Multi-Hazard Mitigation Plan
Appendix A

Acronyms and Abbreviations Used in this Plan

AMEC	AMEC Earth & Environmental
ARES	Amateur Radio Emergency Services
BLM	Bureau of Land Management
BMPs	Best Management Practices
BOR	Bureau of Reclamation
CA-DWR	California Department of Water Resources
Caltrans	California Department of Transportation
CA-OES	California Office of Emergency Services
CCR	California Code of Regulations
CDBG	Community Development Block Grants
CDF	California Department of Forestry
CEQA	California Environmental Quality Act
CERES	California Environmental Resources Evaluation System
CERT	Citizen Emergency Response Team
CFS	Cubic Foot per Second
CGS	California Geological Survey
CRCV	Coast Range Central Valley
CRS	Community Rating System
CWA	Clean Water Act
DHS	Department of Homeland Security

DMA	Disaster Mitigation Act
EIR	Environmental Impact Report
FEMA	Federal Emergency Management Agency (technically the Emergency Preparedness and Response (EP&R) within the Department of Homeland Security [DHS])
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance
FTP	File Transfer Protocol
FWS	Fish and Wildlife Service
GIS	Geographical Information System
HAZUS	FEMA's Loss Estimation Software Program
HI	Heat Index
HMGP	Hazard Mitigation Grant Program
HMPC	Hazard Mitigation Planning Committee
HUD	Housing and Urban Development
ISO	Insurance Services Office
Km	Kilometer
LHMP	Local Hazard Mitigation Plan
LOMA	Letter of Map Amendment
LOMC	Letter of Map Change
LOMR	Letter of Map Revision
MCE	Maximum Credible Earthquake
MMI	Modified Mercalli Intensity scale

MPE	Maximum Probable Earthquake
NCDC	National Climatic Data Center
NEPA	National Environmental Quality Act
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
OES	Office of Emergency Services
PDM	Pre-Disaster Mitigation (Grant Program)
PG&E	Pacific Gas & Electric
PHGA	Peak Horizontal Ground Acceleration
POR	Period of Record
RL	Repetitive Loss
SEMS	State Emergency Management System
SUP	Special Use Permit
UBC	Uniform Building Code
URM	Unreinforced Masonry (e.g., brick buildings, most prone to earthquake damage)
USACE	United Sates Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WUI	Wildland Urban Interface
WNV	West Nile Virus

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Multi-Hazard Mitigation Plan
Appendix B

Data Collection Guide

MULTI-HAZARD MITIGATION PLAN
DATA COLLECTION GUIDE

For

YUBA-SUTTER
HAZARD MITIGATION PLANNING COMMITTEE (HMPC)

Prepared by

AMEC Earth and Environmental, Inc.

July, 2006

OVERVIEW

The contents of this workbook have been designed to assist the Yuba-Sutter Planning Area, including all participating jurisdictions, (collectively referred to as Yuba-Sutter) in collecting necessary background information to support the hazard mitigation planning process pursuant to the Federal Disaster Mitigation Act (DMA) of 2000. This includes a hazard identification and vulnerability assessment, an assessment of Yuba-Sutter's current hazard mitigation capabilities, and an identification of potential mitigation projects that, if undertaken, could prevent or reduce future losses.

The essential information needed to support the planning process includes background information about Yuba-Sutter; plans, technical studies, and data related to hazards and risks; current governing codes, ordinances, regulations, and procedures whose intent is to minimize future losses; and some indication of Yuba-Sutter's technical and organizational capabilities to perform hazard mitigation/loss prevention functions. It is important that the plan shows what Yuba-Sutter is doing now to limit future disaster losses.

The planning process is heavily dependent on existing data to be supplied by each of the participants represented on the Hazard Mitigation Planning Committee (HMPC). The DMA plan development process does not require the development of new data, but requires *existing data only*.

The information collected provides the basis for the action plan that contains goals for the future; identifies mitigation issues and actions that are important to each participant; and assigns priorities and responsibilities for their adoption and implementation. The goal of this process is to produce a hazard mitigation plan that meets Yuba-Sutter's needs, as well as the requirements of DMA 2000 and that contains a list of projects that may be eligible for streamlined federal mitigation funding pre or post disaster.

PARTICIPATION

The DMA planning regulations and guidance stress that each entity seeking the required FEMA approval of their mitigation plan must:

- Participate in the process;
- Detail areas within the planning area where the risk differs from that facing the entire area;
- Identify specific projects to be eligible for funding; and
- Have the governing board formally adopt the plan.

For HMPC members, 'participation' means the planning committee representatives will:

- Attend and participate in HMPC meetings;
- Provide available data that is requested of the HMPC coordinator;
- Review and provide/coordinate comments on the draft plans;
- Advertise, coordinate and participate in the public input process; and
- Coordinate the formal adoption of the plan by the governing board.

DATA COLLECTION GUIDE

This guide contains an explanation of the types of hazard mitigation/loss prevention data that is needed for the hazard mitigation planning process. This guide identifies specific requirements for the Risk Assessment Process, which includes the Hazard Identification, Vulnerability, and Capability Assessments and requirements for development of the Mitigation Strategy

AMEC has learned some valuable lessons about how to make the data collection process well organized and effective. Some ways of organizing the data collection process include: (1) the "circuit riding" HMPC member who contacts everyone individually in his/her jurisdiction or area of expertise and assembles the information; (2) the committee approach wherein a "mini-HMPC" is formed within the jurisdiction to collectively compile the needed data; and (3) a "network" based on existing relationships is used to funnel data to the HMPC representative (seems especially useful for widely dispersed types of organizations that have common functions, such as school districts and fire districts). Regardless, it is important to contact and involve those persons whose responsibilities include activities for avoiding future losses.

Some lessons about effective data collection include: (1) being inclusive; that is, collecting all of the potentially useful information one time so time-consuming follow-up work is minimized, (2) following this guidance carefully, and (3) asking questions of the consultants before great effort is expended.

The worksheets at the end of this guide have been developed to assist with the data collection. These need to be completed by each participating entity and will serve two purposes:

1) they will help facilitate the collection of the necessary information, and
2) they will function as evidence of "participation" in the planning process.

The Risk Assessment Process

The risk assessment process includes three components: 1) Hazard Identification, 2) Vulnerability Assessment, and 3) Capability Assessment. Data needs for each of the plan components are described in the following pages.

Hazard Identification Data for the following hazards:

- Avalanche
- Dam failure
- Drought
- Earthquakes
- Floods
- Landslides
- Natural health hazards

    - West Nile Virus
    - Rabies
    - Other?
- Severe weather
    - Dust storms
    - Extreme temperatures
    - Fog
    - Hailstorm
    - Heavy rains/storms
    - Lightning
    - Tornadoes
    - Windstorm
    - Winter Storms
- Soil Hazards
    - Land subsidence
    - Expansive soils
    - Erosion
    - Soil liquefaction
- Volcanoes
- Wildfires

Specifically, we need the following types of data to construct a good historical summary of each hazard as it impacts Yuba-Sutter:

- What type of hazard event?
- Brief description of the nature and magnitude of the event
- Where did the event occur?
    - County, City, area/facilities affected, physical location/boundaries on map
- When did it occur – date?
- Type of damage?
    - Personal injury/death
    - Damage to infrastructure/personal property
    - Damage to crops
    - Lost business or work
    - Road/School/other closures
- Approximate dollar amount of damage?
- Percentage of costs covered by insurance? Other?
- Opinion as to whether this is likely to occur again, either in the planning area in general and/or in the location of the previous occurrence.
- Dollars received from federal/state disaster declarations in each community

A summary Hazard Identification Worksheet (**Worksheet 1**) and Historic Hazard Event Data Collection Sheet (**Worksheet 2**) are included at the end of this workbook to help collect this information. It is also very useful to provide backup data that supports the information provided in the worksheets. Types of backup data include news articles and reports, interagency memos, and copies of pertinent information from technical reports, plans and studies.

Vulnerability Data

For each identified hazard, we need to determine the vulnerability of Yuba-Sutter as follows:

- Do any of the hazards occur repeatedly in a given area or areas to create a hazard map? Provide existing hazard map or identify hazard risk areas on a base map.
- Inventorying each mapped risk area (hazard by hazard, where different):
    - Total Values at Risk (i.e., types, numbers, and value of improvements)
    - Building Counts, by type of use, occupancy, construction
    - Estimated Values of those structures
    - Past Loss Data, as an indication of potential future losses
    - Insurance Data – coverage, claims paid, and repetitive losses
    - Identification of critical facilities at risk and provide estimated values (See list below)
    - Identification of natural resources at risk- wetlands, threatened & endangered species, others
    - Identification of cultural resources at risk – state & federal listed historic sites
    - Identification of impact to the community
    - Describe development trends within risk area
- Identify the above items for risk areas that can't be specifically mapped (likely a total listing of all above items on a community by community basis)
- County Abstract of assessed valuations or insured values
- Flood risk areas and floodplain inventory on a community by community basis (# of buildings and # of Repetitive Losses)
- National Flood Insurance Program (NFIP) insurance data (# of policies, number/date/dollars of claims paid)
- Average depth of 100-year floodplain in communities

A critical facility is often defined as one that is essential in providing utility or direction either: 1) during the response to an emergency; or 2) during the recovery operation. Some critical facilities are likely located in identified risk areas of the County and communities, potentially rendering them inoperable in an emergency. Critical facilities can also include those facilities that may require additional attention during an emergency such as daycares and nursing homes. Examples of critical facilities include:

- Main County Office Building/Municipal Buildings
- Water pumping and disinfection stations
- Airports
- Wellheads and water towers and tanks
- Power Substations
- Sewage Lift Stations
- Aboveground pipeline (gas) facilities
- Police Stations
- Fire Stations
- Emergency Operations Center(s)
- Key Access Roads
- Hospitals
- Schools
- Shelters
- Day Cares
- Nursing Homes

A Vulnerability Worksheet (**Worksheet 3**) is included at the end of this workbook.

Capability Data

This section describes the type of required information for documenting Yuba-Sutter's existing capabilities for reducing future disaster losses. A matrix (**Worksheet 4**), included at the end of this workbook, can be used as a checklist for collecting this information.

Capabilities are methods that the participating jurisdiction currently uses to reduce hazard impacts. A capability matrix is provided to help identify the usual methods that communities follow to mitigate hazards. Please err on the side of generosity so the planning team has the most complete relevant information available to it to support the planning process. Please complete the matrix and *provide supporting documentation* regarding:

- ID and provide other programs/projects underway for hazard mitigation
- ID and provide other community plans and goals
- ID and provide existing policy/program guidance
  - General Plan/safety elements/natural environment elements
  - Zoning/Flood Plain Management Ordinances
  - Building Codes (Seismic, Wildfire, BCEGS rating?)
  - Existing Emergency Management (i.e., Warning, Evacuation, EOC, LEPC, Utilities Response Plan)
- Other existing capabilities that mitigate the risk and vulnerability of a community to a given hazard?
- Listing of GIS Data available for each community: Floodplain maps, Floodplain Building/parcel inventory, Building type? Critical facility inventory [Police, Fire, Power, Water, Sewer, Drainage pumps], repetitive loss *areas*, completed/underway mitigation project areas (elevation/acquisition), land use, building types (URM, manufactured housing parks), soils map, vegetation types, natural/cultural resource areas, dam-failure inundation maps, levee failure inundation maps, existing hazard maps)
- Response and evacuation plans for Dams

The Mitigation Strategy

One of the planning process' last activities will be for HMPC members to prepare brief descriptions of proposed mitigation projects that would effectively reduce future disaster losses. It is very important that potential projects start being identified very early so the information needed to describe them and to assign priorities is developed during the entire process, leaving only "final tinkering" for the final phase of work.

This section provides guidance on the categories of mitigation measures to be considered and a mitigation project outline with two example projects. Two Mitigation Worksheets (**Worksheets 5 and 6**) are included at the end of this workbook. **Worksheet 5** provides a form for brainstorming potential projects to address identified issues. **Worksheet 6**

provides the format for writing up potential projects to be included in the mitigation strategy.

Categories of Mitigation Measures

PREVENTION: Preventive measures are designed to keep the problem from occurring or getting worse. Their objective is to ensure that future development is not exposed to damage and does not increase damage to other properties.

- ***Planning***
- ***Zoning***
- ***Open Space Preservation***
- ***Land Development Regulations***
  - ***Subdivision regulations***
  - ***Building Codes***
    - ***Fire-Wise Construction***
  - ***Floodplain development regulations***
  - ***Geologic Hazard Areas development regulations (for roads too!)***
- ***Storm Water Management***
- ***Fuels Management, Fire-Breaks***

EMERGENCY SERVICES measures protect people during and after a disaster. A good emergency services program addresses all hazards. Measures include:

- ***Warning*** (flooding, tornadoes, winter storms, geologic hazards, fire)
  - NOAA Weather Radio
  - Sirens
  - "Reverse 911" (Emergency Notification System)
- ***Emergency Response***
  - ***Evacuation & Sheltering***
  - ***Communications***
  - ***Emergency Planning***
    - Activating the EOC (emergency management)
    - Closing streets or bridges (police or public works)
    - Shutting off power to threatened areas (utility company)
    - Holding/releasing children at school (school district)
    - Passing out sand and sandbags (public works)
    - Ordering an evacuation (mayor)
    - Opening emergency shelters (Red Cross)
    - Monitoring water levels (engineering)
    - Security and other protection measures (police)
- ***Critical Facilities Protection (Buildings or locations vital to the response and recovery effort, such as police/fire stations, hospitals, sewage treatment plants/lift stations, power substations)***
  - Buildings or locations that, if damaged, would create secondary disasters, such as hazardous materials facilities and nursing homes
  - Lifeline Utilities Protection
- ***Post-Disaster Mitigation***

- Building Inspections
- ID mitigation opportunities & funding before reconstruction

PROPERTY PROTECTION: Property protection measures are used to modify buildings subject to damage rather than to keep the hazard away. A community may find these to be inexpensive measures because often they are implemented by or cost-shared with property owners. Many of the measures do not affect the appearance or use of a building, which makes them particularly appropriate for historical sites and landmarks.

- ***Retrofitting/disaster proofing***
  - ***Floods***
    - Wet/Dry floodproofing (barriers, shields, backflow valves)
    - Relocation/Elevation
    - Acquisition
    - Retrofitting
  - ***High Winds/Tornadoes***
    - Safe Rooms
    - Securing roofs and foundations with fasteners and tie-downs
    - Strengthening garage doors and other large openings
  - ***Winter Storms***
    - Immediate snow/ice removal from roofs, tree limbs
    - "Living" snow fences
  - ***Geologic Hazards (Landslides, earthquakes, sinkholes)***
    - Anchoring, bracing, shear walls
    - Dewatering sites, agricultural practices
    - Catch basins
  - ***Drought***
    - Improve water supply (transport/storage/conservation)
    - Remove moisture competitive plants (Tamarisk/Salt Cedar)
    - Water Restrictions/Water Saver Sprinklers/Appliances
    - Grazing on CRP lands (no overgrazing-see Noxious Weeds)
    - Create incentives to consolidate/connect water services
    - Recycled wastewater on golf courses
  - ***Wildfire, Grassfires***
    - Replacing building components with fireproof materials
      - Roofing, screening
    - Create "Defensible Space"
    - Installing spark arrestors
    - Fuels Modification
  - ***Noxious Weeds/Insects***
    - Mowing
    - Spraying
    - Replacement planting
    - Stop overgrazing

- Introduce natural predators

- ***Insurance***

NATURAL RESOURCE PROTECTION: Natural resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. In so doing, these activities enable the naturally beneficial functions of floodplains and watersheds to be better realized. These natural and beneficial floodplain functions include the following:

- storage of floodwaters
- absorption of flood energy
- reduction in flood scour
- infiltration that absorbs overland flood flow
- groundwater recharge
- removal/filtering of excess nutrients, pollutants, and sediments from floodwaters
- habitat for flora and fauna
- recreational and aesthetic opportunities

Methods of protecting natural resources include:

- ***Wetlands Protection***
- ***Riparian Area/Habitat Protection/Threatened-Endangered Species***
- ***Erosion & Sediment Control***
- ***Best Management Practices***

  Best management practices ("BMPs") are measures that reduce nonpoint source pollutants that enter the waterways. Nonpoint source pollutants come from non-specific locations. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, and other farm chemicals, animal wastes, oils from street surfaces and industrial areas and sediment from agriculture, construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams. BMPs can be implemented during construction and as part of a project's design to permanently address nonpoint source pollutants. There are three general categories of BMPs:

1. Avoidance: setting construction projects back from the stream.
2. Reduction: Preventing runoff that conveys sediment and other water-borne pollutants, such as planting proper vegetation and conservation tillage.
3. Cleanse: Stopping pollutants after they are en route to a stream, such as using grass drainageways that filter the water and retention and detention basins that let pollutants settle to the bottom before they are drained

- ***Dumping Regulations***
- ***Set-back regulations/buffers***
- ***Fuels Management***

- ***Water Use Restrictions***
- ***Landscape Management***
- ***Weather Modification***

STRUCTURAL PROJECTS have traditionally been used by communities to control flows and water surface elevations. Structural projects keep flood waters away from an area. They are usually designed by engineers and managed or maintained by public works staff. These measures are popular with many because they "stop" flooding problems. However, structural projects have several important shortcomings that need to be kept in mind when considering them for flood hazard mitigation:

- They are expensive, sometimes requiring capital bond issues and/or cost sharing with Federal agencies, such as the U.S. Army Corps of Engineers or the Natural Resources Conservation Service.

- They disturb the land and disrupt natural water flows, often destroying habitats or requiring Environmental Assessments.

- They are built to a certain flood protection level that can be exceeded by a larger flood, causing extensive damage.

- They can create a false sense of security when people protected by a structure believe that no flood can ever reach them.

- They require regular maintenance to ensure that they continue to provide their design protection level.

Structural measures include:

- ***Detention/Retention structures***
- ***Erosion and Sediment Control***
- ***Basins/Low-head Weirs***
- ***Channel Modifications***
- ***Culvert resizing/replacement/Maintenance***
- ***Levees and Floodwalls***
- ***Anchoring, grading, debris basins (for landslides)***
- ***Fencing (for snow, sand, wind)***
- ***Drainage System Maintenance***
- ***Reservoirs(for flood control, water storage, recreation, agriculture)***
- ***Diversions***
- ***Storm Sewers***

PUBLIC INFORMATION: A successful hazard mitigation program involves both the public and private sectors. Public information activities advise property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. These activities can motivate people to take protection

- ***Hazard Maps and Data***
- ***Outreach Projects*** (mailings, media, web, speakers bureau, displays)
- ***Library Resources***
- ***Real Estate Disclosure***
- ***Environmental Education***

Example Project Description

Each project description for each jurisdiction should conform to the following format:

TITLE
Issue/Background
Other Alternatives
Responsible Office
Priority (H,M,L)

Cost Estimate

Benefits
Potential funding
Schedule

This Mitigation Project Description Worksheet (**Worksheet 6**) is included at the end of this workbook to record potential projects during the planning process.

The following are two examples taken from other DMA 2000 qualifying plans.

Sample ACTION #12: ELEVATE REMAINING 95 HOMES IN THE DRY CREEK WATERSHED

Issue/Background: Historically, flooding in the Dry Creek watershed has been a major concern. The February 1986 flood caused widespread damage in most of the Dry Creek watershed. Nearly all bridges and culverts were overtopped, with 30 sustaining embankment damages and one crossing washing out; two bridges over Dry Creek were damaged, street cave-ins occurred at a number of locations, and over 125 homes flooded. Of the 145 homes subject to historical flooding within the Watershed, 95 structures remain non-elevated. Of these 95 remaining homes, 25-30 declined initial grant money for elevation as did the three repetitive loss structures. Placer County is not only concerned with existing flooding problems, but with future problems resulting from increased growth and development in the area. According to the 1992 Dry Creek Watershed, Flood Control Plan, substantial flood damages will occur with the 100-year flood under existing conditions. Areas with the most extensive and frequent damages include areas in the location of the 95 homes. The report indicates that some of these areas are susceptible to flooding from storms as frequent as the 10-year storm. Elevating the remaining 95 homes will reduce future flood-related losses.

Other Alternatives: No Action

Responsible Office: Placer County Flood Control and Water Conservation District, in conjunction with its member agencies including the cities of Rocklin, Loomis, and Roseville.

Priority (H, M, L): Medium

Cost Estimate: The cost to elevate is estimated at $40 per square foot. Homes need to be elevated anywhere from one to six feet. Of the 95 homes where elevating is feasible, it is estimated to cost $6 million or $50 to $60 K per home.

Benefit: Life Safety; Reduction in Property Loss.

Potential Funding: HGMP, PDM, Dry Creek Trust Fund

Schedule: Within three years

Sample ACTION #4: TODD VALLEY SHADED FUEL BREAK

Issue/Background: Saving lives and property along with rapid containment of wildfires and structure fires are a high priority for the Foresthill Fire Protection District (FFPD) and Foresthill Fire Safe Council (FFSC). The Todd Valley Subdivision is a neighborhood of about 1,100 homes located southeast of Foresthill, CA in rural Placer County. Encompassing some 1,500 acres, and 45 miles of roadways, with only two main exits to Foresthill Rd. The southern boundary of the 25-year-old subdivision directly intersects the steep cliffs of the Middle Fork of the American River. Lot sizes are all one acre or more. To the 3,000 people who live there, Todd Valley appears to be an isolated enclave, sheltered by towering oaks and pine trees. Many homes are shielded from neighbor's views by a quarter-century accumulation of dense brush and impenetrable vegetation under story. The calculations for fire travel from the Middle Fork American River to this subdivision in the middle of summer on the right day is 15 minutes.

A Shaded Fuel Break at the top of the ridge of the Middle Fork American River Canyon would give firefighters a place to make a stand and allow an area for the fire to slow and drop to the ground where it can be managed. This would also give Sheriffs and Firefighters a better chance to evacuate the area.

Other Alternatives: If you look at the fire history on the Foresthill Divide its not a question of IF but WHEN will we have a devastating wildfire. To do nothing in the Todd Valley area would leave the residents open to a devastating firestorm. The Placer County Chipper Program has been used very successfully in this area, but is still far from making a significant continuous connected Shaded Fuel Break. Continuous public education is also an alternative.

Responsible Office: Luana R. Dowling: FFSC Chairman

Priority (H, M, L): High

Cost Estimate: Approximately $1,200 per acre. 50/50 match with property owners and a Federal Grant. The Property in the canyon is State Recreation area owned by Bureau of Reclamation (BOR). This recreation area has been the area of several fire starts in the past. It's only a matter of time.

Benefit: Benefit to the 3,000 residents of Todd Valley is their lives as well as their homes. At the current County median value per home of over $400,000 per home, the 1,100 homes in Todd Valley are valued at $440,000,000. Having a strategically planned shaded fuel break will not only save lives, but also assist firefighters in gaining timely access to protect homes.

Potential Funding: Grants, loans and subsidies available for such projects.

Schedule: Completed by the end of 2008

WORKSHEETS

Worksheet 1
Hazard Identification Worksheet

Purpose: Use this worksheet to identify the possible hazards that may impact your jurisdiction. This worksheet will be used to support the hazard identification and risk assessment. Use the Hazard Event worksheet to provide evidence to justify your conclusions.

Hazard	**Frequency of Occurrence**	**Spatial Extent**	**Potential Magnitude**	**Significance**	**Risk Map Avail. Source/scale**	
					GIS	**Hard Copy**
Avalanches						
Dam Failure						
Drought						
Earthquakes						
Floods						
Hail						
Heavy Rains/Lightning						
High Winds						
Landslides						
Natural Health Hazards						
Tornados						
Wildfires						
Winter Storms						

Guidelines

Frequency of Occurrence:
Highly Likely: Near 100% probability in next year.
***Likely*:** Between 10 and 100% probability in next year, or at least one chance in ten years.
***Occasional*:** Between 1 and 10% probability in next year, or at least one chance in next 100 years.
***Unlikely*:** Less than 1% probability in next 100 years.

Potential Magnitude
***Catastrophic*:** More than 50% of area affected
***Critical*:** 25 to 50%
Limited: 10 to 25%
***Negligible*:** Less than 10

Spatial Extent
***Limited*:** Less than 10% of planning area
***Significant*:** 10-50% of planning area
***Extensive*:** 50-100% of planning area

Significance (Your subjective opinion)

Low Medium High

Contact information
Filled out by:
Address:
Phone:

Worksheet 2
Historic Hazard Event Data Collection Sheet

Instructions: Please fill out one sheet for each event with as much detail as possible. Attach supporting documentation, photocopies of newspaper articles or other original sources.

Type of natural hazard event	
Date of Event	
Description of the nature and magnitude of the event	
Location (community or description with map)	
Injuries	
Deaths	
Property damage	
Infrastructure damage	
Crop damage	
Business/Economic Impact	
Road/School/Other Closures	
Other damage	
Total damages	
Insured losses	
Fed/State Disaster relief funding $	
Opinion on likelihood of occurring again	
Source of information	
Comments	

Contact information
Name of jurisdiction:
Filled out by:
Address:
Phone:

Worksheet 3
Vulnerability Assessment

Instructions: Please complete to the extent possible the vulnerable buildings, populations, critical facilities and infrastructure for each hazard that affects your jurisdiction. This information will be used to estimate disaster losses, which can then be used to gauge potential benefits of mitigation measures. Attach supporting documentation, photocopies of engineering reports or other sources.

Jurisdiction:

Hazard type, location and description of potential impact:

Building Inventory

Residential	count	Estimated value
Comments		
Commercial	count	Estimated value
Comments		

Industrial	count	Estimated value
Comments		
Agricultural	count	Estimated value
Comments		

Other (Define, e.g., gov.)	count	Estimated value
Comments		

Critical facilities (List, describe type, number, estimated value/replacement cost):

Infrastructure (roads, bridges, lifelines, utilities, etc. estimated value/ replacement cost):

Affected Population estimate:

Comments (i.e. special needs populations, residents serviced, etc.):

Historic/cultural resources affected:

Natural resources affected:

Other Community Impacts:

Development trends/constraints in hazard area:

Existing or potential mitigation actions:

Source and method of information collection:

Contact information

Filled out by:
Address:
Phone:

Worksheet 4: Capability Matrix

Jurisdiction:	Y/N other	Comments
Comp Plan/General Plan		
Subdivision Ordinance		
Zoning Ordinance		
NFIP/FPM Ordinance		
- Substantial Damage language?		
- Administrator/Certified Floodplain Manager?		
- # of Flood threatened Buildings?		
- # of flood insurance policies		
- # of Repetitive Losses?		
- Maintain Elevation Certificates?		
CRS Rating, if applicable		
Stormwater Program?		
Erosion or Sediment controls		
# of unreinforced masonry buildings		
Hospitals built before 1973 (for HSSA)		
Alquist-Priolo Special Studies Zones Act		
Building Code Version		
Full-time Building Official?		
Conduct "as-built" Inspections?		
BCEGS Rating		
Local Emergency Operations Plan		
Fire Department ISO Rating		
Fire Safe Programs		
Warning Systems/Services		
- Storm Ready Certified?		
- Weather Radio reception?		
- Outdoor Warning Sirens?		
- Emergency Notification (R-911)?		
- Other? (e.g., cable over-ride)		
GIS System?		
- Hazard Data?		
- Building footprints?		
- Links to Assessor data?		
- Land-Use designations?		
Structural Protection Projects		
Property Protection Projects		
Critical Facilities Protected?		
Natural/Cultural Resources Inventory?		
Public Information Program/Outlet		
Environmental Education Program?		

EXPLANATION OF CAPABILITY ASSESSMENT MATRIX

The following definitions are designed to help each HMPC member complete an assessment of his or hers current capabilities. This list is not exhaustive, and the amount of information available locally can vary greatly between jurisdictions.

[Accompanying matrix entries: Y=yes, N=no, ? = uncertain or item unclear.]

Comprehensive, General, or Land Use Plan: Comprehensive (general, land use) long-term community growth management plan; in CA especially need copies of policy section, safety and public facilities elements, and any parts that mention public safety programs, hazards of any kind, and emergency services;

Special Plans: Also need similar information from any related "special plans" for limited areas (e.g., new developments, downtown renewals that might require special codes, wildland fire fuels management plans, etc.).

Subdivision Ordinance: Dictates lot sizes, densities, set-backs, construction type; need copy.

Zoning Ordinance: Dictates type of use and occupancy; implements Land Use Plan; need copy.

NFIP & FPM Ordinances: National Flood Insurance Program (NFIP) and Floodplain Management ordinances (FPM): govern development in identified Flood Hazard Areas, and are required for participation in NFIP and Floodplain Mitigation programs. Do not need floodplain maps, but do need related recent (within last 10 years) documents, special studies, program summaries, etc.

Substantial Damage Language: FPM ordinance language on Substantial Damage/Improvements ("50% rule"); copy needed if yes.

Administrator/Certified Floodplain Manager: Name and contact information needed for Floodplain Management Administrator (someone with the responsibility of enforcing the ordinance and providing ancillary services {e.g., map reading, public education on floods, etc.}, need to know if CFM).

# of flood threatened buildings: Need total number of buildings by community that are in the floodplains.

# of flood insurance policies: Need total number of buildings by community that are insured against floods through the NFIP.

# of Repetitive Flood Losses: Need number of repetitive losses properties (usually on a parcel basis); and for which NFIP/FEMA has paid more than $1,000 twice in the past 10 years.

Maintain Elevation Certificates: The Elevation Certificate documents the lowest floor elevation of any new building or substantial improvement built in the Special Flood Hazard Area. How does the jurisdiction maintain these?

Community Rating System (CRS) Rating: NFIP's: participation (yes or no), and if yes, need the rating.

Stormwater program: Need documentation of any existing stormwater management programs.

Erosion or Sediment Controls: Need summary information any projects or regulations.

# of unreinforced masonry buildings: Need number of URMs reported to state and any mitigation plan or risk reduction program information.

Hospitals built before 1973 - Hospital Seismic Safety Act: Need number of hospital buildings governed by HSSA that were built prior to 1973 and which are governed by 1994 legislation that calls for their replacement or change of use.

Alquist-Priolo Special Studies Zones Act: Need information about Act's local implementation regarding geologic studies, report reviews, development controls across defined active faults, etc.

Building Code Version: Need the date of most recent UBC adoption (do not need the code itself). Also need to know if the jurisdiction has a full-time inspector and if "as-built" inspections are conducted.

Building Code Effectiveness Grading System (BCEGS): rating information; need at least the rating and date of it; and could use back-up documentation showing ratings of various items, and need to know if not rated.

Local Emergency Operations Plan: Local Emergency Operations Plan (EOP; a disaster or multi-hazard functional response plan); and any directly related contingency plans (e.g., terrorism response, hazardous materials response, dam failure evacuation {and maps}. Do not need copies of full plans, but do need any hazard assessments/summaries from them and brief information about the compliance with CA's Standardized Emergency Management System (SEMS), recent or planned updates, training, exercises, etc.

Fire Department ISO Rating: Need at least the rating and date of it; and could use back-up documentation showing ratings of various items, especially fire prevention measures and programs, including date of most recent UFC adoption (do not need the code itself).

Fire Safe Programs: Need summary information about local fire-safe programs and extent of participation.

Hazard Mitigation Plans: Need existing Hazard Mitigation Plans that were for recent past disasters or that were prepared for other reasons. Also need related grant information: purpose of application (e.g., replace earthquake vulnerable communications center), amount requested, and whether approved or not.

Warning Systems/Services: Do not need technical information, but do need to know if communities have any types of systems, such as: "Storm Ready" Certification from the National Weather Service, NOAA's Weather Radio reception, sirens, cable (TV) override, "Reverse 911," etc.

GIS and HAZUS Capabilities: Geographic Information System capabilities and hazards layers and applications, including uses of federally-funded loss estimation software (HAZUS) for earthquakes, floods, and high winds. If yes, need summary information on hazards related layers (e.g., floodplains, ground motion contours) and how used (e.g., to estimate post-earthquake debris, zoning decisions).

Structural Protection Projects: Need summary information about proposed or planned projects (e.g., levees, drainage facilities, detention/retention basins, seismic retrofits).

Property Protection Projects: Need summary information about proposed or planned projects (e.g., buy-outs, elevation of structures, floodproofing, small "residential" levees or berms/floodwalls, non-structural measures for buildings).

Critical Facility Protection: Need summary information about proposed or planned projects (e.g., protection of power substations, sewage lift stations, water-supply sources, the EOC, police/fire stations, medical facilities) that are at risk from the area's hazards.

Natural And Cultural Inventories: Inventories of resources, maps, or special regulations within the community (e.g., wetlands, Native American sites, historic structures/districts, etc.); need only summary information.

Public Information And/Or Environmental Education Program: Do not need documents; need only summary information about ongoing programs even if their primary foci are not hazards (e.g., "regular" flyers included in utility billings, a website, or environmental education programs in conjunction with parks and recreational activities).

Worksheet 5
Mitigation Strategy

Date: Identify Mitigation Actions

Instructions: For each type of loss identified on previous worksheets, determine possible actions. Record information below.

Hazard _____

Priority	**Possible Actions** (include location)	**Sources of Information** (include sources you reference and documentation)	**Comments** (Note any initial issues you may want to discuss or research further)	**Planning Reference** (Determine into which pre-existing planning suggested projects can be integrated)

Contact information
Name of jurisdiction:
Filled out by:
Address:
Phone:

Worksheet 6
Mitigation Project Description Worksheet

Instructions: Use this guide to record potential mitigation projects (1 or more pages per project) identified during the planning process. Provide as much detail as possible and use additional pages as necessary. These will be collected following HMPC meetings on mitigation goals and measures and included in the plan.

Jurisdiction:

Mitigation Project Title:

Issue/Background:

Other Alternatives:

Responsible Office:

Priority (High, Medium, Low):

Cost Estimate:

Benefits (avoided Losses):

Potential funding:

Schedule:

Worksheet Completed by
Name and Title:
Phone:

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Multi-Hazard Mitigation Plan

Appendix C

Mitigation Categories, Alternatives and Selection Criteria

CATEGORIES OF MITIGATION MEASURES CONSIDERED
(from CRS, with some multi-hazard examples added)

- **Prevention**
  - Planning & Zoning
  - Open Space Preservation
  - Land Development Regulations
  - Storm Water Management
  - Fuels Management

- **Property Protection**
  - Fire-Wise Construction
  - Defensible Space/Fuels Modification
  - Water Supply
  - Flood Protection

- **Natural Resource Protection**
  - Erosion & Sediment Control
  - Wetlands Protection
  - Threatened & Endangered Species Protection
  - Fuels Management

- **Emergency Services**
  - Warning & Evacuation
  - Communications
  - Critical Facilities Protection
  - Lifeline Utilities Protection
  - Health & Safety Maintenance

- **Structural Projects**
  - Detention/Retention structures
  - Sediment Basins/Low-head Weirs
  - Channel Modifications
  - Culvert resizing/replacement/Maintenance
  - Floodwalls

- **Public Information**
  - Hazard Maps
  - Outreach Programs (mailings, media, web, speakers bureau)
  - Education Program (Children/Adults)

ALTERNATIVE MITIGATION MEASURES WITHIN EACH CATEGORY

PREVENTION: Preventive measures are designed to keep the problem from occurring or getting worse. Their objective is to ensure that future development is not exposed to damage and does not increase damage to other properties.

- ***Planning***
- ***Zoning***
- ***Open Space Preservation***
- ***Land Development Regulations***
  - ***Subdivision regulations***
  - ***floodplain development regulations***
- ***Storm Water Management***
- ***Fuels Management, Fire-Breaks***
- ***Building Codes***
  - ***Fire-Wise Construction***
- ***(See Property Protection also)***

EMERGENCY SERVICES measures protect people during and after a disaster. A good emergency services program addresses all hazards. Measures include:

- ***Warning*** (floods, tornadoes, ice storms, hail storms, dam failures)
  - NOAA Weather Radio
  - Sirens
  - Reverse 911
- ***Evacuation & Sheltering***
- ***Communications***
- ***Emergency Planning***
  - Activating the emergency operations room (emergency management)
  - Closing streets or bridges (police or public works)
  - Shutting off power to threatened areas (utility company)
  - Holding children at school/releasing children from school (school district)
  - Passing out sand and sandbags (public works)
  - Ordering an evacuation (mayor)
  - Opening evacuation shelters (Red Cross)
  - Monitoring water levels (engineering)
  - Security and other protection measures (police)
- ***Monitoring of Conditions (dams)***
- ***Critical Facilities Protection (Buildings or locations vital to the response and recovery effort, such as police/fire stations, hospitals, sewage treatment plants/lift stations, power substations)***
  - Buildings or locations that, if damaged, would create secondary disasters, such as hazardous materials facilities and nursing homes
  - Lifeline Utilities Protection
  - Health & Safety Maintenance

PROPERTY PROTECTION: Property protection measures are used to modify buildings subject to damage rather than to keep the hazard away. A community may find these to be inexpensive measures because often they are implemented by or cost-shared with property owners. Many of the measures do not affect the appearance or use of a building, which makes them particularly appropriate for historical sites and landmarks.

- ***Retrofitting/disaster proofing***
  - ***Floods***
    - Wet/Dry floodproofing (barriers, shields, backflow valves)
    - Relocation
    - Acquisition
  - ***Tornadoes***
    - Safe Rooms
    - Securing roofs and foundations with fasteners and tie-downs
    - Strengthening garage doors and other large openings
  - ***Drought***
    - Improve water supply (transport/storage/conservation)
    - Remove moisture competitive plants (Tamarisk/Salt Cedar)
    - Water Restrictions/Water Saver Sprinklers/Appliances
    - Grazing on CRP lands (no overgrazing-see Noxious Weeds)
    - Create incentives to consolidate/connect water services
    - Recycled wastewater on golf courses
  - ***Earthquakes***
    - Removing masonry overhangs, bracing other parts.
    - Tying down appliances, water heaters, bookcases and fragile furniture so they won't fall over during a quake.
    - Installing flexible utility connections that won't break during shaking (pipelines too!)
  - ***Wildfire, Grassfires***
    - Replacing building components with fireproof materials
      - Roofing, screening
    - Create "Defensible Space"
    - Installing spark arrestors
    - Fuels Modification
  - ***Noxious Weeds/Insects***
    - Mowing
    - Spraying
    - Replacement planting
    - Stop overgrazing
    - Introduce natural predators

- ***Insurance***

NATURAL RESOURCE PROTECTION: Natural resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. In so doing, these activities enable the naturally beneficial functions of floodplains and watersheds to be better realized. These natural and beneficial floodplain functions include the following:

- storage of floodwaters
- absorption of flood energy
- reduction in flood scour
- infiltration that absorbs overland flood flow
- groundwater recharge
- removal/filtering of excess nutrients, pollutants, and sediments from floodwaters
- habitat for flora and fauna
- recreational and aesthetic opportunities

Methods of protecting natural resources include:

- ***Erosion & Sediment Control***
- ***Wetlands Protection***
- ***Riparian Area/Habitat Protection***
- ***Threatened & Endangered Species Protection***
- ***Fuels Management***
- ***Set-back regulations/buffers***
- ***Best Management Practices***

  Best management practices ("BMPs") are measures that reduce nonpoint source pollutants that enter the waterways. Nonpoint source pollutants come from non-specific locations. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, and other farm chemicals, animal wastes, oils from street surfaces and industrial areas and sediment from agriculture, construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams. BMPs can be implemented during construction and as part of a project's design to permanently address nonpoint source pollutants. There are three general categories of BMPs:

4. Avoidance: setting construction projects back from the stream.
5. Reduction: Preventing runoff that conveys sediment and other water-borne pollutants, such as planting proper vegetation and conservation tillage.
6. Cleanse: Stopping pollutants after they are en route to a stream, such as using grass drainageways that filter the water and retention and detention basins that let pollutants settle to the bottom before they are drained

- ***Dumping Regulations***
- ***Water Use Restrictions***
- ***Weather Modification***
- ***Landscape Management***

STRUCTURAL PROJECTS have traditionally been used by communities to control flows and water surface elevations. Structural projects keep flood waters away from an area. They are usually designed by engineers and managed or maintained by public works staff. These measures are popular with many because they "stop" flooding problems. However, structural projects have several important shortcomings that need to be kept in mind when considering them for flood hazard mitigation:

- They are expensive, sometimes requiring capital bond issues and/or cost sharing with Federal agencies, such as the U.S. Army Corps of Engineers or the Natural Resources Conservation Service.

- They disturb the land and disrupt natural water flows, often destroying habitats.

- They are built to a certain flood protection level that can be exceeded by a larger flood, causing extensive damage.

- They can create a false sense of security when people protected by a structure believe that no flood can ever reach them.

- They require regular maintenance to ensure that they continue to provide their design protection level.

Structural measures include:

- ***Detention/Retention structures***
- ***Erosion and Sediment Control***
- ***Basins/Low-head Weirs***
- ***Channel Modifications***
- ***Culvert resizing/replacement/Maintenance***
- ***Levees and Floodwalls***
- ***Fencing (for snow, sand, wind)***
- ***Drainage System Maintenance***
- ***Reservoirs(for flood control, water storage, recreation, agriculture)***
- ***Diversions***
- ***Storm Sewers***

PUBLIC INFORMATION: A successful hazard mitigation program involves both the public and private sectors. Public information activities advise property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. These activities can motivate people to take protection

- ***Hazard Maps and Data***
- ***Outreach Projects***
- (mailings, media, web, speakers bureau)
- ***Library Resources***
- ***Real Estate Disclosure***
- ***Environmental Education***
- ***Technical Assistance***

MITIGATION ALTERNATIVE SELECTION CRITERIA
For use in selecting and prioritizing Proposed Mitigation Measures

1. **STAPLE**

Social: Does the measure treat people fairly? (different groups, different generations)

Technical: Will it work? (Does it solve the problem? Is it feasible?)

Administrative: Do you have the capacity to implement & manage project?

Political: Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support?

Legal: Does your organization have the authority to implement? Is it legal? Are there liability implications?

Economic: Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development?

Environmental: Does it comply with Environmental regulations?

2. **SUSTAINABLE DISASTER RECOVERY**

- Quality of Life
- Social Equity
- Hazard Mitigation
- Economic Development
- Environmental Protection/Enhancement
- Community Participation

3. SMART GROWTH PRINCIPLES

- Infill versus Sprawl
- Efficient Use of Land Resources
- Full Use of Urban Resources
- Mixed Uses of Land
- Transportation Options
- Detailed, Human-Scale Design

4. OTHER

- Does measure address area with highest risk?
- Does measure protect …
    - The largest # of people exposed to risk?
    - The largest # of buildings?
    - The largest # of jobs?
    - The largest tax income?
    - The largest average annual loss potential?
    - The area impacted most frequently?
    - Critical Infrastructure (access, power, water, gas, telecommunications)
- Timing of Available funding
- Visibility of Project
- Community Credibility

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Multi-Hazard Mitigation Plan
Appendix D

Community Adoption

Note to Reviewers: When this plan has been reviewed and approved pending adoption by FEMA Region IX, the adoption resolutions will be scanned and put on the document CD which will contain the adoptions, as Appendix D. A Model resolution is provided below:

Resolution # _____

Adopting the Yuba City-Sutter County, California

Multi-Hazard Mitigation Plan

***Whereas**, **(Name of Government/District/Organization seeking FEMA approval of Hazard Mitigation Plan)** recognizes the threat that natural hazards pose to people and property within our community; and*

***Whereas,** undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and*

***Whereas,** an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and*

***Whereas, (Name of Government/District/Organization)** fully participated in the FEMA-prescribed mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and*

***Whereas,** the California Office of Emergency Services and Federal Emergency Management Agency, Region IX officials have reviewed the* "Yuba City-Sutter County, California Multi-Hazard Mitigation Plan" *( ) and approved it ( ) contingent upon this official adoption of the participating governing body;*

***Now, therefore, be it resolved,** that the **(Name of Government/District/Organization)** adopts the* "Yuba City-Sutter County, California Multi-Hazard Mitigation Plan" *as an official plan; and*

***Be it further resolved, (Name of Government/District/Organization)** will submit this Adoption Resolution to the California Office of Emergency Services and Federal Emergency Management Agency, Region IX officials to enable the Plan's final approval.*

Passed: ___(date)___

_____

Certifying Official

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Multi-Hazard Mitigation Plan
Appendix E

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Multi-Hazard Mitigation Plan
Appendix F

Sutter County Localized Flooding Problems

Provided in this Appendix F is a list of roads that were either flooded this past winter (2005-2006) or roads that flood every year. All of these samples take water on them with hard rains. The amount of damage or flooding that's occurs depends of course on the quantity flow of the runoff, these samples however are average of what will occur year to year.

The Live Oak canal plan was prepared by our drainage foreman. The L/O canal drains approx 1/3 of the Yuba City Area and Approx. ½ of the Yuba City rural area. Most of his plan is for an increase in the capacity of the system, to handle the increases due to development in the Yuba City Rural area.

County of Sutter
Public Works

Flood Prevention Plan - Live Oak Canal
Pease Rd. – Schlag Rd.

True Road @ Live Oak Canal Pipe Crossing Replacement.
Reason: There is now a pipe of unknown size that filters threw large rock, and should be replaced with two 36" pipes approximately 60' long for the new development in the area.

Lincoln Road @ Live Oak Canal Pipe Crossing Replacement.
Reason: There are three pipes that are under size that just handle the flow now. And should be replaced with two 60" pipes approximately 60' long for the new development in the area.

Bogue Road @ Live Oak Canal Pipe Crossing Replacement.
Reason: There are three pipes that are under size that just handle the flow now. And should be replaced with two 60" pipes approximately 60' long for the new development in the area.

Bike Path @ Live Oak Canal Pipe Crossing Replacement.
Reason: There are two pipes that are under size that just handle the flow now. **A**nd should be replaced with two 48"" pipes approximately 80' long for new development in the area.

Jefferson @ Live Oak Canal Pipe Crossing Replacement.
Reason: There is one pipe that is under size that just handles the flow now. And should be replaced with two 48" pipes approximately 60' long for new development in the area.

Industrial Dr. @ Live Oak Canal Pipe Crossing Replacement.
Reason: There is one pipe at each crossing that is under size now that just handle the flow now. And should be replaced with two 48" pipes approximately 80' long for new development in the area.

George Washington @ Live Oak Canal Pipe Crossing Replacement.
Reason: There is two businesses & one Church with two crossings that is under size now that just handle the flow. And should be replaced with 2- 60" pipes approximately 60' long each for new development in the area.

South of Bogue Road @ Live Oak Canal pipe Crossings Replacement.
Reason: There is one house and four field crossing that is under size now that now run at maximum flow, and should be replaced with 2 -60" pipes approximately 60' long to handle the development from north end of the canal.

Roosevelt Road @ Live Oak Canal Pipe Crossing Replacement.
Reason: There is one pipe that is under size now that just handle the flow now. And should be replaced with a 60" pipe approximately 60' long for new development in the area.

La Mantia Dr. @ Live Oak Canal Pipe Crossing Replacement.
Reason: There is one pipe that under size now that just handle the flow now. And should be replaced with a 60" pipe approximately 60' long for new development in the area.

Monroe Dr. @ Live Oak Canal pipe Crossing Replacement.
Reason: there is one pipe that is under size now that just the flow now. This should be replaced with a 60" pipe approximately 60' long for new development in the area.

El Margarita Pump
Reason: The pump has been repaired every three years and needs to be up dated with a new system. In addition to install a back up pump and a generator when power is down to keep streets passable and water out of homes.

No.	Road Name	Flooding	Pavement Detoriation	Washouts	Landslide Or Mudslides	Debris	Downed Trees
1	Pass Rd	x	x	x	x	x	
2	West Butte Rd.	x	x	x		x	
3	North Butte Rd.	x	x	x		x	x
4	East Butte Rd.	x	x	x		x	x
5	South Butte Rd.	x	x	x		x	x
6	Powell Rd.	x	x	x		x	x
7	Pennington Rd.	x	x	x		x	x
8	Butte House Rd.	x				x	x
9	Kellogg Rd.	x	x	x	x	x	x
10	Lower Pass Rd.	x	x	x		x	x
11	Almond Orchard Rd.	x				x	
12	Hagaman Rd.	x					
13	Metterr Rd.	x	x				
14	Fifield Rd	x		x	x	x	
15	Keyes Rd.	x	x	x			
16	Catlett Rd.	x		x		x	
17	Howsley Rd.	x	x			x	
18	Pleasant Grove Rd.	x	x	x		x	
19	Brewer Rd.	x	x	x		x	x
20	Sacramento Ave.	x	x	x		x	x
21	Reclamation Rd.		x		x		
22	Subaco Rd..		x	x	x		
23	Hicks Rd.	x	x			x	x
24	Hughes	x	x			x	x
25	Oswald	x	x			x	x
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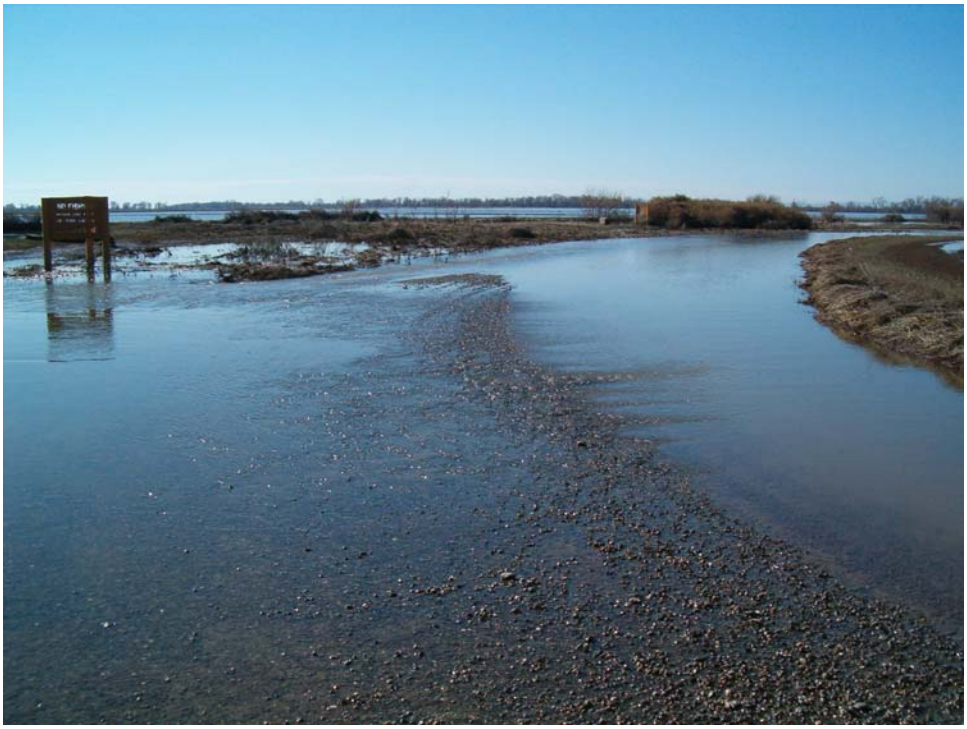
Site #1 Sacramento Ave.



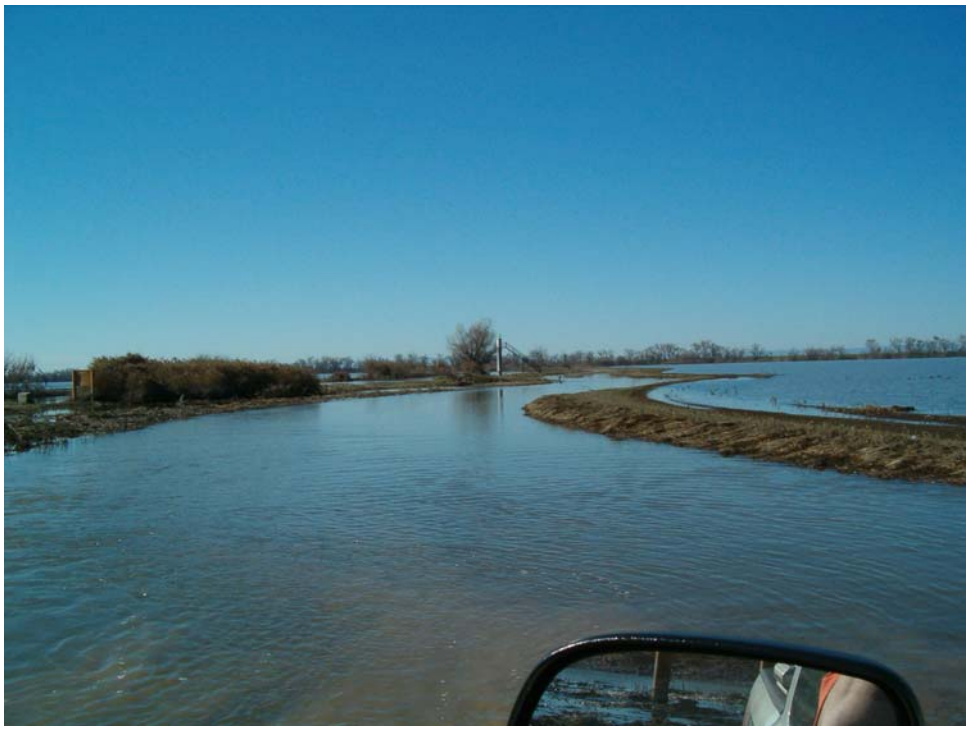


Photo courtesy of Sutter County Dept. of Public Works.

Sutter County Flood Mitigation Plan
Dec. 2006

Site #2 Keys @ Natomas Levee Rd.

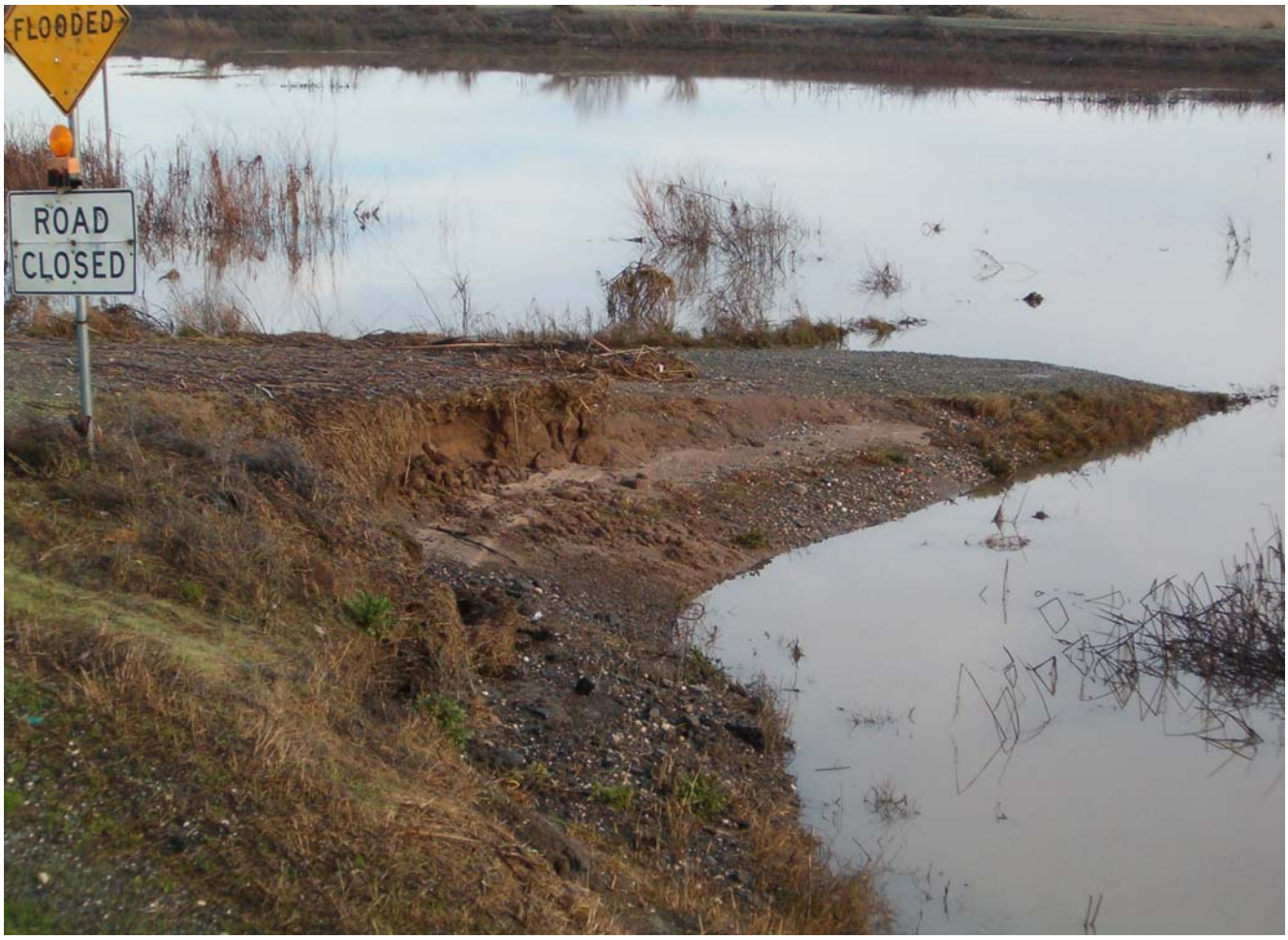
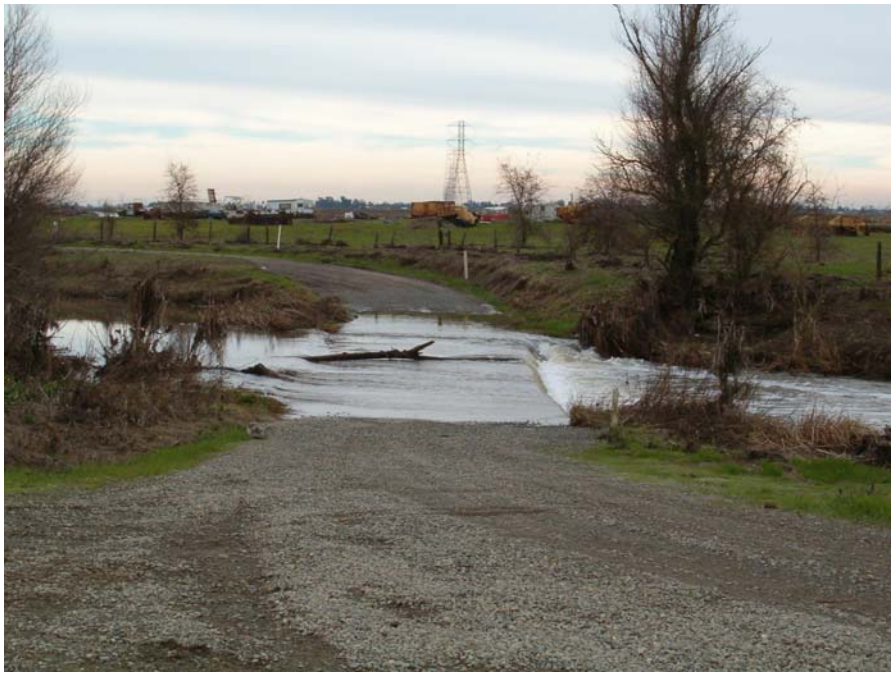
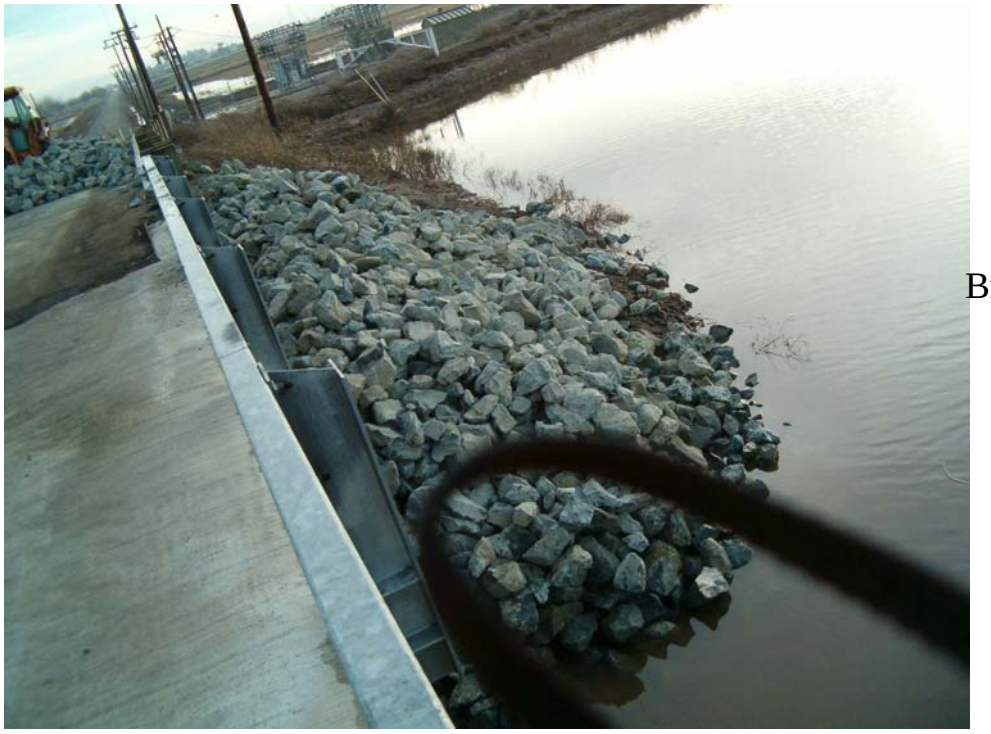


Photo courtesy of Sutter County Dept. of Public Works.

Site #3 Fifield Rd.

Low water Crossing



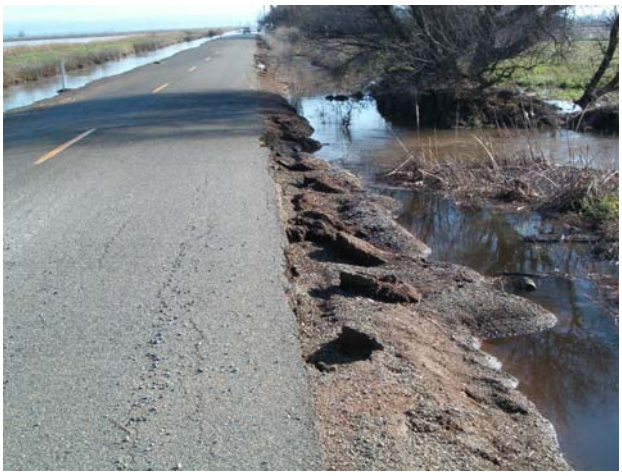


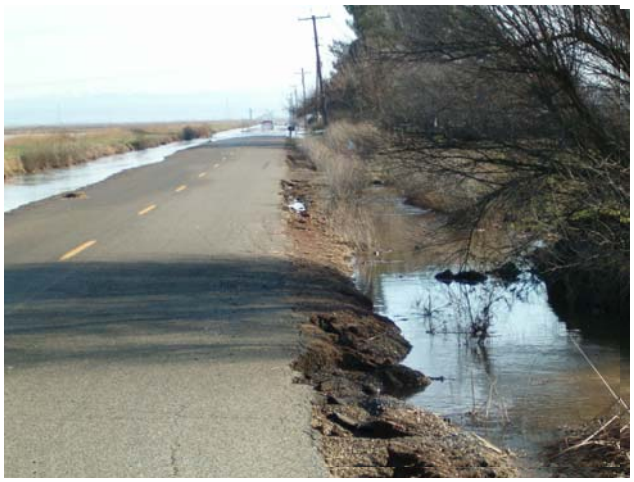
Fifield Bridge.

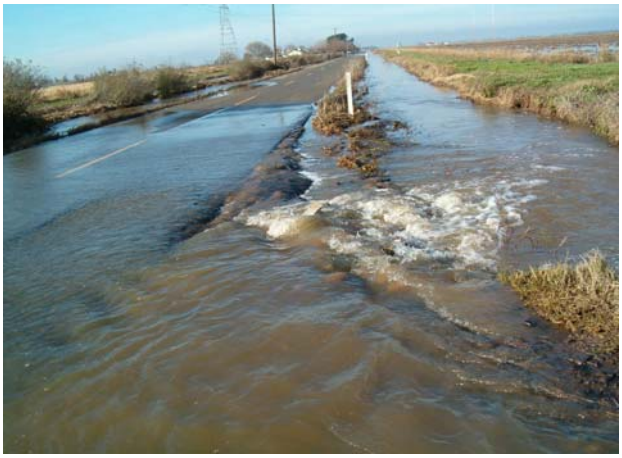
Photo courtesy of Sutter County Dept. of Public Works.

Sutter County Flood Mitigation Plan
Dec. 2006

Site 5 Catlett Rd.







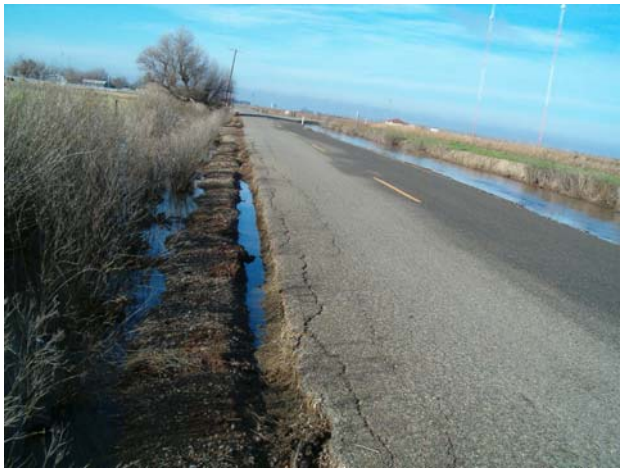
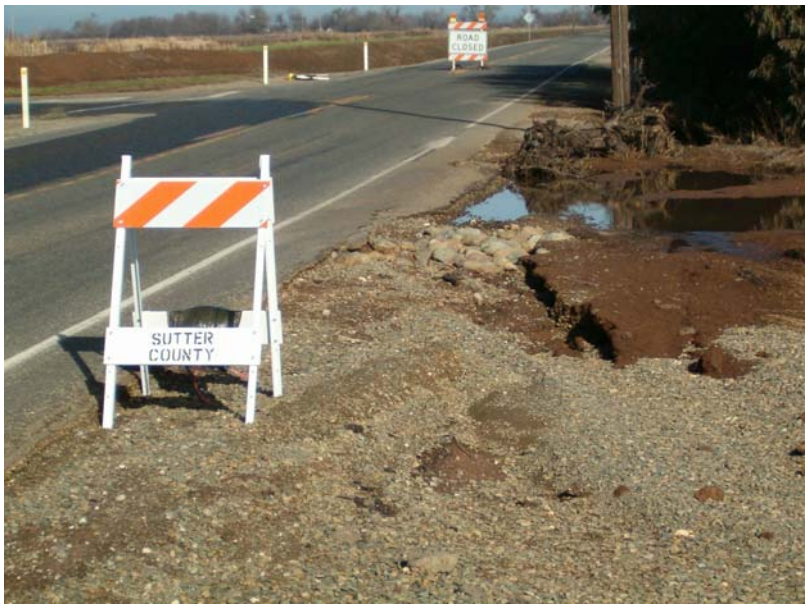
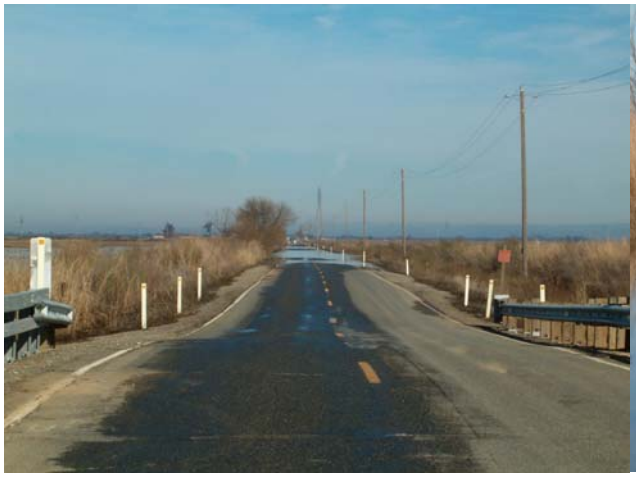


Photo courtesy of Sutter County Dept. of Public Works.

Site 6 & 7 Pleasant Grove Rd.





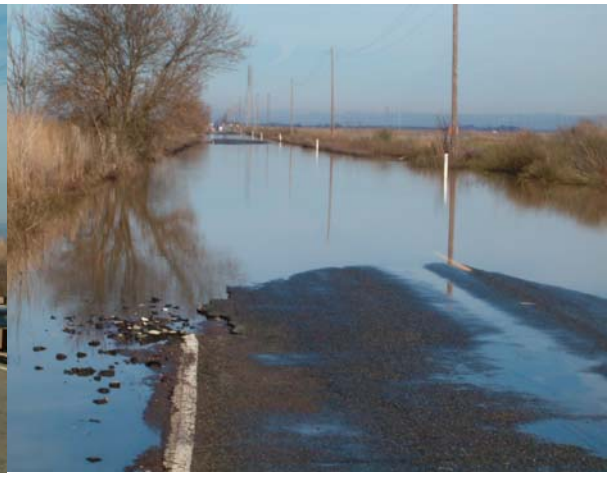


Photo courtesy of Sutter County Dept. of Public Works.

Site #8 Nicolaus Rd

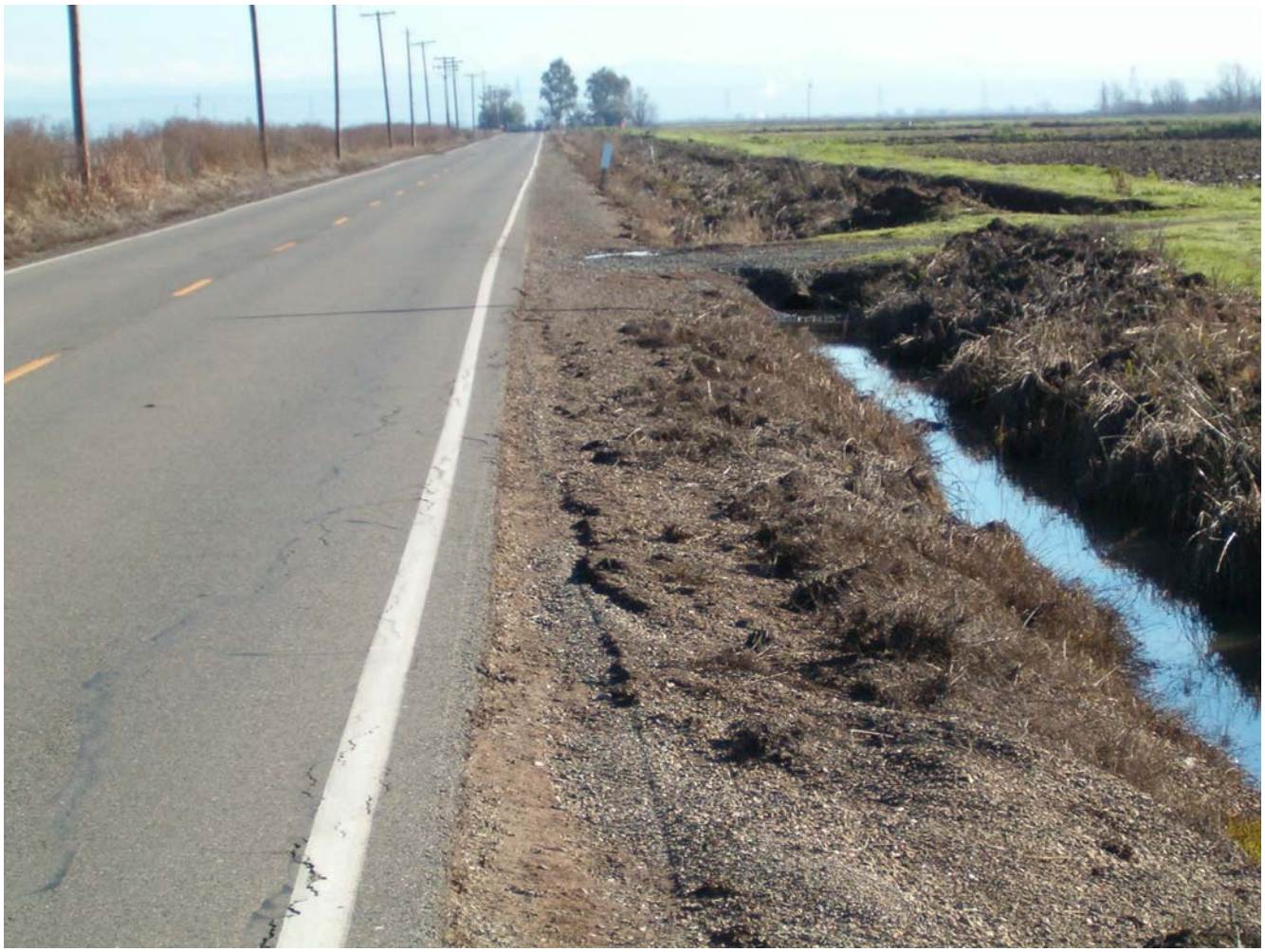
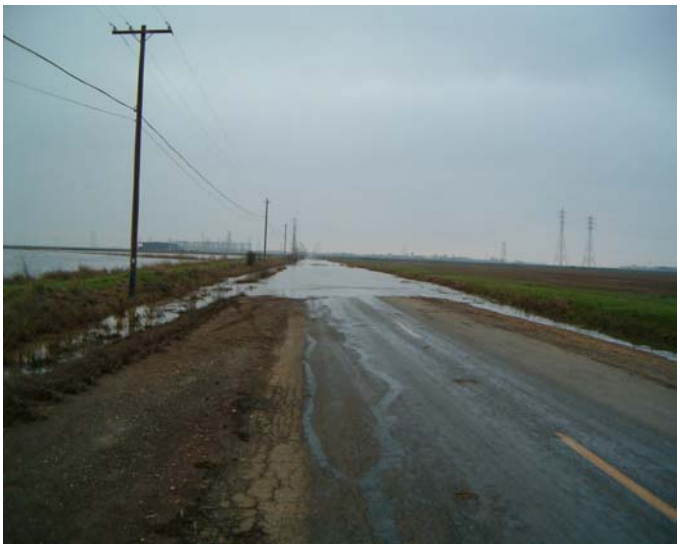
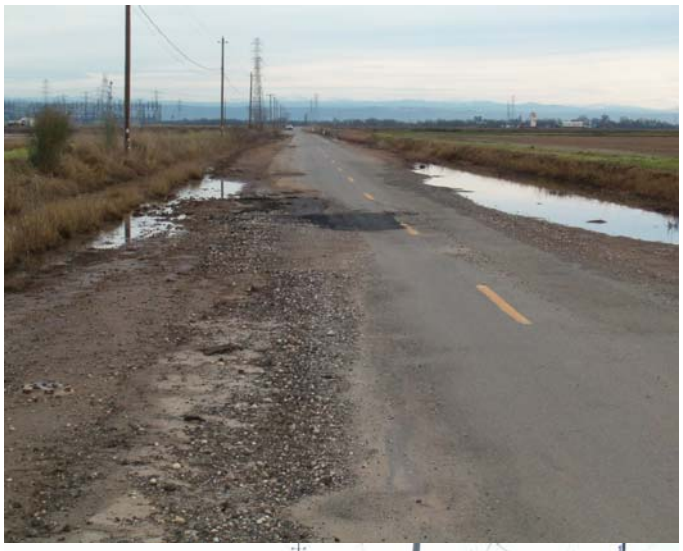
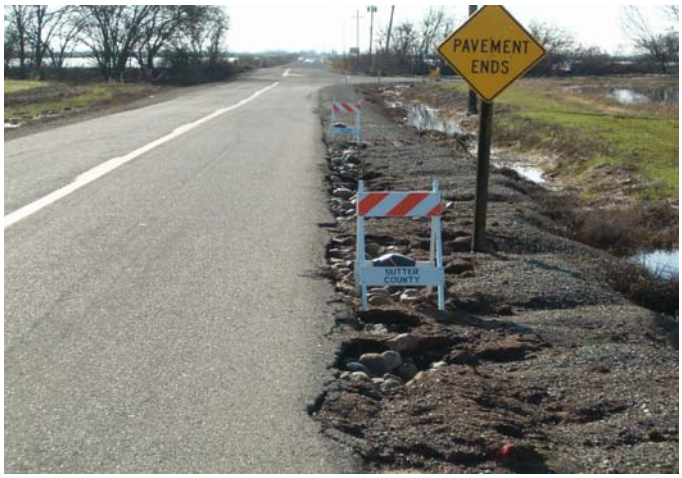


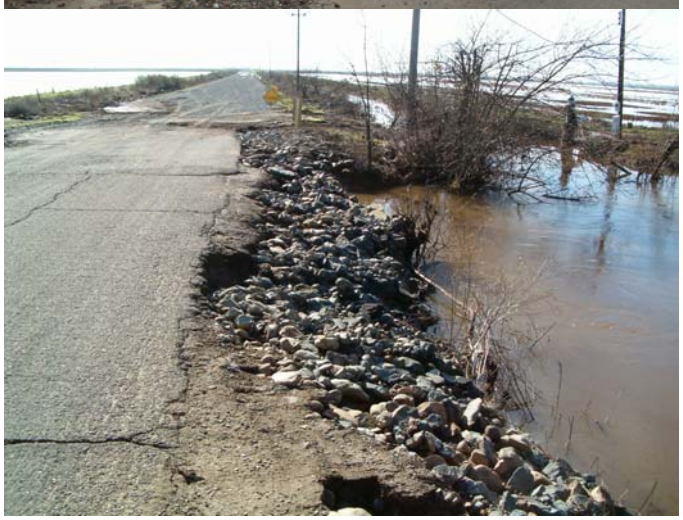
Photo courtesy of Sutter County Dept. of Public Works.

Site 9 Hicks / Brewer Rds.









38deg.56.033N/ 121deg.27.074

Photo courtesy of Sutter County Dept. of Public Works.

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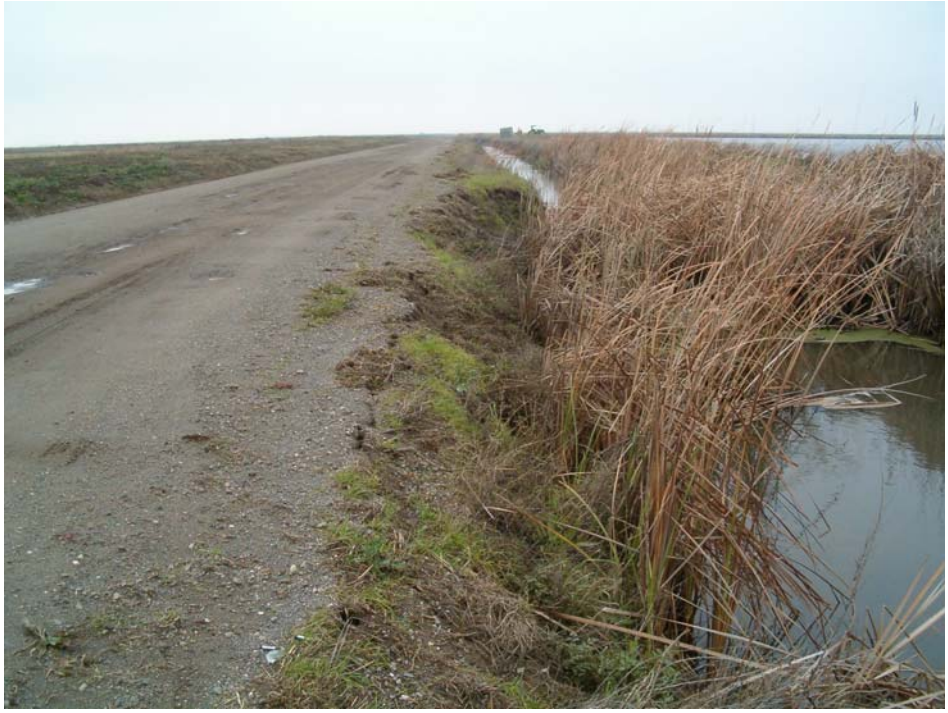
Site 10 Subaco Rd.



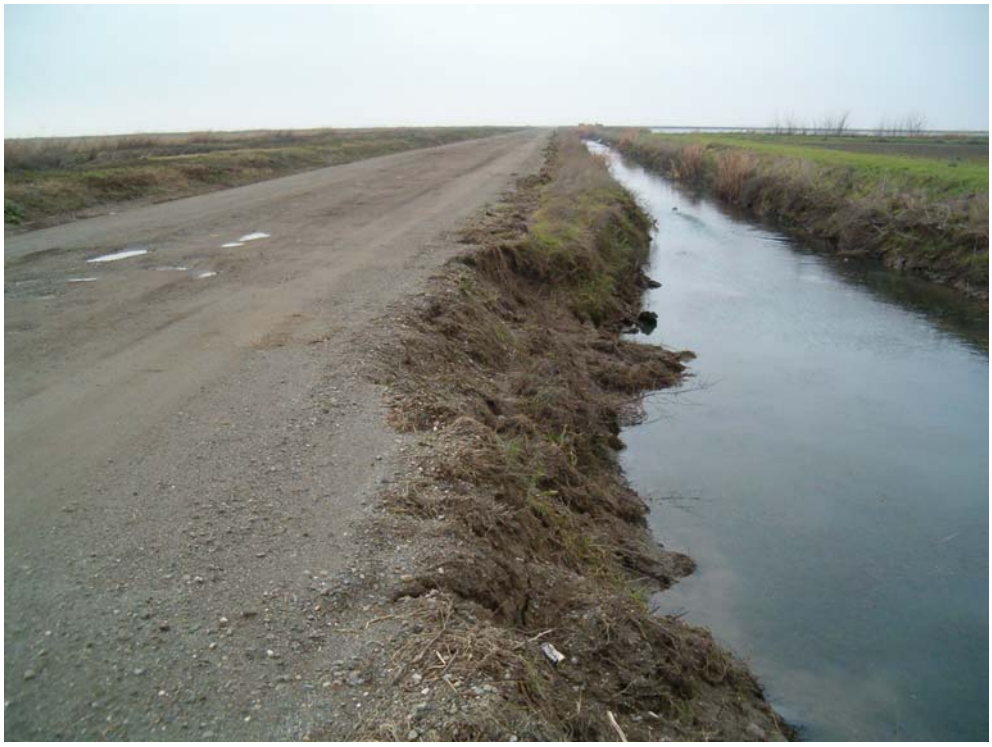
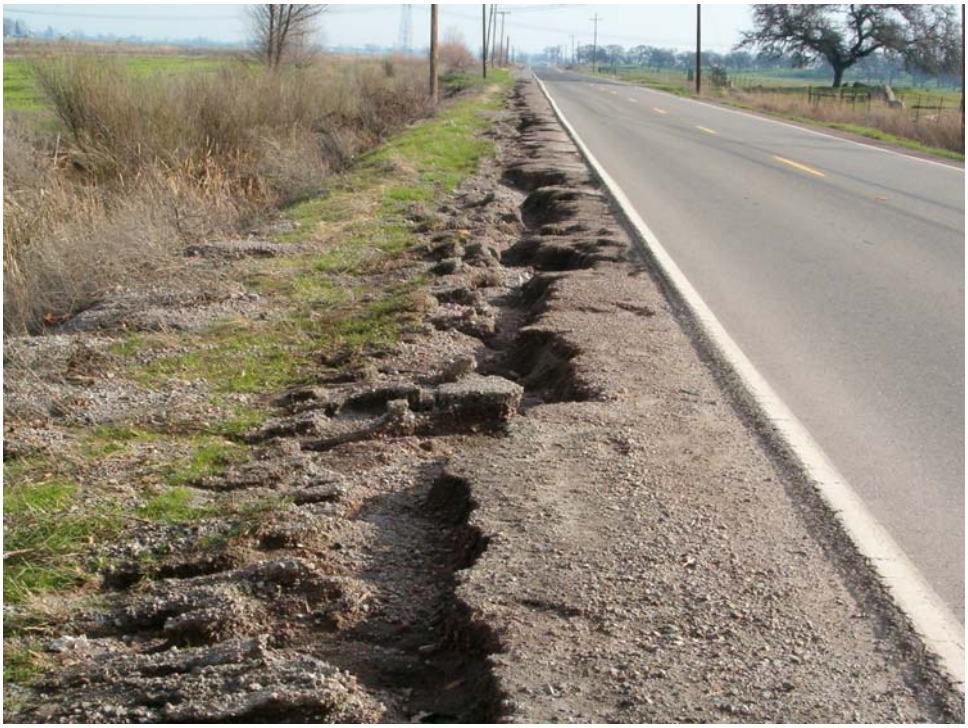
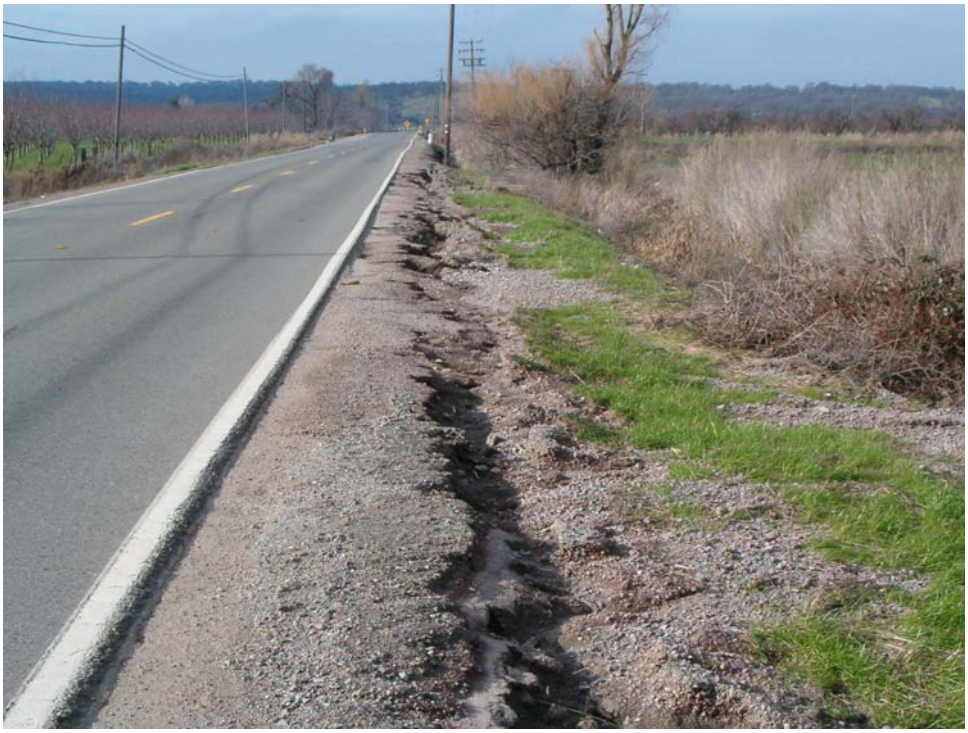


Photo courtesy of Sutter County Dept. of Public Works.

Site 11. Pennington Rd. @ Powell Rd.





<u>39 deg 16.523 N /112 deg.45.898 W</u>

Photo courtesy of Sutter County Dept. of Public Works.

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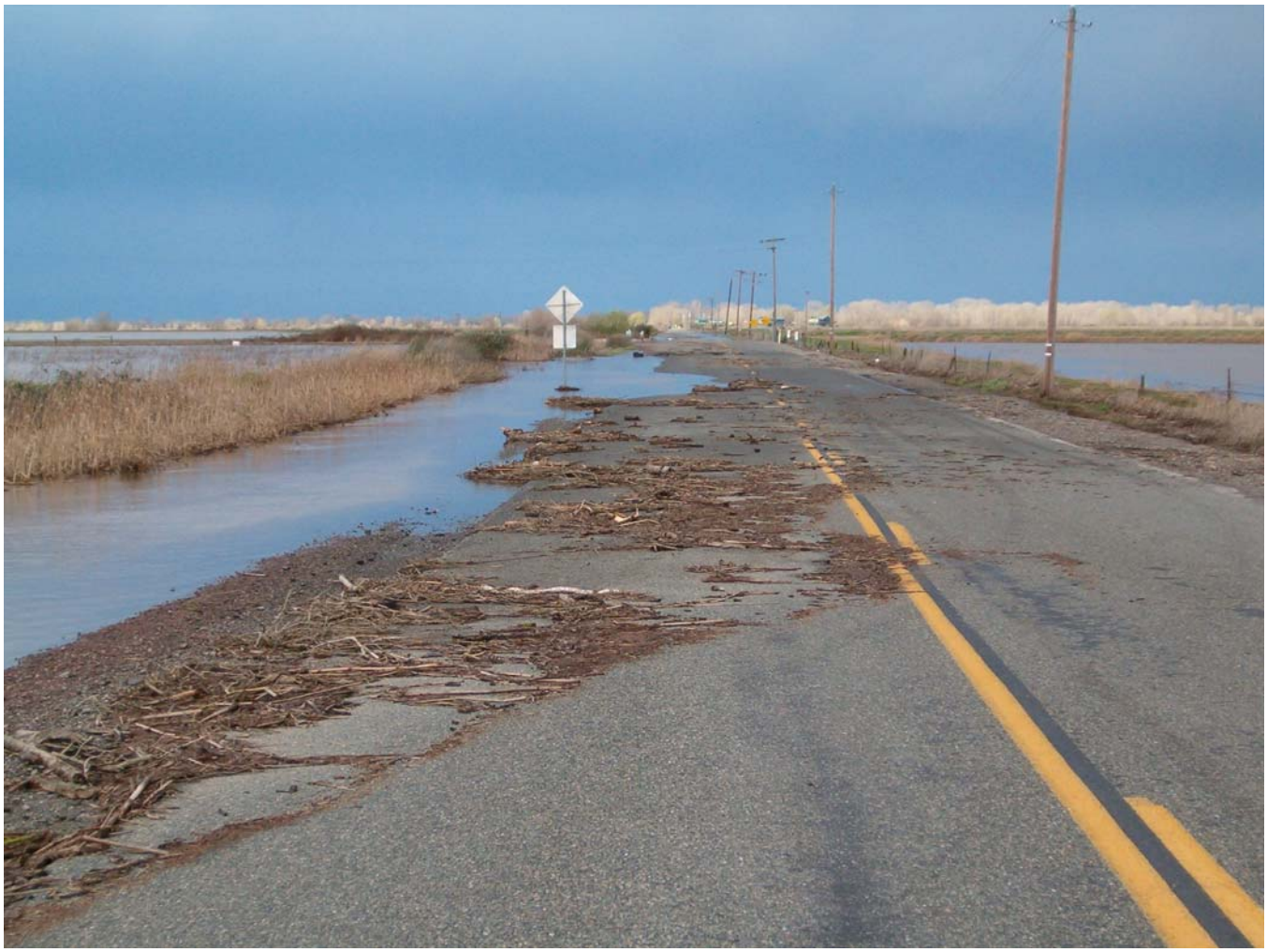
Site 13 West Butte Rd. @ North Butte Rd.



39deg. 17.05 N / 121deg.51.32 W

Photo courtesy of Sutter County Dept. of Public Works.

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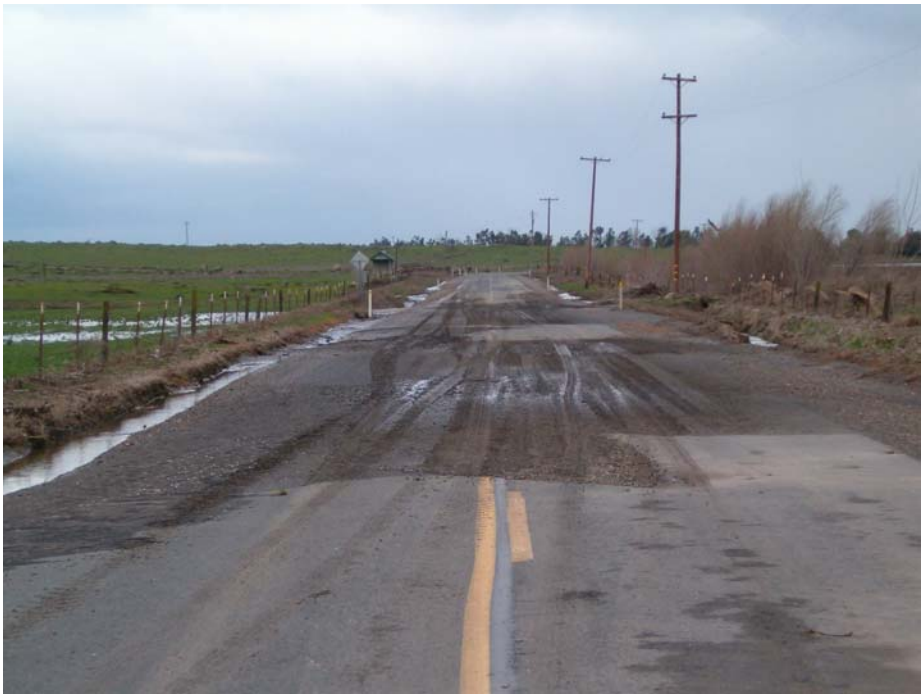
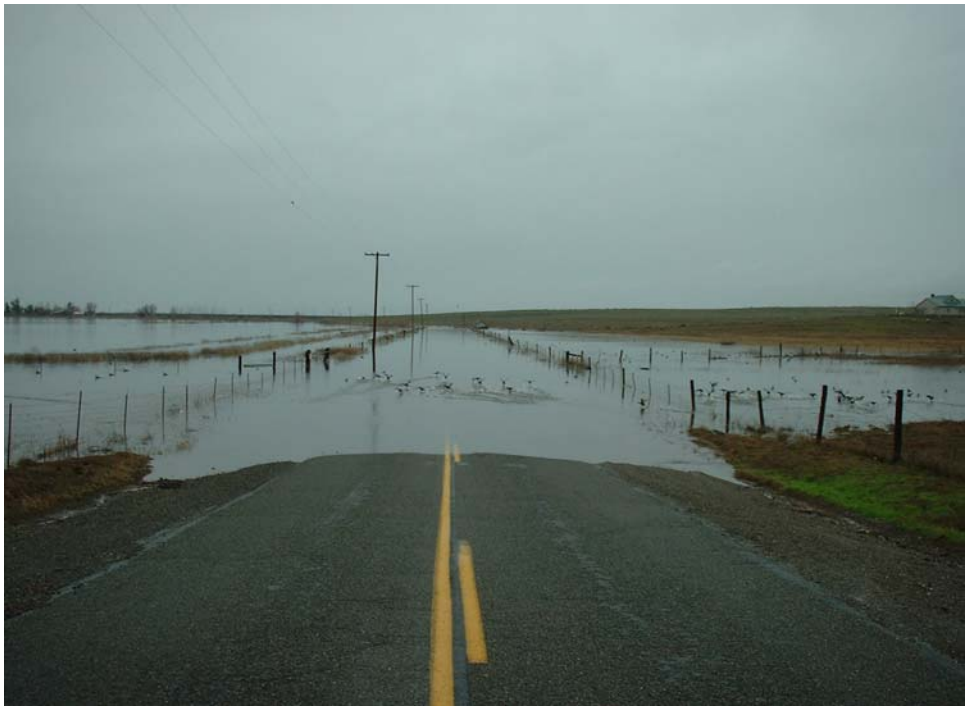
Site 13 A West Butte Rd. (North of Pass Rd.)





39deg. 15.036 N /121deg. 53.04W

Photo's courtesy of Sutter County Dept. of Public Works.

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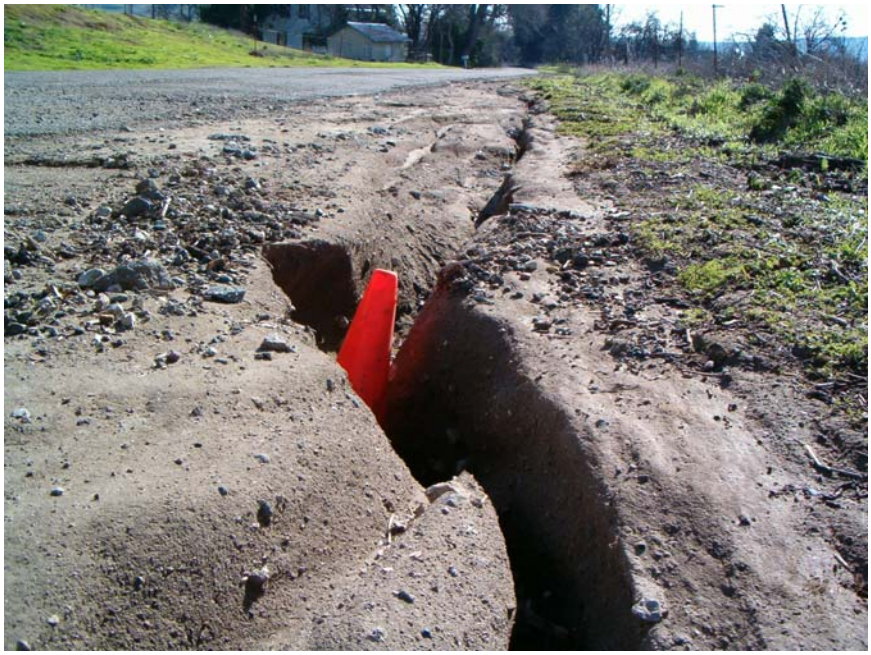
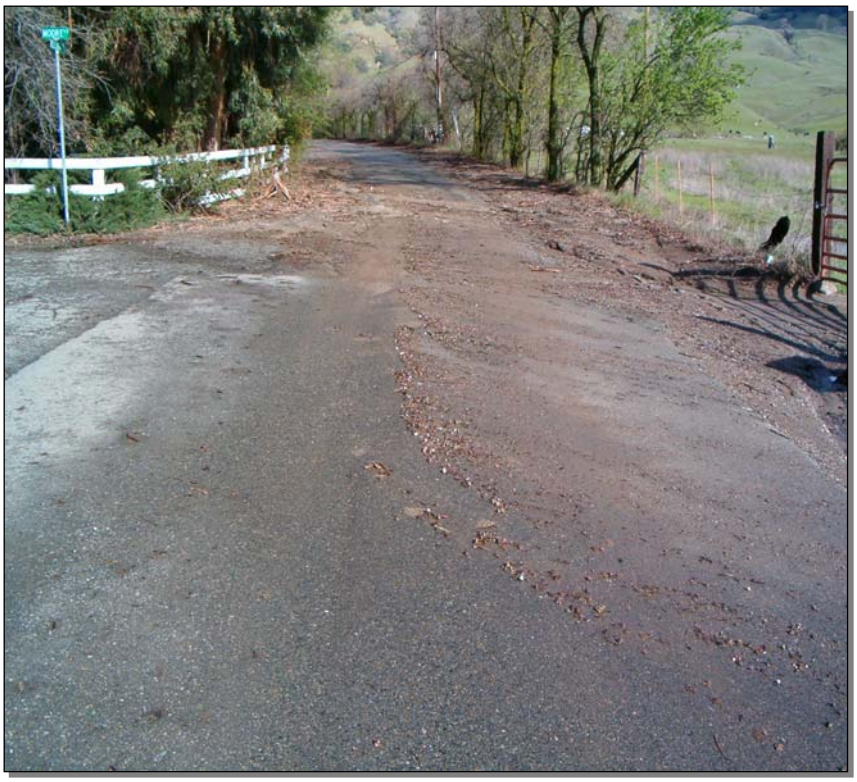
Site 14 Kellogg Rd.





39deg. 12.077 N 121deg.47.15 W

Photo's courtesy of Sutter County Dept. of Public Works.

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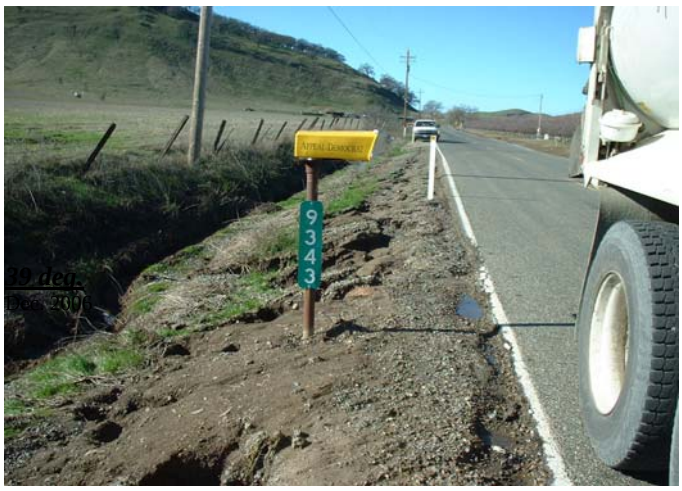
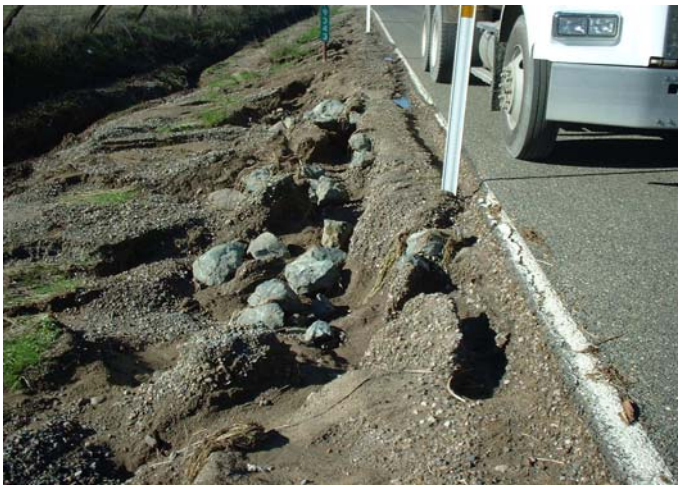
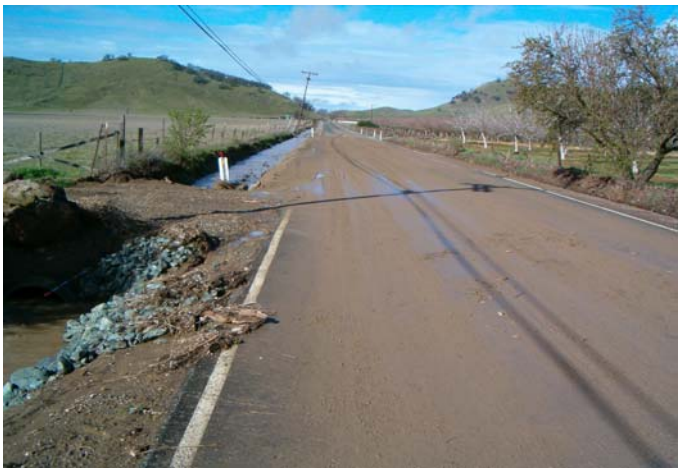
Site 15 Pass Rd. @ Kellogg Rd.







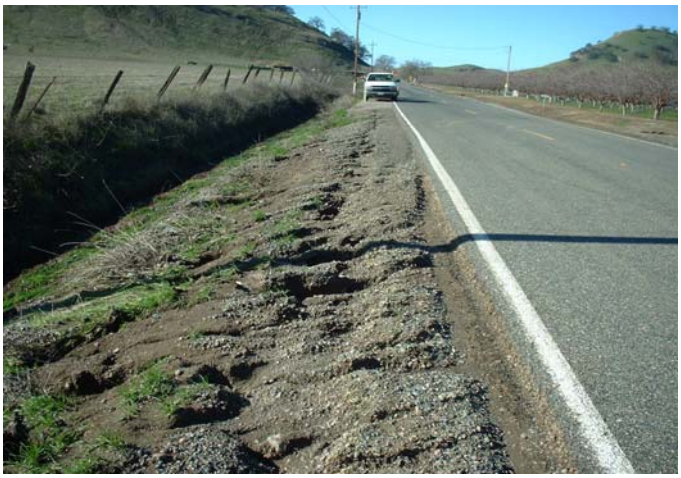


Photo courtesy of Sutter County Dept. of Public Works.
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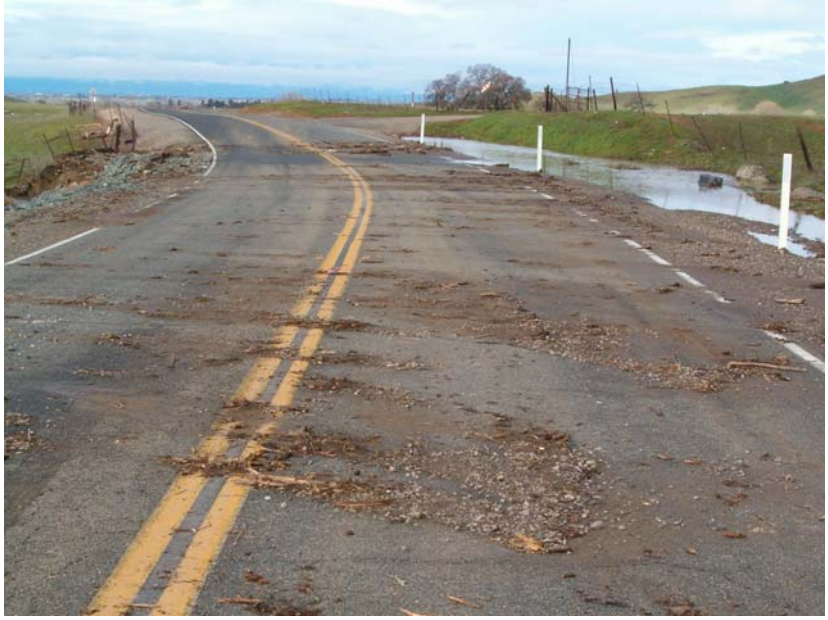
Site 16 Pass Rd



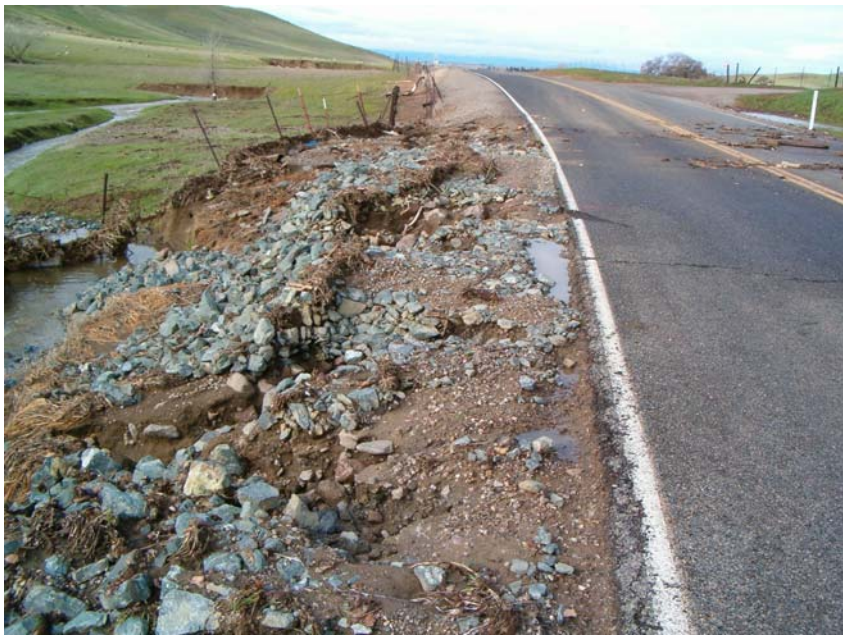


Photo courtesy of Sutter County Dept. of Public Works.

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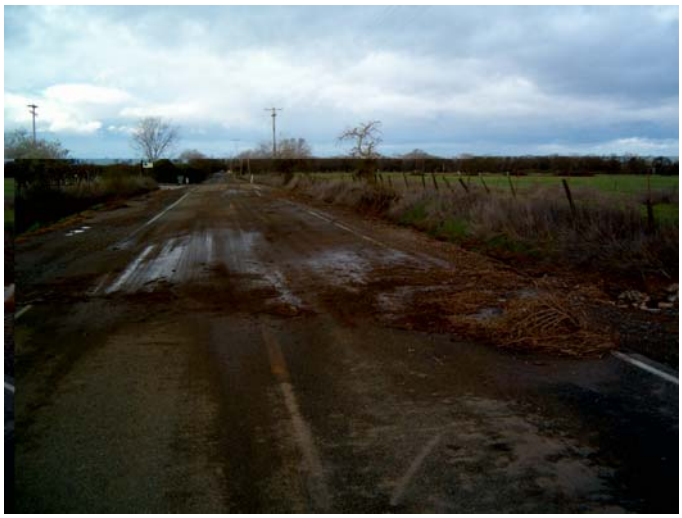
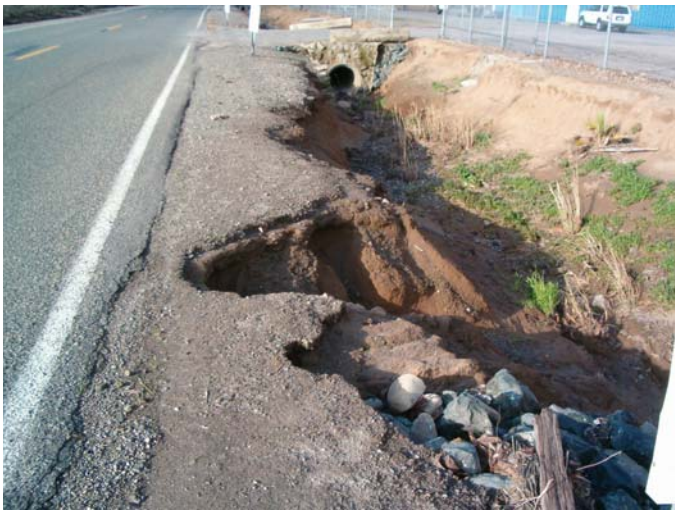
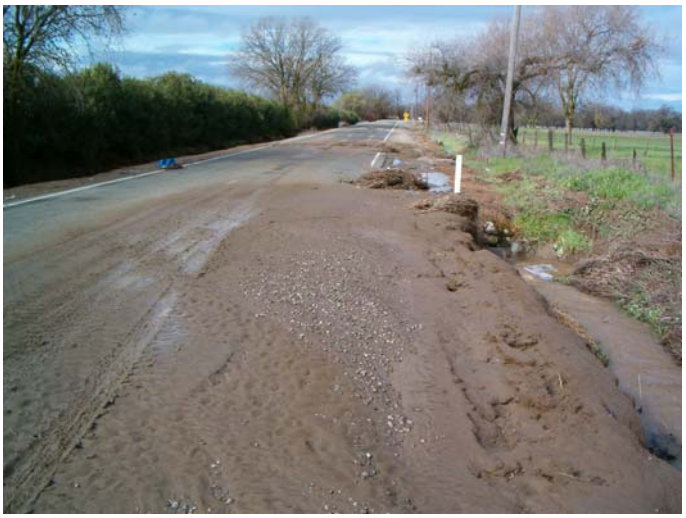
Site 17 Pass Rd. *(West of North West Butte Rd.)*







39deg. 11.13.92N / 121deg.53.27.58W

Photo courtesy of Sutter County Dept. of Public Works.

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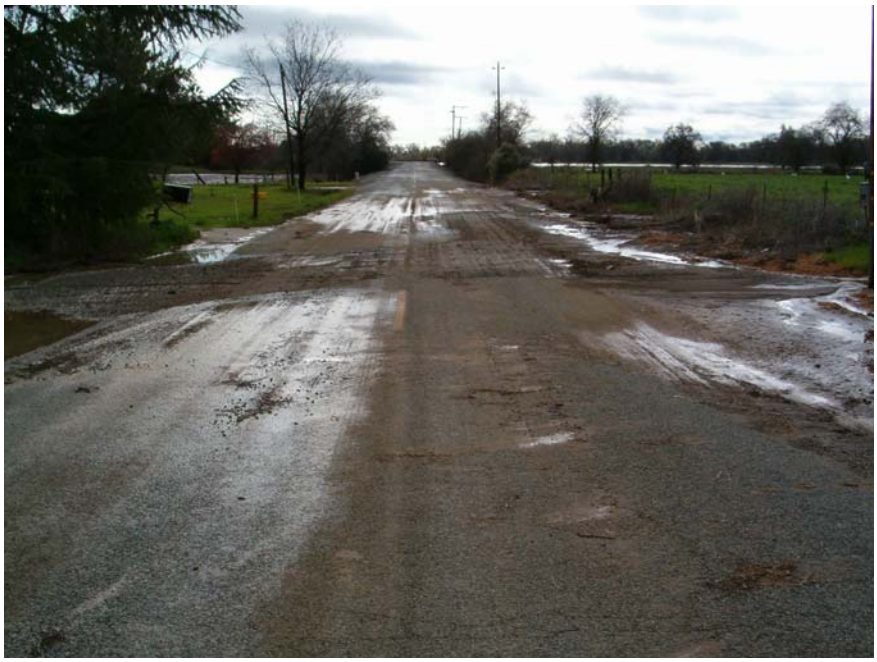
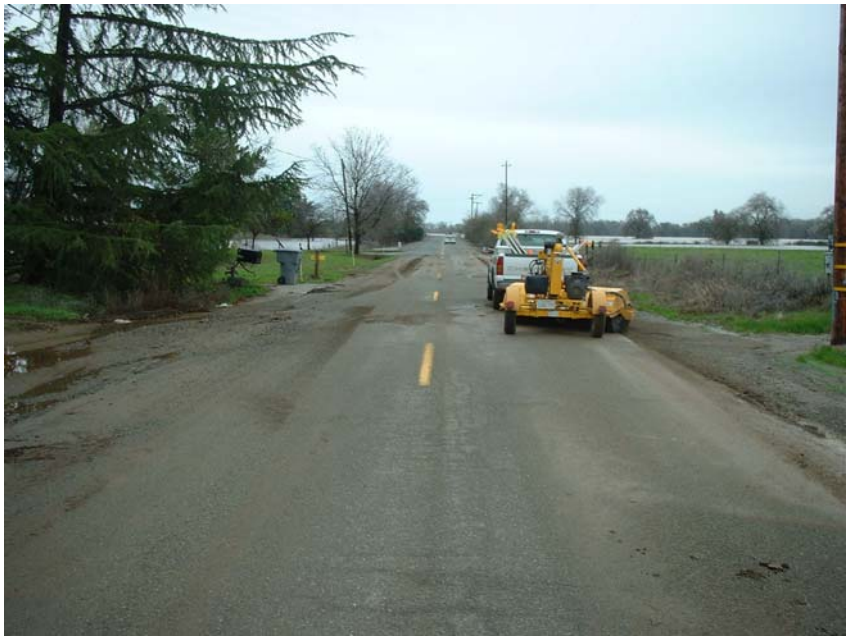
Site 18 West Butte Rd.. (South of Pass Rd.)





39deg.10.18.00N / 121deg.52.15.27W

Photo courtesy of Sutter County Dept. of Public Works.

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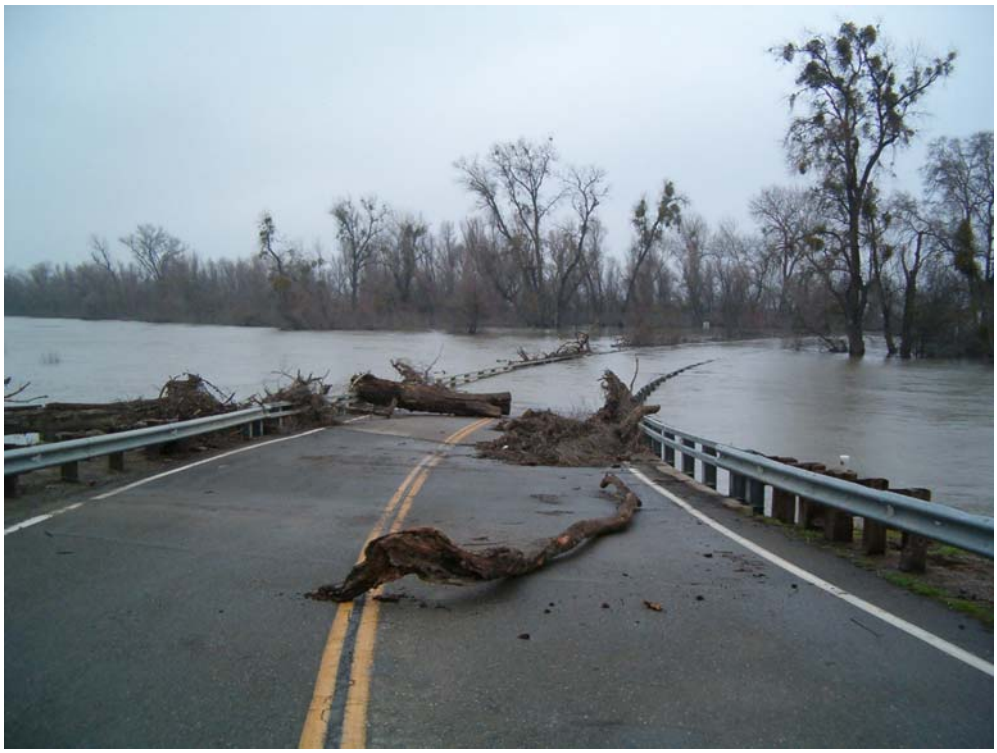
Hughes / Oswald Rds.



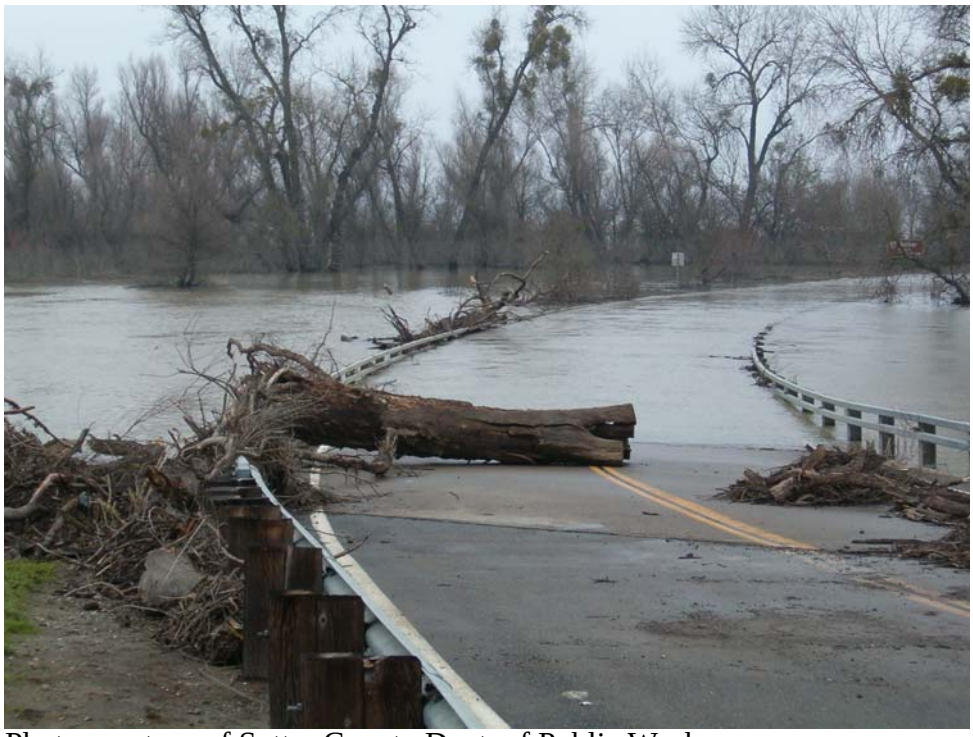


Photo courtesy of Sutter County Dept. of Public Works.