	$ 2,800.33	$ -	$ 3,734.32	$ 12,757.61	0.26
23	10770	Old River	Forestvil	38.50667	-122.92492	1 Story, without Basement	1180	67.4	72.1	7/10/1998	$ 202,960.00	$ 52,268.45	Russian River	66.00	-1.4	$ -	$ -	$ -	$ -	$ -	0.00
24	10840	Buena Vis	Forestvil	38.50648	-122.92594	1 Story, without Basement	600	63.4	71.5	12/8/2000	$ 103,200.00	$ 59,411.02	Russian River	65.95	2.6	$ 25,542.00	$ 11,493.90	$ 6,844.27	$ 10,072.16	$ 53,952.33	0.91
25	10841	Summerhom	Forestvil	38.50616	-122.92596	1 Story, without Basement	520	64	71.5	10/12/2001	$ 89,440.00	$ 61,124.72	Russian River	65.98	2.0	$ 19,533.70	$ 8,790.16	$ 5,410.64	$ 9,086.95	$ 42,821.45	0.70
26	10843	Summerhom	Forestvil	38.50607	-122.92607	2 Story, without Basement	960	67.2	75.4	5/19/2000	$ 165,120.00	$ 81,643.10	Russian River	66.00	-1.2	$ -	$ -	$ -	$ -	$ -	0.00
27	10870	Forest Hi	Forestvil	38.50711	-122.92462	1 Story, without Basement	3276	65	71.5	3/31/2000	$ 563,472.00	$ 74,274.78	Russian River	66.09	1.1	$ 82,943.08	$ 37,324.39	$ 11,322.54	$ 6,676.40	$ 138,266.40	1.86
28	10940	Sunset Av	Forestvil	38.50763	-122.9284	1 Story, without Basement	972	66.8	74.8	2/5/1999	$ 167,184.00	$ 76,896.13	Russian River	65.82	-1.0	$ 300.93	$ 135.42	$ -	$ 1,753.74	$ 2,190.09	0.03
29	10959	Sunset Av	Forestvil	38.50669	-122.92869	1 Story, without Basement	893	65.7	72.9	6/18/1999	$ 153,596.00	$ 57,708.87	Russian River	65.74	0.0	$ 14,130.83	$ 6,358.87	$ 638.04	$ 4,807.55	$ 25,935.30	0.45
30	11035	Sunset Av	Forestvil	38.50634	-122.929	1 or 2 Story, with Basement	776	69	72.5	3/9/2004	$ 217,408.00	$ 103,397.80	Russian River	65.71	-3.3	$ -	$ -	$ -	$ -	$ -	0.00

Table G.1 Part 2 of 7

Summary of Losses Avoided and ROI Calculations for January 2006 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	JAN 06 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
31	11880	Summerhom	Forestvil	38.49798	-122.93892	1 Story, without Basement	1260	73.2	66.9	12/14/1998	$ 216,720.00	$ 63,553.65	Russian River	63.89	-9.3						
32	14060	Church St	Guernevil	38.50294	-122.99777	1 Story, without Basement	1045	54.7	60.8	9/20/2002	$ 179,740.00	$ 63,777.73	Russian River	55.28	0.6	$ 21,389.06	$ 9,625.08	$ 2,740.25	$ 5,721.66	$ 39,476.05	0.62
33	14070	Mill St	Guernevil	38.50304	-122.99929	2 Story, without Basement	1390	53	59.2	7/15/2005	$ 239,080.00	$ 102,351.75	Russian River	54.98	2.0	$ 30,889.14	$ 13,900.11	$ 4,594.07	$ 6,067.00	$ 55,450.31	0.54
34	14185	Old Cazad	Guernevil	38.49746	-123.0085	1 or 2 Story, with Basement	2070	44.9	56.8	2/25/2000	$ 356,040.00	$ 88,636.88	Hulbert Creek	52.46	7.6	$ 166,626.72	$ 74,982.02	$ 35,229.18	$ 17,537.41	$ 294,375.33	3.32
35	14216	Mill St	Guernevil	38.50473	-122.99923	1 Story, without Basement	935	53.1	59.5	1/15/1999	$ 160,820.00	$ 64,957.76	Russian River	54.60	1.5	$ 28,947.60	$ 13,026.42	$ 5,904.53	$ 7,786.88	$ 55,665.43	0.86
36	14226	Lovers Ln	Guernevil	38.49662	-123.00931	1 Story, without Basement	700	47.2	56.1	6/23/2000	$ 120,400.00	$ 55,068.33	Russian River	52.17	5.0	$ 36,083.88	$ 16,237.75	$ 9,463.00	$ 11,839.44	$ 73,624.07	1.34
37	14226	Mill St	Guernevil	38.5048	-122.99922	2 Story, without Basement	1190	49.7	59	1/16/2003	$ 204,680.00	$ 99,708.43	Hulbert Creek	55.01	5.3	$ 46,298.62	$ 20,834.38	$ 9,487.78	$ 9,351.03	$ 85,971.81	0.86
38	14259	Mill Ct	Guernevil	38.50519	-122.99862	2 Story, without Basement	2264	49.6	59.1	10/18/2004	$ 389,408.00	$ 168,319.90	Fife Creek	54.07	4.5	$ 81,542.04	$ 36,693.92	$ 14,076.85	$ 8,782.25	$ 141,095.05	0.84
39	14259	Old Cazad	Guernevil	38.49824	-123.01002	2 Story, without Basement	852	46.8	55.2	10/11/2002	$ 146,544.00	$ 121,875.80	Hulbert Creek	52.27	5.5	$ 33,617.19	$ 15,127.74	$ 7,692.81	$ 9,459.37	$ 65,897.11	0.54
40	14261	Lovers Ln	Guernevil	38.49679	-123.00987	1 Story, without Basement	986	54.1	56.5	5/31/2002	$ 169,592.00	$ 34,110.80	Hulbert Creek	52.10	-2.0	$ -	$ -	$ -	$ -	$ -	0.00
41	14263	Lovers Ln	Guernevil	38.49685	-123.01	1 Story, without Basement	975	52.2	56	10/8/1999	$ 167,700.00	$ 64,076.62	Hulbert Creek	52.09	-0.1	$ 13,432.77	$ 6,044.75	$ -	$ 4,404.67	$ 23,882.18	0.37
42	14290	Old Cazad	Guernevil	38.4983	-123.01039	1 or 2 Story, with Basement	1265	53.1	56.3	4/15/2004	$ 473,000.00	$ 69,362.50	Hulbert Creek	52.14	-1.0	$ 38,407.60	$ 17,283.42	$ 707.86	$ 4,441.91	$ 60,840.79	0.88
43	14301	Mill Ct	Guernevil	38.50537	-122.99819	1 or 2 Story, with Basement	1764	50.7	59	1/23/2006	$ 545,584.00	$ 114,911.44	Fife Creek	53.12	2.4						
44	14315	Lovers La	Guernevil	38.497	-123.01078	1 Story, without Basement	780	49.9	55.6	1/12/2001	$ 134,160.00	$ 60,228.72	Hulbert Creek	51.98	2.1	$ 30,051.84	$ 13,523.33	$ 7,053.89	$ 9,276.54	$ 59,905.60	0.99
45	14420	Western A	Guernevil	38.51741	-122.97371	1 Story, without Basement	880	58.8	65.6	4/26/2002	$ 151,360.00	$ 71,233.30	Russian River	57.55	-1.3	$ -	$ -	$ -	$ -	$ -	0.00
46	14464	Western A	Guernevil	38.51691	-122.97393	1 Story, without Basement	656	53.4	61.2	4/15/2005	$ 112,832.00	$ 69,062.88	Russian River	57.54	4.1	$ 32,879.24	$ 14,795.66	$ 8,797.53	$ 11,558.44	$ 68,030.88	0.99
47	14469	Western A	Guernevil	38.5169	-122.97383	1 Story, without Basement	841	56.5	65.9	11/3/2005	$ 144,652.00	$ 106,231.03	Russian River	57.59	1.1	$ 21,292.77	$ 9,581.75	$ 4,117.73	$ 6,676.40	$ 41,668.66	0.39
48	14479	Western A	Guernevil	38.51681	-122.97386	1 Story, without Basement	728	57.4	66.7	1/10/2005	$ 125,216.00	$ 67,231.82	Russian River	57.59	0.2	$ 12,458.99	$ 5,606.55	$ 1,070.81	$ 5,061.47	$ 24,197.82	0.36
49	14501	Armstrong	Guernevil	38.50999	-122.99431	1 Story, without Basement	564	49.9	59.5	11/3/2000	$ 97,008.00	$ 64,321.62	Fife Creek	53.63	3.7	$ 27,608.48	$ 12,423.81	$ 7,837.24	$ 11,328.22	$ 59,197.75	0.92
50	14501	Armstrong	Guernevil	38.51027	-122.99437	1 Story, without Basement	569	51.7	60.6	8/24/2001	$ 97,868.00	$ 83,085.68	Fife Creek	53.65	2.0	$ 21,139.49	$ 9,512.77	$ 5,597.80	$ 9,005.70	$ 45,255.75	0.54
51	14501	Armstrong	Guernevil	38.51014	-122.99429	1 Story, without Basement	564	51.8	60.6	11/3/2000	$ 97,008.00	$ 64,321.62	Fife Creek	53.64	1.8	$ 20,100.06	$ 9,045.03	$ 5,280.27	$ 8,707.76	$ 43,133.12	0.67
52	14501	Armstrong	Guernevil	38.50982	-122.99431	1 Story, without Basement	922	52.7	59	5/11/2001	$ 158,584.00	$ 63,688.56	Fife Creek	53.63	0.9	$ 21,646.72	$ 9,741.02	$ 3,782.43	$ 6,314.14	$ 41,484.31	0.65
53	14501	Armstrong	Guernevil	38.50961	-122.99432	1 Story, without Basement	890	54.1	58.4	11/6/2001	$ 153,080.00	$ 67,591.89	Fife Creek	53.63	-0.5	$ 7,301.92	$ 3,285.86	$ -	$ 3,307.73	$ 13,895.51	0.21
54	14501	Armstrong	Guernevil	38.50961	-122.99432	1 Story, without Basement	1310	54.1	58.4	4/19/2002	$ 225,320.00	$ 77,494.80	Hulbert Creek	53.63	-0.5	$ 10,747.76	$ 4,836.49	$ -	$ 3,307.73	$ 18,891.99	0.24
55	14501	Cherry St	Guernevil	38.49695	-123.01263	2 Story, without Basement	1350	50.1	56	12/10/1999	$ 232,200.00	$ 67,830.11	Fife Creek	52.00	1.9	$ 29,257.20	$ 13,165.74	$ 4,174.97	$ 5,958.66	$ 52,556.57	0.77
56	14509	Cherry St	Guernevil	38.49702	-123.013	1 Story, without Basement	760	53.4	61.8	8/20/2004	$ 130,720.00	$ 75,780.97	Hulbert Creek	52.00	-1.4	$ -	$ -	$ -	$ -	$ -	0.00
57	14530	Western A	Guernevil	38.51571	-122.97427	1 Story, without Basement	950	54.4	64.9	8/20/2004	$ 163,400.00	$ 95,250.58	Russian River	57.51	3.1	$ 44,477.48	$ 20,014.87	$ 10,255.24	$ 10,908.40	$ 85,655.99	0.90
58	14536	Eastern A	Guernevil	38.51529	-122.97383	1 Story, without Basement	1617	55.9	64.7	9/24/1999	$ 278,124.00	$ 65,529.24	Russian River	57.57	1.7	$ 53,844.81	$ 24,230.16	$ 9,653.47	$ 8,247.32	$ 95,975.76	1.46
59	14549	Eastern A	Guernevil	38.51542	-122.9737	1 Story, without Basement	656	59.7	64	11/15/2002	$ 112,832.00	$ 60,626.85	Russian River	57.62	-2.1	$ -	$ -	$ -	$ -	$ -	0.00
60	14569	Eastern A	Guernevil	38.51567	-122.97344	2 Story, without Basement	1080	54.1	63.6	6/30/2001	$ 185,760.00	$ 128,679.77	Russian River	57.64	3.5	$ 35,443.01	$ 15,949.35	$ 7,051.17	$ 8,152.52	$ 66,596.06	0.52

Table G.1 Part 3 of 7

Summary of Losses Avoided and ROI Calculations for January 2006 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	JAN 06 EVENT FLOOD ELEVATION	MP$_A$ FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
61	14594	Eastern A	Guernevil	38.5158	-122.97331	1 Story, without Basement	1180	57.6	61.2	12/1/2000	$ 202,960.00	$ 89,649.78	Russian River	57.61	0.0	$ 18,367.88	$ 8,265.55	$ 542.28	$ 4,756.77	$ 31,932.47	0.36
62	14600	Rio Nido	Guernevil	38.51966	-122.9786	1 Story, without Basement	670	52	62.9	7/14/2000	$ 115,240.00	$ 59,283.88	Russian River	56.84	4.8	$ 34,387.62	$ 15,474.43	$ 9,166.65	$ 11,795.43	$ 70,824.13	1.19
63	14612	Eastern A	Guernevil	38.51611	-122.97301	1 Story, without Basement	640	60.3	66.8	11/8/2004	$ 110,080.00	$ 70,601.24	Russian River	57.63	-2.7	$ -	$ -	$ -	$ -	$ -	0.00
64	14619	Eastern A	Guernevil	38.51618	-122.97296	1 Story, without Basement	928	59.7	64.1	10/25/1999	$ 159,616.00	$ 62,829.73	Russian River	57.69	-2.0	$ -	$ -	$ -	$ -	$ -	0.00
65	14620	Eastern A	Guernevil	38.5162	-122.97293	1 Story, without Basement	832	58.1	68.1	1/10/2005	$ 143,104.00	$ 66,807.99	Russian River	57.65	-0.5	$ 7,083.65	$ 3,187.64	$ -	$ 3,368.67	$ 13,639.96	0.20
66	14630	Eastern A	Guernevil	38.51634	-122.97281	1 Story, without Basement	968	58.4	68.7	12/14/2004	$ 166,496.00	$ 74,827.87	Russian River	57.67	-0.7	$ 4,045.85	$ 1,820.63	$ -	$ 2,515.50	$ 8,381.99	0.11
67	14650	Eastern A	Guernevil	38.51665	-122.9725	1 Story, without Basement	796	58.4	66.9	12/15/2000	$ 136,912.00	$ 73,044.78	Russian River	57.70	-0.7	$ 3,696.62	$ 1,663.48	$ -	$ 2,606.91	$ 7,967.02	0.11
68	14651	Carrier L	Guernevil	38.51139	-122.99755	1 Story, without Basement	663	53.1	62	5/18/2001	$ 114,036.00	$ 68,477.09	Fife Creek	54.50	1.4	$ 19,614.19	$ 8,826.39	$ 4,496.11	$ 7,516.03	$ 40,452.72	0.59
69	14652	Rio Nido	Guernevil	38.51959	-122.97867	1 Story, without Basement	572	50.9	63.8	10/11/2004	$ 98,384.00	$ 77,574.04	Russian River	56.82	5.9	$ 38,566.53	$ 17,354.94	$ 11,477.36	$ 14,964.35	$ 82,363.18	1.06
70	14680	Orchard L	Guernevil	38.51677	-122.97294	1 Story, without Basement	686	59	63.9	3/30/2001	$ 117,992.00	$ 60,043.28	Russian River	57.65	-1.4	$ -	$ -	$ -	$ -	$ -	0.00
71	14687	Orchard L	Guernevil	38.51716	-122.97317	1 Story, without Basement	855	58.1	64.9	5/18/2001	$ 147,060.00	$ 67,436.82	Russian River	57.65	-0.5	$ 7,279.47	$ 3,275.76	$ -	$ 3,368.67	$ 13,923.90	0.21
72	14698	Orchard L	Guernevil	38.51696	-122.97305	1 Story, without Basement	384	59.3	64.4	9/29/2000	$ 66,048.00	$ 71,328.93	Russian River	57.63	-1.7	$ -	$ -	$ -	$ -	$ -	0.00
73	14706	Rio Nido	Guernevil	38.5202	-122.97882	1 Story, without Basement	1240	56.7	63	1/14/2000	$ 213,280.00	$ 59,697.31	Russian River	56.85	0.1	$ 20,794.80	$ 9,357.66	$ 1,158.56	$ 4,993.76	$ 36,304.78	0.61
74	14707	Willow Rd	Rio Nido	38.52095	-122.97822	1 Story, without Basement	960	58.8	63.7	5/4/2001	$ 165,120.00	$ 68,309.93	Russian River	57.00	-1.8	$ -	$ -	$ -	$ -	$ -	0.00
75	14709	Carrier L	Guernevil	38.51224	-122.99767	1 Story, without Basement	1301	56.2	60.7	9/8/2000	$ 223,772.00	$ 75,845.49	Fife Creek	57.57	1.4	$ 37,951.73	$ 17,078.28	$ 6,795.51	$ 7,434.78	$ 69,260.30	0.91
76	14710	Carrier L	Guernevil	38.5124	-122.99778	1 Story, without Basement	1356	56.5	65.2	8/11/2000	$ 233,232.00	$ 69,821.57	Fife Creek	57.99	1.5	$ 41,795.17	$ 18,807.83	$ 7,584.03	$ 7,759.80	$ 75,946.83	1.09
77	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	557	52.35	63	3/26/1999	$ 95,804.00	$ 62,100.52	Russian River	56.85	4.5	$ 28,252.18	$ 12,717.98	$ 8,123.95	$ 11,680.32	$ 60,784.44	0.98
78	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	557	53.02	63	2/19/1999	$ 95,804.00	$ 62,736.56	Russian River	56.85	3.8	$ 27,457.43	$ 12,355.84	$ 7,848.51	$ 11,395.93	$ 59,057.71	0.94
79	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	557	53.25	62.9	1/29/1999	$ 95,804.00	$ 98,680.08	Russian River	56.85	3.6	$ 27,016.73	$ 12,157.53	$ 7,697.67	$ 11,240.19	$ 58,112.12	0.59
80	14712	Rio Nido	Rio Nido	38.52076	-122.97954	1 Story, without Basement	563	56.7	63	2/5/1999	$ 96,836.00	$ 56,144.36	Russian River	56.85	0.1	$ 9,441.51	$ 4,248.68	$ 883.63	$ 4,993.76	$ 19,567.58	0.35
81	14717	Canyon 7	Rio Nido	38.52104	-122.9793	2 Story, without Basement	1491	53.5	64.9	4/27/2001	$ 256,452.00	$ 81,354.38	Russian River	56.93	3.4	$ 48,366.85	$ 21,785.08	$ 8,749.33	$ 8,078.04	$ 86,959.30	1.07
82	14723	Northern	Guernevil	38.51717	-122.97233	1 Story, without Basement	1672	61.2	64.2	6/29/2001	$ 287,584.00	$ 68,339.78	Russian River	57.70	-3.5	$ -	$ -	$ -	$ -	$ -	0.00
83	14726	Willow Rd	Rio Nido	38.52138	-122.97815	1 Story, without Basement	671	59	64	6/18/1999	$ 115,412.00	$ 67,866.22	Russian River	57.05	-2.0	$ -	$ -	$ -	$ -	$ -	0.00
84	14736	Rio Nido	Guernevil	38.52081	-122.97986	2 Story, without Basement	873	60.7	62.4	11/1/2002	$ 150,156.00	$ 78,361.15	Russian River	56.83	-3.9	$ -	$ -	$ -	$ -	$ -	0.00
85	14736	Willow Rd	Rio Nido	38.52162	-122.97804	1 Story, without Basement	1230	59.3	64.1	8/9/2002	$ 211,560.00	$ 91,892.47	Russian River	57.07	-2.2	$ -	$ -	$ -	$ -	$ -	0.00
86	14760	Rio Nido	Guernevil	38.5211	-122.98015	1 Story, without Basement	606	59.3	64.8	1/14/2000	$ 104,232.00	$ 54,569.52	Russian River	56.82	-2.5	$ -	$ -	$ -	$ -	$ -	0.00
87	14775	Northern	Guernevil	38.51763	-122.97264	1 Story, without Basement	856	60.2	68.4	4/17/1998	$ 147,232.00	$ 48,710.52	Russian River	57.67	-2.5	$ -	$ -	$ -	$ -	$ -	0.00
88	14821	Northern	Guernevil	38.51804	-122.97304	1 Story, without Basement	640	58.4	65.7	6/10/2004	$ 110,080.00	$ 81,807.74	Russian River	57.63	-0.8	$ 2,278.66	$ 1,025.40	$ -	$ 2,393.62	$ 5,697.67	0.07
89	14902	Melody Av	Guernevil	38.51307	-122.97908	1 or 2 Story, with Basement	986	57.6	65.6	1/25/2002	$ 331,960.00	$ 114,965.27	Russian River	56.74	-0.9	$ 27,951.03	$ 12,577.96	$ 1,037.02	$ 4,543.48	$ 46,109.49	0.40
90	14917	Melody Av	Guernevil	38.51291	-122.97993	1 or 2 Story, with Basement	760	60.9	61.5	6/8/2001	$ 261,440.00	$ 101,181.95	Russian River	56.74	-4.2	$ -	$ -	$ -	$ -	$ -	0.00

Table G.1 Part 4 of 7

Summary of Losses Avoided and ROI Calculations for January 2006 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	JAN 06 EVENT FLOOD ELEVATION	MP$_A$ FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
91	14918	Drake Roa	Guernevil	38.5126	-122.97935	1 Story, without Basement	564	56.8	61.3	4/2/1999	$ 97,008.00	$ 43,033.66	Russian River	56.72	-0.1	$ 8,032.26	$ 3,614.52	$ -	$ 4,496.08	$ 16,142.86	0.38
92	14991	Foothill	Guernevil	38.51503	-122.98273	1 or 2 Story, with Basement	824	56.5	61.5	3/2/2001	$ 283,456.00	$ 77,335.98	Russian River	56.68	0.2	$ 33,221.04	$ 14,949.47	$ 4,378.42	$ 5,660.72	$ 58,209.66	0.75
93	14991	Melody Av	Guernevil	38.51172	-122.98007	1 or 2 Story, with Basement	848	57.3	62.6	10/18/2000	$ 261,440.00	$ 78,956.47	Russian River	56.70	-0.6	$ 24,052.48	$ 10,823.62	$ 1,762.21	$ 4,807.55	$ 41,445.86	0.52
94	15029	Foothill	Guernevil	38.51429	-122.98312	1 or 2 Story, with Basement	647	48	61.7	10/1/1999	$ 126,420.00	$ 88,260.49	Russian River	56.73	8.7	$ 126,420.00	$ 28,706.19	$ 17,995.20	$ 18,776.54	$ 191,897.93	2.17
95	15030	Old River	Guernevil	38.51427	-122.98268	1 Story, without Basement	885	52.6	61	3/31/2000	$ 152,220.00	$ 67,076.21	Russian River	56.67	4.1	$ 44,250.35	$ 19,912.66	$ 10,597.70	$ 11,534.74	$ 86,295.45	1.29
96	15076	Old River	Guernevil	38.51332	-122.98313	1 or 2 Story, with Basement	720	53.1	61.2	3/7/2003	$ 239,424.00	$ 77,436.15	Russian River	56.74	3.6	$ 62,729.09	$ 28,228.09	$ 12,861.13	$ 10,563.07	$ 114,381.38	1.48
97	15083	Leasowe L	Guernevil	38.51092	-122.98076	1 Story, without Basement	890	58.9	61.5	3/29/2002	$ 153,080.00	$ 77,054.38	Russian River	56.66	-2.2	$ -	$ -	$ -	$ -	$ -	0.00
98	15105	River Rd	Guernevil	38.51304	-122.98285	1 Story, without Basement	1064	51.4	60.5	7/1/2005	$ 183,008.00	$ 90,801.44	Russian River	56.73	5.3	$ 60,941.66	$ 27,423.75	$ 14,160.90	$ 12,966.85	$ 115,493.16	1.27
99	15170	Drake Rd	Guernevil	38.50971	-122.98124	1 or 2 Story, with Basement	1026	56.2	61.3	11/1/2004	$ 352,944.00	$ 94,665.82	Russian River	56.62	0.4	$ 44,753.30	$ 20,138.98	$ 5,966.56	$ 5,985.74	$ 76,844.59	0.81
100	15270	Old River	Guernevil	38.51086	-122.9845	2 Story, without Basement	1331	56.8	66	2/26/2004	$ 228,932.00	$ 60,843.59	Russian River	56.60	-0.2	$ 9,157.28	$ 4,120.78	$ -	$ 3,047.04	$ 16,325.10	0.27
101	15280	Old River	Guernevil	38.51086	-122.9845	1 Story, without Basement	1105	57.5	64.9	7/30/1999	$ 190,060.00	$ 50,188.40	Russian River	56.60	-0.9	$ 1,710.54	$ 769.74	$ -	$ 1,997.50	$ 4,477.79	0.09
102	15410	Riverside	Guernevil	38.50895	-122.98567	1 Story, without Basement	912	55.6	61.4	5/5/2000	$ 156,864.00	$ 60,013.34	Russian River	56.43	0.8	$ 20,627.62	$ 9,282.43	$ 3,407.01	$ 6,144.86	$ 39,461.92	0.66
103	15437	Riverside	Guernevil	38.50879	-122.98592	1 Story, without Basement	1114	56.5	62.1	3/9/2001	$ 191,608.00	$ 98,776.64	Russian River	56.39	-0.1	$ 15,347.80	$ 6,906.51	$ -	$ 4,404.67	$ 26,658.98	0.27
104	15470	Riverside	Guernevil	38.50837	-122.9864	1 Story, without Basement	1160	55.1	61.3	3/5/1999	$ 199,520.00	$ 50,097.18	Russian River	56.30	1.2	$ 31,125.12	$ 14,006.30	$ 5,535.54	$ 6,974.34	$ 57,641.30	1.15
105	15486	River Rd	Guernevil	38.50859	-122.98705	1 Story, without Basement	582	52	61.2	5/27/2002	$ 100,104.00	$ 76,973.83	Russian River	56.28	4.3	$ 29,310.45	$ 13,189.70	$ 8,252.94	$ 11,605.84	$ 62,358.93	0.81
106	15549	Riverside	Guernevil	38.5077	-122.98711	1 or 2 Story, with Basement	966	51.7	60.6	8/23/2002	$ 257,656.00	$ 89,748.32	Russian River	56.16	4.5	$ 78,069.77	$ 35,131.40	$ 16,292.06	$ 11,951.17	$ 141,444.40	1.58
107	15555	Bonita Av	Guernevil	38.50774	-122.98819	2 Story, without Basement	1175	49.4	59.7	2/19/1999	$ 202,100.00	$ 53,547.22	Russian River	56.09	6.7	$ 51,292.98	$ 23,081.84	$ 10,902.89	$ 10,285.45	$ 95,563.17	1.78
108	15587	Bonita Av	Guernevil	38.50778	-122.98827	1 Story, without Basement	874	53.5	59.5	5/28/1999	$ 150,328.00	$ 49,109.87	Russian River	56.09	2.6	$ 37,506.84	$ 16,878.08	$ 8,702.77	$ 10,139.87	$ 73,227.55	1.49
109	15604	Riverside	Guernevil	38.50748	-122.98748	1 or 2 Story, with Basement	783	56.1	59.8	5/10/2002	$ 257,656.00	$ 66,733.48	Russian River	56.10	0.0	$ 28,342.16	$ 12,753.97	$ 3,619.01	$ 5,416.96	$ 50,132.11	0.75
110	15619	Riverside	Guernevil	38.50754	-122.98788	1 Story, without Basement	592	49	60.2	11/20/1998	$ 101,824.00	$ 60,949.92	Russian River	56.05	7.1	$ 43,835.23	$ 19,725.85	$ 13,017.10	$ 16,267.81	$ 92,846.00	1.52
111	15623	Riverside	Guernevil	38.50708	-122.98816	1 or 2 Story, with Basement	1429	51.5	60.2	9/29/2000	$ 327,488.00	$ 73,936.53	Russian River	56.01	4.5	$ 100,047.58	$ 45,021.41	$ 19,902.68	$ 12,035.81	$ 177,007.48	2.39
112	15625	Riverside	Guernevil	38.50718	-122.98803	1 Story, without Basement	882	52	59.9	7/16/1999	$ 151,704.00	$ 66,559.56	Russian River	56.02	4.0	$ 44,024.50	$ 19,811.03	$ 10,551.71	$ 11,517.81	$ 85,905.05	1.29
113	15627	Riverside	Guernevil	38.50704	-122.98824	1 Story, without Basement	1058	60.8	50.5	9/4/1998	$ 181,976.00	$ 64,751.43	Russian River	56.00	-4.6						
114	15675	Riverside	Guernevil	38.50651	-122.98881	1 or 2 Story, with Basement	1020	54	62	2/26/1999	$ 350,880.00	$ 74,974.73	Russian River	55.92	1.9	$ 68,772.48	$ 30,947.62	$ 11,793.74	$ 8,328.58	$ 119,842.42	1.60
115	15850	Riverland	Guernevil	38.50458	-122.99016	1 or 2 Story, with Basement	1386	55.9	60.2	5/28/1999	$ 271,416.00	$ 75,005.68	Russian River	55.62	-0.3	$ 27,575.87	$ 12,409.14	$ 2,841.27	$ 5,132.57	$ 47,958.84	0.64
116	15961	Riverland	Guernevil	38.5025	-122.99013	1 Story, without Basement	1817	53.7	62.1	3/14/2003	$ 312,524.00	$ 65,746.58	Russian River	55.61	1.9	$ 66,505.11	$ 29,927.30	$ 12,044.12	$ 8,897.36	$ 117,373.88	1.79
117	15980	Drake Rd	Guernevil	38.50128	-122.99	1 or 2 Story, with Basement	884	56.7	58.6	4/21/2005	$ 304,096.00	$ 73,562.31	Russian River	55.59	-1.1	$ 22,989.66	$ 10,345.35	$ -	$ 4,252.31	$ 37,587.32	0.51
118	15991	Riverland	Guernevil	38.50292	-122.991	1 Story, without Basement	992	55.7	60.2	3/8/2002	$ 170,624.00	$ 74,514.72	Russian River	55.60	-0.1	$ 13,820.54	$ 6,219.24	$ -	$ 4,435.14	$ 24,474.92	0.33
119	16010	Drake Rd	Guernevil	38.50086	-122.99042	1 Story, without Basement	960	47.8	59.9	8/27/1999	$ 165,120.00	$ 100,770.85	Russian River	55.57	7.8	$ 72,273.02	$ 32,522.86	$ 18,085.37	$ 16,511.57	$ 139,392.83	1.38
120	16055	Riverland	Guernevil	38.50156	-122.99157	1 Story, without Basement	1050	56.4	62.2	7/17/1998	$ 180,600.00	$ 56,860.48	Russian River	55.58	-0.8	$ 2,925.72	$ 1,316.57	$ -	$ 2,241.27	$ 6,483.56	0.11

Table G.1 Part 5 of 7

Summary of Losses Avoided and ROI Calculations for January 2006 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	JAN 06 EVENT FLOOD ELEVATION	MP$_a$ FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
121	16060	Riverland	Guernevil	38.50111	-122.99214	2 Story, without Basement	1296	55.6	59.5	3/12/1999	$ 222,912.00	$ 72,003.61	Russian River	55.56	0.0	$ 10,699.78	$ 4,814.90	$ -	$ 3,317.89	$ 18,832.56	0.26
122	16117	Laughlin	Guernevil	38.51084	-122.99656	1 Story, without Basement	376	49.3	58.7	6/19/1998	$ 64,672.00	$ 49,514.60	Fife Creek	53.69	4.4	$ 19,007.10	$ 8,553.20	$ 6,624.76	$ 11,643.08	$ 45,828.13	0.93
123	16185	Neeley Rd	Guernevil	38.49835	-122.9942	1 Story, without Basement	960	59.3	49.8	11/20/1998	$ 165,120.00	$ 53,786.23	Pocket Canyon Cree	55.53	-3.8						
124	16225	Drake Rd	Guernevil	38.4993	-122.99287	2 Story, without Basement	1887	49.1	58	11/6/1998	$ 324,564.00	$ 73,679.65	Pocket Canyon Cree	55.53	6.4	$ 80,686.61	$ 36,308.97	$ 15,248.90	$ 10,109.40	$ 142,353.88	1.93
125	16325	4th ST	Guernevil	38.5032	-122.99808	1 Story, without Basement	1256	53.7	59.2	9/4/1998	$ 216,032.00	$ 51,014.90	Russian River	55.25	1.6	$ 39,749.89	$ 17,887.45	$ 7,450.97	$ 7,922.30	$ 73,010.61	1.43
126	16342	5th ST #A	Guernevil	38.50407	-122.99773	1 Story, without Basement	633	49.2	58.9	7/9/1999	$ 108,876.00	$ 72,278.23	Russian River	55.44	6.2	$ 44,334.31	$ 19,950.44	$ 12,718.28	$ 15,478.96	$ 92,481.99	1.28
127	16356	4th ST #1	Guernevil	38.50327	-122.99856	1 Story, without Basement	1500	54	58.6	1/7/2000	$ 258,000.00	$ 49,581.92	Russian River	55.25	1.3	$ 41,280.00	$ 18,576.00	$ 6,909.00	$ 7,109.76	$ 73,874.76	1.49
128	16356	4th ST #2	Guernevil	38.50327	-122.99856	1 Story, without Basement	1500	54	58.6	1/7/2000	$ 258,000.00	$ 46,260.92	Russian River	55.25	1.3	$ 41,280.00	$ 18,576.00	$ 6,909.00	$ 7,109.76	$ 73,874.76	1.60
129	16365	4th ST	Guernevil	38.50326	-122.99879	2 Story, without Basement	1250	55.5	59.4	9/8/2000	$ 215,000.00	$ 74,831.36	Russian River	55.11	-0.4	$ 6,557.50	$ 2,950.88	$ -	$ 2,725.41	$ 12,233.78	0.16
130	16451	4th ST	Guernevil	38.50336	-122.99838	1 Story, without Basement	672	51.5	59.2	10/8/1999	$ 115,584.00	$ 77,936.34	Russian River	55.27	3.8	$ 32,987.67	$ 14,844.45	$ 8,704.62	$ 11,355.30	$ 67,892.05	0.87
131	16451	Mill St	Guernevil	38.50375	-122.99927	2 Story, without Basement	1800	45	59	3/12/1999	$ 309,600.00	$ 73,060.29	Russian River	54.55	9.6	$ 110,682.00	$ 49,806.90	$ 20,887.07	$ 13,796.32	$ 195,172.29	2.67
132	16463	HWY 116	Guernevil	38.50188	-123.00095	1 Story, without Basement	988	50.8	58.4	1/5/1999	$ 169,936.00	$ 50,483.62	Russian River	54.32	3.5	$ 47,650.05	$ 21,442.52	$ 10,925.96	$ 11,186.02	$ 91,204.56	1.81
133	16485	HWY 116	Guernevil	38.50188	-123.00095	1 Story, without Basement	910	50.9	57.8	10/30/1998	$ 156,520.00	$ 49,027.25	Russian River	54.32	3.4	$ 43,575.17	$ 19,608.83	$ 10,241.98	$ 11,118.31	$ 84,544.29	1.72
134	16570	River Rd	Guernevil	38.50227	-123.00143	1 or 2 Story, with Basement	900	55.3	59.1	1/12/2001	$ 309,600.00	$ 62,629.18	Russian River	54.09	-1.2	$ 22,167.36	$ 9,975.31	$ -	$ 4,116.89	$ 36,259.56	0.58
135	16600	Laughlin	Guernevil	38.51346	-123.0031	2 Story, without Basement	2464	55.2	59.1	3/26/1999	$ 423,808.00	$ 51,022.09	Fife Creek	63.72	8.5						
136	16610	Neeley Rd	Guernevil	38.49827	-123.00121	1 or 2 Story, with Basement	642	52.6	57	7/14/2000	$ 206,400.00	$ 68,832.03	Russian River	53.72	1.1	$ 32,198.40	$ 14,489.28	$ 5,666.19	$ 6,974.34	$ 59,328.20	0.86
137	16635	Center Wa	Guernevil	38.49815	-123.00203	1 Story, without Basement	730	52.4	59.5	4/25/2001	$ 125,560.00	$ 95,921.18	Russian River	53.44	1.0	$ 17,980.19	$ 8,091.09	$ 3,633.96	$ 6,540.98	$ 36,246.22	0.38
138	16664	Center Wa	Guernevil	38.49778	-123.00238	1 Story, without Basement	872	50.2	57.3	5/21/1999	$ 149,984.00	$ 57,952.78	Russian River	53.32	3.1	$ 40,855.64	$ 18,385.04	$ 9,692.61	$ 10,915.17	$ 79,848.47	1.38
139	16686	Center Wa	Guernevil	38.49734	-123.00246	1 or 2 Story, with Basement	832	53.1	57.8	9/3/1999	$ 286,208.00	$ 65,200.02	Russian River	53.24	0.1	$ 33,085.64	$ 14,888.54	$ 4,294.65	$ 5,606.55	$ 57,875.39	0.89
140	16724	Center Wa	Guernevil	38.49696	-123.00261	1 Story, without Basement	1499	51.9	57.5	12/9/2002	$ 257,828.00	$ 84,465.60	Russian River	53.12	1.2	$ 40,633.69	$ 18,285.16	$ 6,747.92	$ 7,028.51	$ 72,695.28	0.86
141	16725	Guernewoo	Guernevil	38.4975	-123.00326	1 Story, without Basement	764	51.3	60.3	2/4/2000	$ 131,408.00	$ 93,920.34	Russian River	53.18	1.9	$ 27,648.24	$ 12,441.71	$ 6,419.31	$ 8,816.10	$ 55,325.37	0.59
142	16751	Guernewoo	Guernevil	38.49704	-123.00336	1 Story, without Basement	640	51.5	58	12/24/1998	$ 110,080.00	$ 52,623.89	Russian River	53.12	1.6	$ 20,871.17	$ 9,392.03	$ 5,036.28	$ 8,111.90	$ 43,411.37	0.82
143	16755	Center Wa	Guernevil	38.4966	-123.0291	1 Story, without Basement	1144	53.4	57.7	1/29/1999	$ 196,768.00	$ 51,256.49	Russian River	52.93	-0.5	$ 9,385.83	$ 4,223.63	$ -	$ 3,307.73	$ 16,917.19	0.33
144	16775	Center Wa	Guernevil	38.49648	-123.00304	1 Story, without Basement	930	48	57.4	2/23/2001	$ 159,960.00	$ 72,121.18	Russian River	52.79	4.8	$ 47,652.08	$ 21,443.44	$ 11,286.34	$ 11,778.50	$ 92,160.37	1.28
145	16794	Center Wa	Guernevil	38.49598	-123.0033	1 or 2 Story, with Basement	1338	47.8	56.8	5/17/2002	$ 460,272.00	$ 117,439.73	Russian River	52.62	4.8	$ 147,747.31	$ 66,486.29	$ 28,111.66	$ 12,560.58	$ 254,905.84	2.17
146	16811	Center Wa	Guernevil	38.49574	-123.00337	1 Story, without Basement	864	47	56.9	1/22/1999	$ 148,608.00	$ 81,389.55	Russian River	52.64	5.6	$ 54,093.31	$ 24,341.99	$ 13,619.99	$ 14,016.38	$ 106,071.68	1.30
147	16847	Center Wa	Guernevil	38.49523	-123.00364	1 Story, without Basement	760	51.7	56.2	6/28/2002	$ 130,720.00	$ 67,770.21	Russian River	52.57	0.9	$ 17,451.12	$ 7,853.00	$ 3,189.09	$ 6,212.58	$ 34,705.79	0.51
148	17314	Riverside	Guernevil	38.49372	-123.00972	1 or 2 Story, with Basement	700	47.5	56.4	10/1/2002	$ 240,800.00	$ 61,843.37	Russian River	50.91	3.4	$ 60,320.40	$ 27,144.18	$ 12,201.12	$ 10,173.73	$ 109,839.43	1.78
149	17325	Riverside	Guernevil	38.49373	-123.01006	1 Story, without Basement	603	51.5	56.1	9/21/2004	$ 103,716.00	$ 65,587.16	Russian River	51.01	-0.5	$ 4,760.56	$ 2,142.25	$ -	$ 3,246.79	$ 10,149.61	0.15
150	17336	Riverside	Guernevil	38.49363	-123.00996	1 Story, without Basement	660	51.6	56.1	11/8/2002	$ 113,520.00	$ 80,376.36	Russian River	50.87	-0.7	$ 2,758.54	$ 1,241.34	$ -	$ 2,515.50	$ 6,515.38	0.08

Table G.1 Part 6 of 7

Summary of Losses Avoided and ROI Calculations for January 2006 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	JAN 06 EVENT FLOOD ELEVATION	MP_A FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
151	17351	HWY 116	Guernevil	38.49438	-123.00961	1 Story, without Basement	838	51.1	57.1	6/30/1998	$ 144,136.00	$ 51,014.90	Russian River	51.09	0.0	$ 12,842.52	$ 5,779.13	$ -	$ 4,709.37	$ 23,331.02	0.46
152	17355	HWY 116	Guernevil	38.49421	-123.00988	1 Story, without Basement	729	48.9	56.4	7/17/1998	$ 125,388.00	$ 49,630.52	Russian River	51.15	2.3	$ 29,152.71	$ 13,118.72	$ 7,095.95	$ 9,564.32	$ 58,931.70	1.19
153	17385	HWY 116 (	Guernevil	38.49397	-123.01058	1 Story, without Basement	1442	49.5	56.9	8/18/2000	$ 363,608.00	$ 71,165.34	Russian River	50.78	1.3	$ 59,049.94	$ 26,572.47	$ 9,209.52	$ 7,191.01	$ 102,022.95	1.43
154	17388	Riverside	Guernevil	38.49368	-123.01049	1 Story, without Basement	1045	49.7	56.3	6/8/2001	$ 179,740.00	$ 63,296.03	Russian River	50.94	1.2	$ 28,614.61	$ 12,876.57	$ 5,319.40	$ 7,082.68	$ 53,893.26	0.85
155	17429	River Ln	Guernevil	38.48988	-123.01326	1 Story, without Basement	885	50.2	57.5	12/3/1999	$ 152,220.00	$ 68,496.40	Russian River	49.45	-0.8	$ 3,424.95	$ 1,541.23	$ -	$ 2,454.56	$ 7,420.74	0.11
156	17443	Riverside	Guernevil	38.49321	-123.01158	1 or 2 Story, with Basement	1866	50.2	56.4	11/1/2002	$ 532,856.00	$ 99,605.62	Russian River	50.62	0.4	$ 67,566.14	$ 30,404.76	$ 8,316.10	$ 5,985.74	$ 112,272.75	1.13
157	17456	Orchard A	Guernevil	38.5056	-122.9964	1 Story, without Basement	894	52.6	60	6/19/2003	$ 153,768.00	$ 67,447.40	Russian River	49.64	-3.0	$ -	$ -	$ -	$ -	$ -	0.00
158	17460	River Ln	Guernevil	38.49009	-123.01334	1 Story, without Basement	888	51	54.3	12/28/2001	$ 152,736.00	$ 59,122.98	Russian River	49.50	-1.5	$ -	$ -	$ -	$ -	$ -	0.00
159	17461	Riverside	Guernevil	38.49302	-123.01204	1 Story, without Basement	1313	46.3	56.1	6/9/2000	$ 225,836.00	$ 103,286.79	Russian River	50.55	4.3	$ 66,057.03	$ 29,725.66	$ 14,116.18	$ 11,595.68	$ 121,494.56	1.18
160	17485	Riverside	Guernevil	38.49283	-123.01257	2 Story, without Basement	1744	40.4	56.2	3/17/2000	$ 299,968.00	$ 106,455.89	Russian River	50.43	10.0	$ 113,987.84	$ 51,294.53	$ 20,363.77	$ 14,558.08	$ 200,204.21	1.88
161	17549	Orchard A	Guernevil	38.48898	-123.01251	1 Story, without Basement	936	51.7	59.1	2/19/1999	$ 160,992.00	$ 57,556.14	Russian River	49.21	-2.5	$ -	$ -	$ -	$ -	$ -	0.00
162	17570	Orchard A	Guernevil	38.48869	-123.01241	1 Story, without Basement	951	50.9	55.7	1/12/2001	$ 163,572.00	$ 66,260.73	Russian River	49.15	-1.8	$ -	$ -	$ -	$ -	$ -	0.00
163	17670	Neeley Rd	Guernevil	38.48727	-123.01067	1 Story, without Basement	1683	49.8	55.6	2/25/2000	$ 289,476.00	$ 89,061.84	Russian River	48.79	-1.0	$ -	$ -	$ -	$ -	$ -	0.00
164	17711	GreenTree	Guernevil	38.48649	-123.01075	1 Story, without Basement	768	51.1	56.4	5/12/2000	$ 132,096.00	$ 60,507.55	Russian River	48.61	-2.5	$ -	$ -	$ -	$ -	$ -	0.00
165	17765	GreenTree	Guernevil	38.48577	-123.01004	1 Story, without Basement	560	43.9	53.3	6/23/2000	$ 96,320.00	$ 75,827.66	Russian River	48.34	4.4	$ 28,356.61	$ 12,760.47	$ 8,128.58	$ 11,660.01	$ 60,905.67	0.80
166	17775	Orchard A	Guernevil	38.4853	-123.01025	1 Story, without Basement	834	49.5	57	12/3/1999	$ 143,448.00	$ 59,068.38	Russian River	48.33	-1.2	$ -	$ -	$ -	$ -	$ -	0.00
167	17777	Orchard A	Guernevil	38.48521	-123.01011	1 Story, without Basement	944	48.3	56.1	10/15/1999	$ 162,368.00	$ 61,294.50	Russian River	48.29	0.0	$ 14,466.99	$ 6,510.14	$ -	$ 4,709.37	$ 25,686.50	0.42
168	17786	Orchard A	Guernevil	38.48512	-123.01002	1 Story, without Basement	1344	46.7	57.7	8/13/1999	$ 231,168.00	$ 61,162.09	Russian River	48.29	1.6	$ 43,274.65	$ 19,473.59	$ 8,017.38	$ 8,030.64	$ 78,796.27	1.29
169	17837	Orchard A	Guernevil	38.48459	-123.00937	1 Story, without Basement	1169	48.2	54	2/10/2003	$ 201,068.00	$ 79,015.36	Russian River	48.02	-0.2	$ 14,838.82	$ 6,677.47	$ -	$ 4,191.37	$ 25,707.66	0.33
170	18063	Elm Ave	Monte Rio	38.47129	-123.00225	1 Story, without Basement	624	43	47.6	6/18/1999	$ 107,328.00	$ 52,047.93	Russian River	42.23	-0.8	$ 2,221.69	$ 999.76	$ -	$ 2,393.62	$ 5,615.07	0.11
171	18105	HWY 116	Guernevil	38.48509	-123.01335	1 Story, without Basement	264	50.1	51.6	12/8/2004	$ 45,408.00	$ 78,945.72	Russian River	48.45	-1.7	$ -	$ -	$ -	$ -	$ -	0.00
172	19720	Redwood D	Monte Rio	38.47541	-122.99894	1 Story, without Basement	360	42.5	48.2	7/10/1998	$ 61,920.00	$ 45,950.36	Russian River	42.94	0.4	$ 6,935.04	$ 3,120.77	$ 1,383.51	$ 5,484.67	$ 16,923.99	0.37
173	19738	Crescent	Monte Rio	38.4755	-122.99913	1 Story, without Basement	936	44.5	48.5	3/17/2000	$ 160,992.00	$ 48,222.91	Russian River	42.94	-1.6	$ -	$ -	$ -	$ -	$ -	0.00
174	19821	Crescent	Monte Rio	38.47559	-123.00039	2 Story, without Basement	1317	45.6	48.2	4/20/2004	$ 226,524.00	$ 84,733.19	Russian River	42.82	-2.8	$ -	$ -	$ -	$ -	$ -	0.00
175	20021	Beech Ave	Monte Rio	38.47004	-123.01294	1 Story, without Basement	780	40.1	47.1	11/26/2002	$ 134,160.00	$ 61,269.62	Russian River	39.85	-0.3	$ 9,055.80	$ 4,075.11	$ -	$ 3,978.08	$ 17,108.99	0.28
176	20030	El Rancho	Monte Rio	38.47041	-123.01345	1 Story, without Basement	1154	42	48.7	6/27/2005	$ 198,488.00	$ 83,705.47	Russian River	39.75	-2.3	$ -	$ -	$ -	$ -	$ -	0.00
177	20201	Willow Rd	Monte Rio	38.47251	-123.00133	1 Story, without Basement	877	40.9	47.4	8/27/1999	$ 150,844.00	$ 83,348.20	Russian River	42.43	1.5	$ 27,513.95	$ 12,381.28	$ 5,771.99	$ 7,868.13	$ 53,535.34	0.64
178	20217	Alder Rd	Monte Rio	38.47245	-123.00183	1 Story, without Basement	800	42.1	50.2	12/11/1998	$ 137,600.00	$ 88,778.35	Russian River	42.38	0.3	$ 14,310.40	$ 6,439.68	$ 1,395.78	$ 5,213.82	$ 27,359.68	0.31
179	20219	Alder Rd	Monte Rio	38.47227	-123.00205	1 Story, without Basement	1162	43.3	49.7	12/10/1999	$ 199,864.00	$ 88,091.34	Russian River	42.36	-0.9	$ 1,079.27	$ 485.67	$ -	$ 1,875.62	$ 3,440.56	0.04
180	20225	Willow Rd	Monte Rio	38.47193	-123.00161	1 Story, without Basement	1014	44.4	48.3	10/9/1998	$ 174,408.00	$ 60,041.98	Russian River	42.35	-2.1	$ -	$ -	$ -	$ -	$ -	0.00

Table G.1 Part 7 of 7

Summary of Losses Avoided and ROI Calculations for January 2006 Event

STRUCTURE NUMBER	STREET NUMBER	STREET NAME	CITY	LATITUDE	LONGITUDE	BUILDING TYPE	LIVING SPACE SQ FT	FFE PRE-PROJECT	FFE POST-PROJECT	ELEVATION COMPLETION DATE	BRV BASED ON 2007 CONTRATOR ESTIMATES	2007 INFLATED COST TO ELEVATE STRUCTURE	FLOODING SOURCE	JAN 06 EVENT FLOOD ELEVATION	MP$_a$ FLOOD DEPTH	BUILDING LOSSES	CONTENTS LOSSES	DISPLACEMENT COSTS	DISRUPTION COSTS	TOTAL LOSSES AVOIDED	ROI
181	20226	Willow Rd	Monte Rio	38.47193	-123.00161	1 Story, without Basement	816	41.4	47.6	8/21/1998	$ 140,352.00	$ 51,014.90	Russian River	42.34	0.9	$ 19,228.22	$ 8,652.70	$ 3,547.97	$ 6,331.07	$ 37,759.96	0.74
182	20240	Willow Rd	Monte Rio	38.47166	-123.00166	1 Story, without Basement	864	37.4	48.7	7/1/2005	$ 148,608.00	$ 95,543.05	Russian River	42.28	4.9	$ 44,404.07	$ 19,981.83	$ 10,782.77	$ 11,808.97	$ 86,977.64	0.91
183	20251	Willow Rd	Monte Rio	38.47128	-123.00185	1 Story, without Basement	690	40.55	47.7	10/27/2004	$ 118,680.00	$ 70,571.73	Russian River	42.23	1.7	$ 23,071.39	$ 10,382.13	$ 5,437.98	$ 8,274.41	$ 47,165.91	0.67
184	20274	Alder Rd	Monte Rio	38.47058	-123.00302	1 Story, without Basement	516	40.8	47.6	11/6/2003	$ 88,752.00	$ 57,044.87	Russian River	42.03	1.2	$ 14,058.32	$ 6,326.24	$ 3,507.32	$ 7,055.59	$ 30,947.47	0.54
185	20290	Willow Rd	Monte Rio	38.46963	-123.00262	1 Story, without Basement	1010	35.1	47.8	11/5/2005	$ 173,720.00	$ 97,958.08	Russian River	41.89	6.8	$ 73,605.16	$ 33,122.32	$ 18,060.10	$ 16,037.59	$ 140,825.17	1.44
186	20295	Alder Rd	Monte Rio	38.46974	-123.00342	1 Story, without Basement	701	38	47.5	12/8/2000	$ 120,572.00	$ 68,272.38	Russian River	41.87	3.9	$ 34,652.39	$ 15,593.58	$ 9,006.08	$ 11,423.01	$ 70,675.06	1.04
187	20309	River Blv	Monte Rio	38.47121	-123.00371	1 Story, without Basement	1100	39.5	48	7/2/1999	$ 189,200.00	$ 68,487.69	Russian River	42.10	2.6	$ 47,300.00	$ 21,285.00	$ 10,205.00	$ 10,156.80	$ 88,946.80	1.30
188	20357	HWY 116	Monte Rio	38.46845	-123.00808	1 Story, without Basement	1056	41.2	46.9	1/9/1999	$ 181,632.00	$ 56,129.37	Russian River	41.67	0.5	$ 20,615.23	$ 9,276.85	$ 2,329.37	$ 5,535.46	$ 37,756.91	0.67
189	20387	River Blv	Monte Rio	38.47021	-123.00403	1 Story, without Basement	775	43.5	49.5	7/27/2001	$ 13,175.00	$ 81,563.33	Russian River	41.94	-1.6	$ -	$ -	$ -	$ -	$ -	0.00
190	20399	River Blv	Monte Rio	38.47006	-123.0041	1 Story, without Basement	852	40.5	48.2	9/18/1998	$ 146,544.00	$ 42,575.43	Russian River	41.91	1.4	$ 25,322.80	$ 11,395.26	$ 5,253.55	$ 7,543.12	$ 49,514.73	1.16
191	20503	River Blv	Monte Rio	38.46926	-123.00457	2 Story, without Basement	1008	43.4	47.6	12/8/2000	$ 173,376.00	$ 67,066.98	Russian River	41.72	-1.7	$ -	$ -	$ -	$ -	$ -	0.00
192	20550	Alder Rd	Monte Rio	38.46901	-123.0039	1 Story, without Basement	752	38.6	47.7	9/10/1999	$ 129,344.00	$ 69,323.91	Russian River	41.64	3.0	$ 35,026.36	$ 15,761.86	$ 8,749.35	$ 10,861.00	$ 70,398.57	1.02
193	20790	Kingston	Monte Rio	38.46776	-123.00485	2 Story, without Basement	700	46.7	47.5	10/22/1999	$ 120,400.00	$ 53,633.38	Russian River	41.65	-5.1	$ -	$ -	$ -	$ -	$ -	0.00
194	20801	River Blv	Monte Rio	38.46781	-123.00557	1 or 2 Story, with Basement	780	42.5	57.4	3/4/2002	$ 264,880.00	$ 105,678.49	Russian River	41.66	-0.8	$ 22,461.82	$ 10,107.82	$ 1,010.19	$ 4,563.79	$ 38,143.63	0.36
195	20813	River Blv	Monte Rio	38.46762	-123.00582	2 Story, without Basement	1500	34.8	47.5	10/2/1998	$ 258,000.00	$ 71,247.45	Russian River	41.66	6.9	$ 66,357.60	$ 29,860.92	$ 13,298.28	$ 10,400.56	$ 119,917.36	1.68
196	21081	River Blv	Monte Rio	38.46545	-123.00781	1 Story, without Basement	1184	40.4	46.9	3/9/2001	$ 203,648.00	$ 72,345.65	Russian River	41.69	1.3	$ 33,235.35	$ 14,955.91	$ 6,007.73	$ 7,218.10	$ 61,417.09	0.85
197	21225	Petray Ln	Monte Rio	38.7172	-122.8865	2 Story, without Basement	840	209.1	212.4	12/11/2002	$ 144,480.00	$ 58,730.59			-209.1						
198	21330	Monte Cri	Monte Rio	38.4752	-123.019	1 Story, without Basement	760	35.7	42.2	5/26/2000	$ 130,720.00	$ 54,088.22	Russian River	40.03	4.3	$ 38,340.18	$ 17,253.08	$ 9,704.92	$ 11,622.76	$ 76,920.94	1.42
199	21340	Monte Cri	Monte Rio	38.47546	-123.01919	1 Story, without Basement	768	36.03	42.1	10/2/1998	$ 132,096.00	$ 60,625.23	Russian River	40.64	4.6	$ 39,113.63	$ 17,601.13	$ 9,881.87	$ 11,717.56	$ 78,314.19	1.29
200	21608	Moscow Rd	Monte Rio	38.46794	-123.01399	1 Story, without Basement	750	38.3	45.7	12/17/1999	$ 129,000.00	$ 61,251.18	Russian River	40.33	2.0	$ 28,573.50	$ 12,858.08	$ 6,785.80	$ 9,191.90	$ 57,409.28	0.94
201	21610	Moscow Rd	Monte Rio	38.46799	-123.0141	1 Story, without Basement	750	38.3	45.7	12/17/1999	$ 129,000.00	$ 64,540.31	Russian River	40.33	2.0	$ 28,573.50	$ 12,858.08	$ 6,785.80	$ 9,191.90	$ 57,409.28	0.89
202	21616	Moscow Rd	Monte Rio	38.46817	-123.01437	1 Story, without Basement	1739	40.8	47	10/12/2001	$ 299,108.00	$ 105,774.07	Russian River	40.12	-0.7	$ 8,614.31	$ 3,876.44	$ -	$ 2,667.85	$ 15,158.60	0.14
203	25832	Freezeout	Monte Rio	38.44569	-123.05726	1 Story, without Basement	354	23.2	31.5	8/7/2003	$ 60,888.00	$ 56,869.76	Russian River	22.59	-0.6	$ 2,137.17	$ 961.73	$ -	$ 2,881.15	$ 5,980.04	0.11
204	25832	Freezeout	Monte Rio	38.44569	-123.05726	1 Story, without Basement	1152	25.3	34.8	8/20/2004	$ 198,144.00	$ 125,093.85	Russian River	22.59	-2.7	$ -	$ -	$ -	$ -	$ -	0.00
205	26709	Freezeout	Monte Rio	38.44266	-123.06462	1 Story, without Basement	656	24.7	27.9	5/11/2004	$ 112,832.00	$ 75,780.97	Russian River	21.34	-3.4	$ -	$ -	$ -	$ -	$ -	0.00
																$ 5,204,284.19	$ 2,313,745.07	$ 977,638.57	$ 1,205,297.30	$ 9,700,965.13	

20 Finished Basements - used damage curve "with basement", although FFE should be measured at basement floor and curve adjusted to account for the elevation at which water enters the building. The "with basement" option provides more conservative values

5 Unknown if basement exists - to be more conservative, a "without basement" damage curve was used

9 structures eliminated from the analysis due to screening process

Structures not included in the loss calculations for the event because the construction to elevate the structure was not completed before the date of the event

Acronyms

APN
Assessor Parcel Number

BCA
Benefit-Cost Analysis

BRV
Building Replacement Value

CADD
Computer-Assisted Drafting and Design

CFS
Cubic feet per second

DEM
Digital Elevation Model

DFIRM
Digital Flood Insurance Rate Map

EMI
Emergency Management Institute

ESRI
Environmental Services Research Institute

EOC
Emergency Operation Center

FEMA
Federal Emergency Management Agency

FFE
First Floor Elevation

FIRM
Flood Insurance Rate Map

FIS
Flood Insurance Study

FMA
Flood Mitigation Assistance Program

GIS
Geographic Information System

GPS
Global Positioning System

HAZUS-MH
Hazards U.S. – Multihazard

HEC-RAS
Hydrologic Engineering Center – River Analysis System

HEC-SSP
Hydrologic Engineering Center – Statistical Software Package

HMGP
Hazard Mitigation Grant Program

IFSAR
Interferometric Synthetic Aperture Radar

LA
Losses Avoided

LIDAR
Light Detection and Ranging (system)

LOMC
Letter of Map Change

MP_A
Mitigation Project Absent

MP_C
Mitigation Project Complete

NCDC
National Climatic Data Center

NFIP
National Flood Insurance Program

NOAA
National Oceanic and Atmospheric Administration

NWS
National Weather Service

OES
(California) Governor's Office of Emergency Services

PA
Public Assistance Program

PDM
Pre-Disaster Mitigation Program

PI
Project Investment

PW
Project Worksheet

RFC
Repetitive Flood Claims Program

ROI
Return on Investment

SCFEP
Sonoma County Flood Elevation Program

SRL
Severe Repetitive Loss Program

TIN
Triangular Irregular Network

USACE
U.S. Army Corps of Engineers

USFS
U.S. Forest Service

USGS
U.S. Geological Survey

WY

Water Year

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