CLACKAMAS COUNTY BOARD OF COUNTY COMMISSIONERS

Study Session Worksheet

Presentation Date: May 1, 2012 **Approx Start Time:** 10:00 AM **Approx Length:** 30 minutes

Presentation Title: Upper Sandy River Basin Flood Warning System

Departments: Emergency Management and Transportation and Development

Presenters: Jay Wilson and Nancy Bush

Other Invitees: Darrel Burnum and/or Sam Irving

WHAT ACTION ARE YOU REQUESTING FROM THE BOARD?
Approval from the Board to apply for Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant funds to support the purchase and installation of a flood warning system for the upper Sandy River Basin.

EXECUTIVE SUMMARY:
The upper Sandy Basin is prone to flash flooding due to heavy winter rainfall accompanied with episodes of rapid snow melt. Historically there have been no means to monitor rising stream levels of the individual upper-basin channels of the Sandy, Zigzag and Salmon Rivers except for estimations from two mid-basin US Geological Survey stream gauges that aggregate all upper basin streams. This project will purchase and install a cost-effective system of five SONAR-based river level monitoring gauges, solar cells, and transmission communication equipment on five County-owned upper basin bridges. This system includes a base receiving and transmitting station at the local fire district office. From there, river levels will be automatically collected and uploaded to the National Weather Service (NWS) River Forecast Prediction Center web site for real-time public monitoring of potential flood conditions every fifteen minutes.

FINANCIAL IMPLICATIONS (current year and ongoing):
Current estimated equipment purchase and installation costs are $45,046 with a 75% federal grant share of $33,784.50 and a 25% local share of $11,281.50. DTD Road Maintenance will cover the local cost share as a portion of the installation expenses per site. Ongoing operation costs are expected to be for internet service to upload data every fifteen minutes to the NWS. Emergency Management is seeking an MOU with the Hoodland Fire Department for covering operation and maintenance expenses as the primary public safety agency for the Villages at Mt Hood.

LEGAL/POLICY REQUIREMENTS:
This flood warning system addresses the Clackamas County Natural Hazard Mitigation Plan's number one goal of the Protection of Life and Property and supports the additional goals of Augmenting Emergency Services and Public Awareness. The Flood Hazard Chapter identifies the "Development of Better Flood Warning Systems" as an Action Item priority and identifies the Salmon, Sandy and Zigzag Rivers as flood prone.

PUBLIC/GOVERNMENTAL PARTICIPATION:
Government participation will come from the NWS design, assembly and programming of stream gauge instruments. County Transportation staff will install solar arrays and antennas on elevated utility poles and install instruments under bridges. County Emergency Management will administer the FEMA grant and, in conjunction with Hoodland Fire, provide ongoing outreach

and education to increase awareness and understanding of flood safety information for Villages at Mt Hood residents, employees and visitors.

OPTIONS:

Option 1: Approve FEMA grant application. Pros: This is a cost-effective and timely means to collect and deliver flood level information to residents, visitors, public officials and the media that is greatly needed for life safety and property protection. Cons: No cons for having the system in place, but requires County to expend funds for local match and partnership for ongoing operation.

Option 2: Consider five standard US Geological Survey river monitoring telemetry-type gauge stations costing $15,000 per unit to install and $10-15,000 per unit/year to operate and maintain. Pros: more complete portfolio of stream data collection per site using satellite upload. Cons: expensive to acquire and maintain and unlikely to receive grant eligibility from FEMA.

Option 3: Do nothing. At this time there are three numbered staff gauge markers on County-owned bridges that require Hoodland Fire Department staff to physically inspect and manually upload data at least every four hours during possible flood events. Critical process observations and logging are based on availability of fire personal during pending emergency situations. Pros: Since installing the staff markers in autumn 2011 these gauges have provided episodic information based on fire crew web posting. Cons: Requires intensive human interface and may not capture and report all stream level changes necessary for adequate flood preparedness measures.

RECOMMENDATION:

Staff recommends Option 1: Approve FEMA grant application. This project will provide reliable capture and posting of current river levels for areas susceptible to channel migration hazards and isolation due to road and bridge closures. Evacuation and property protection measures will be greatly improved with readily available information that is not dependent on fire personnel having to drive out to bridge locations for inspection and then logging on to upload data. Anticipated Problems: If implemented - Possible damage from flood water/debris and possible vandalism. If not implemented – elevated risk to life and property due to poor tracking of escalating flood conditions in Upper Sandy Basin.

ATTACHMENTS:

County application for FEMA hazard mitigation grant with scope of work document.

SUBMITTED BY:

Department Director/Head Approval DR/jw

County Administrator Approval _____

For information on this issue or copies of attachments, please contact Jay Wilson @ 503-723-4848

Fiscal Impact Form

RESOURCES:
Is this item in your current work plan and budget?

☒ YES
☐ NO

START-UP EXPENSES AND STAFFING (if applicable):
Start-up costs for acquiring and installing instruments and related equipment are estimated at $45,046 based on a FEMA grant federal share of $33,784.50 and a local cost-share of $11,261.50. The source of the FEMA hazard mitigation grant comes from the federal disaster declaration DR-1956-OR following the Sandy River flood on January 16, 2011 which provides a maximum of a 75% federal share and a 25% local match.

ONGOING OPERATING EXPENSES/SAVINGS AND STAFFING (if applicable):
Basic ongoing operation expense will be the necessary use of internet service to upload data from the five individual stations. The use of Hoodland Fire's existing internet service is being pursued through an MOU*.

ANTICIPATED RESULTS:
Desired results are improved notification time for pending flood impacts in the upper Sandy River basin and heightened awareness of flood-related risks for property owners. A long-term benefit will be archiving of individual river channel levels during flood events to help determine the predict degree of flood impacts and spatial extent of affected areas.

COSTS & BENEFITS:

Costs:

	Item	Hours	Start-up Capital	Other Start-up	Annual Operations	Annual Capital	TOTAL
5	River Monitor Equip Package		3407				17,035
5	County installation per site			5000			25,000
1	Data Logger and modem		654				654
1	Fire House Base Station		2356				2,357
	Total Project costs						45,046
Total Start-up Costs 25% share							
***Ongoing Annual Costs**					**75/month**		**900**

Benefits/Savings:

	Item	Hours	Start-up Capital	Other Start-up	Annual Operations	Annual Capital	TOTAL
	Improved notification capacity						unknown
	Improved flood threat awareness						unknown
	Reduced flood hazard exposure						unknown
	Reduced demand on Fire service						unknown
Total Start-up Benefit/Savings							
Ongoing Annual Benefit/Savings							

OREGON EMERGENCY MANAGEMENT

HAZARD MITIGATION GRANT PROGRAM (HMGP)

DR-1956-OR

HMGP Basic Project Identification/Concept and Description

A. Project Title: Upper Sandy River Basin Flood Warning System

B. Sub-Applicant Identification

1. Name of Applicant Organization/Agency: Clackamas County Emergency Management

2. Type of Organization: County
   [County or City Government]

C. Sub-Applicant's Representative (The applicant's agent, project manager, or official contact).

Name: Jay Wilson

Title: Hazard Mitigation Coordinator

Address: Clackamas County Emergency Management

2200 Kaen Road

Oregon City, OR 97045

Business Phone: 503-723-4848

FAX & E-mail: 503-655-8531 jaywilson@clackamas.us

D. Projects Linked to Public Assistance Project Worksheets (PW)

PW Number(s) and Supplements:_____

Was the proposed hazard mitigation project a component of a Public Assistance project? If so, what was the State or Federal determination regarding its eligibility? Please describe. Use additional sheets if necessary.

NO

OBJECTIVES

A. Project Objective (Is this project or strategy identified in your local natural hazards mitigation plan?):

Yes, Flood Hazard Action Item #3 - Develop better flood warning systems from Clackamas County's 2007 Natural Hazard Mitigation Plan.

B. Project Description (Briefly describe the proposed project and its scope of work. Include how the proposed project will reduce the hazard's effects and risks):

The upper Sandy Basin is prone to flash flooding due to heavy winter rainfall accompanied with episodes of rapid snow melt. Historically there have been no means to monitor stream levels except for mid-basin USGS gauges that don't reflect the flood levels in individual upper-basin channels on the Sandy, Zigzag and Salmon rivers. This project will purchase and install a cost-effective system of five SONAR-based river level monitoring gauges, solar cells, and transmission communication equipment that includes a base station at the local fire district office. Annual operation and maintenance expenses will be covered by the County Emergency Management and County Bridge Maintenance funds with an MOU for support from the Hoodland Fire District.

C. Project Location (Description of Location, Attached Maps): See attached SOW (with photos) of five river monitoring sites and base station.

Sandy R at Brightwood Bridge	45 22 43.01 N	122 00 45.34 W	elev 1681 ft
Salmon R Bridge	45 22 31.34 N	122 01 26.42 W	elev 1035 ft
Sandy R Lolo Pass Rd Bridge	45 21 23.19 N	121 56 17.00 W	elev 1443 ft
Zig Zag R Lola Pass Rd Bridge	45 20 49.68 N	121 56 32.77 W	elev 1395 ft
Salmon R Welches Bridge Street	45 19 41.78 N	121 57 43.63 W	elev 1291 ft

COST ESTIMATES

A. Cost Summary (A complete cost description including a list of materials and services will be required after submission of the basic application). HMGP projects are based on a maximum 75% federal share with a 25% non-federal share contribution.

1. Federal Share (HMGP): $33,784.50
2. Applicant's Share: $11,261.50*
3. Other Non-Federal Shares (Describe): $_____

Total Funds Required to Complete Project: $45,046.00

**County requests consideration for 25% applicant share to be applied from costs of materials, installation and services time.*

WORK SCHEDULE

A. Starting Date: Within [14] days after final project approval. (If more than sixty (60) days please explain; use additional pages as needed):

Supplies will be ordered following approval and funding obligation.

B. Completion Date: Within [12] months after project initiation. (If more than fifteen (15) months, please explain; use additional pages as needed):

Work is expected to be completed within six weeks of all materials being available, assembled and installed.

C. Provide a General Outline of the Work Schedule Necessary to Complete This Project - (A complete work schedule that clearly describes project milestones and shows the anticipated flow of the project from the time of initiation to completion will be required after submission of the basic application):

County staff will order all equipment upon grant approval and expect to begin installation within 60 days.

Week one:	Pole installation
Week two & three:	Install solar panels, cabinets, conduit to bridge.
Week four & five:	Install river gauges and wiring.
Week six:	Fire Station installation and system check out.

ENVIRONMENTAL CONCERNS

All projects must comply with the National Environmental Policy Act. FEMA is responsible for preparing the necessary documentation; however, the applicant is required to provide the necessary data. At this time, please provide a description of any environmental concerns and impacts associated with this project:

The only environmentally sensitive aspect of this project would be timing to conduct all in-stream work to access underside of bridge decking for sensor installation and wiring during the summer in-water work periods, typically from mid-July through the end of August. If at all possible, crews will work from bridge structure rather than in-stream channel.

Benefit – Cost (BCA) Analysis

Describe how the project will reduce future (potential) disaster damages and that, minimally, every dollar expended on mitigation will reduce future losses by at least one dollar. Use additional pages as necessary:

BCA not necessary for HMGP 5% project

If you have any questions and/or RETURN THIS APPLICATION TO:

Dennis Sigrist
Oregon Emergency Management
DR-17333 – HMGP Application
US Mail Address:
P.O. Box 14370
Salem, OR 97309-5062
(503)378-2911, ext. 22247
FAX: (503)373-7833
http://www.oregon.gov/OMD/OEM/ - dsigrist@oem.state.or.us

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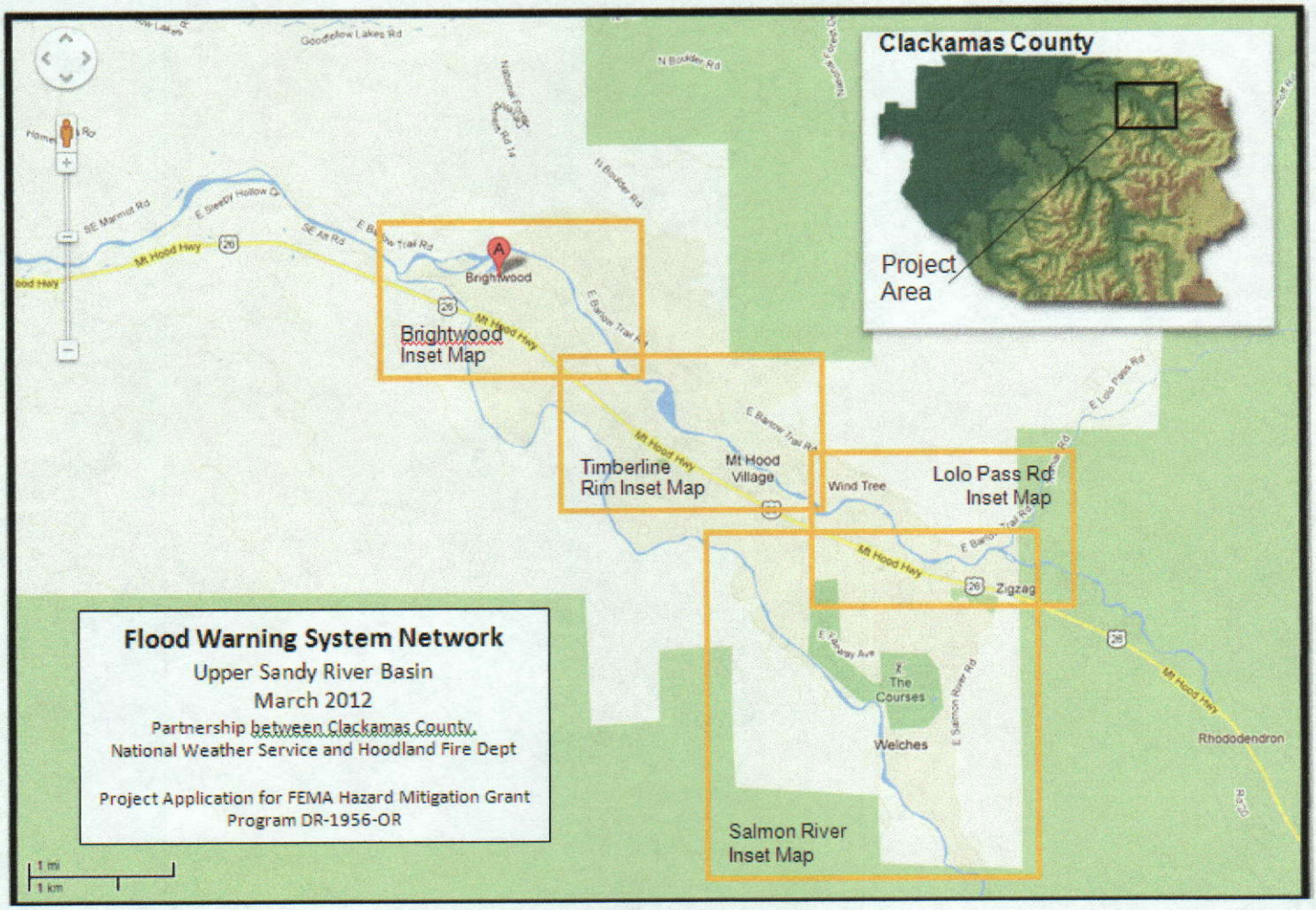
DR-1956-OR HMGP Application Clackamas County – Scope of Work

Setting

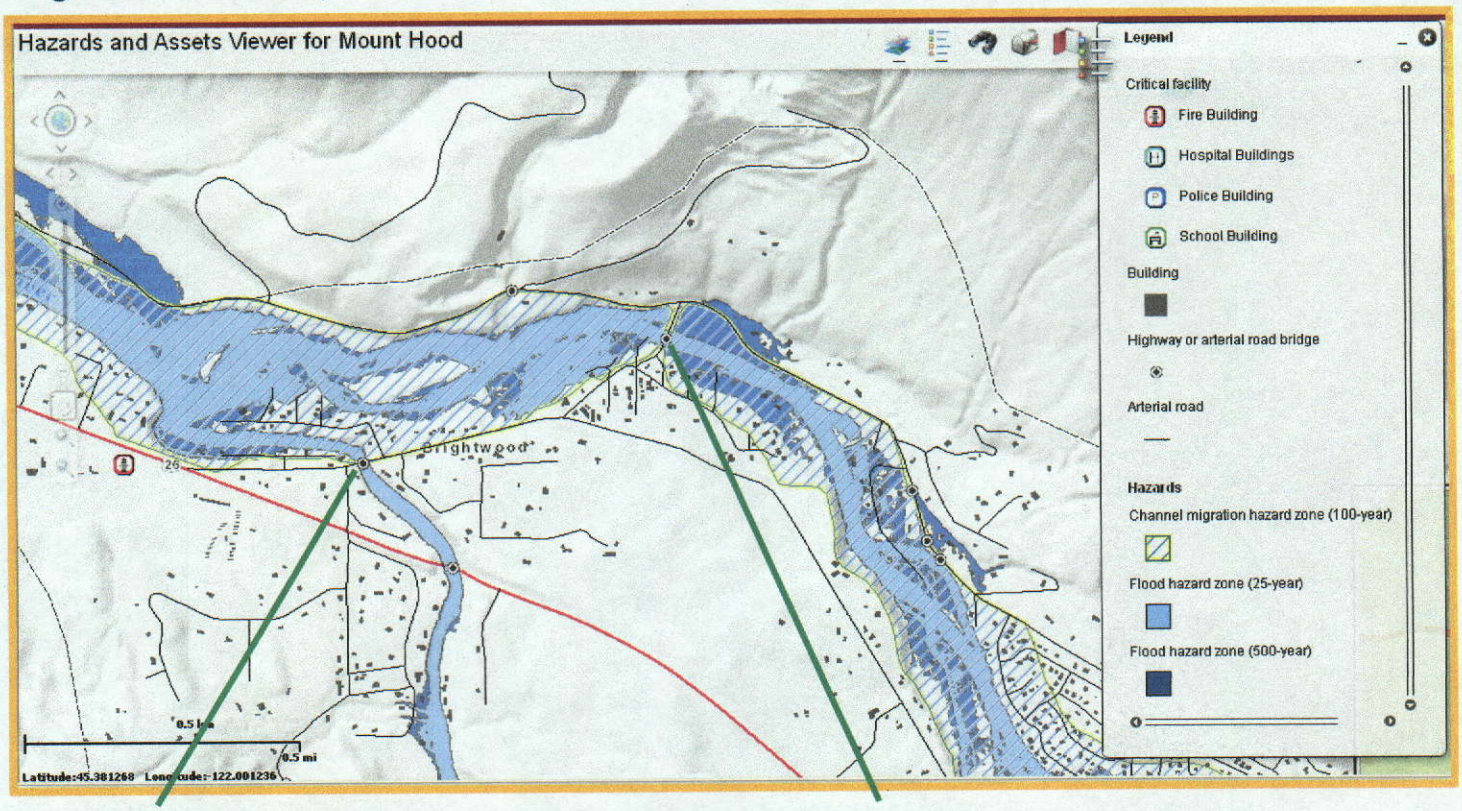
The Villages at Mt Hood encompass the communities of Brightwood, Rhododendron, Welches, Wemme, and Zigzag. Estimated exposure of residential population is approximately 500 households and about 900 residents in the 500 year floodplain. The area identified as the 100 year Channel Migration Zone is a much broader area. The upper Sandy River basin is made up of the drainages from the Zigzag, Salmon and Sandy Rivers along with numerous creeks. All of these rivers drain from the source of Mt Hood and have steep profiles.



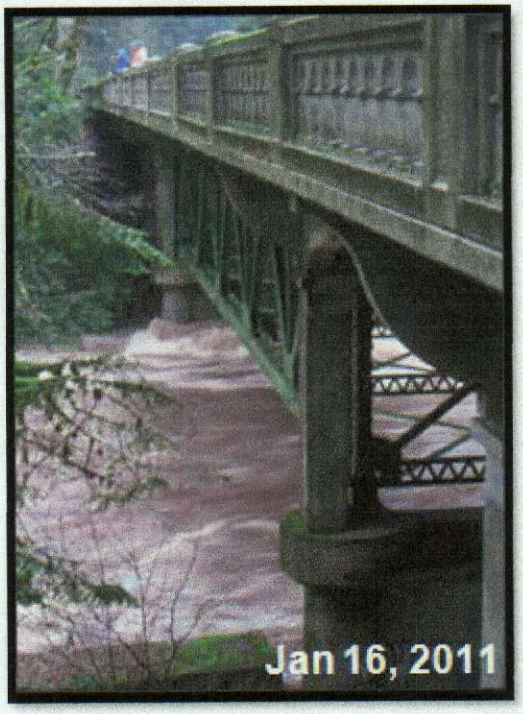
The main stem of the Sandy River represents the highest hazard in terms of steep headlands draining from Mt Hood's 11,239 foot summit, erodible soils, ample sources for inputs of woody debris and the ability to mobilize material even well below "flood stage." All of these factors combine to create an extremely difficult flood hazard to forecast due to no real-time gauges on any of the upper basin channels.

Five sonar-based sensor packages will be located on five County-owned bridges and transmit to a central receiving unit at the Hoodland Fire Department in Welches, where it will be automatically uploaded to the webpage for the National Weather Service Advanced Hydrologic Prediction Service and viewable by emergency officials and the general public.

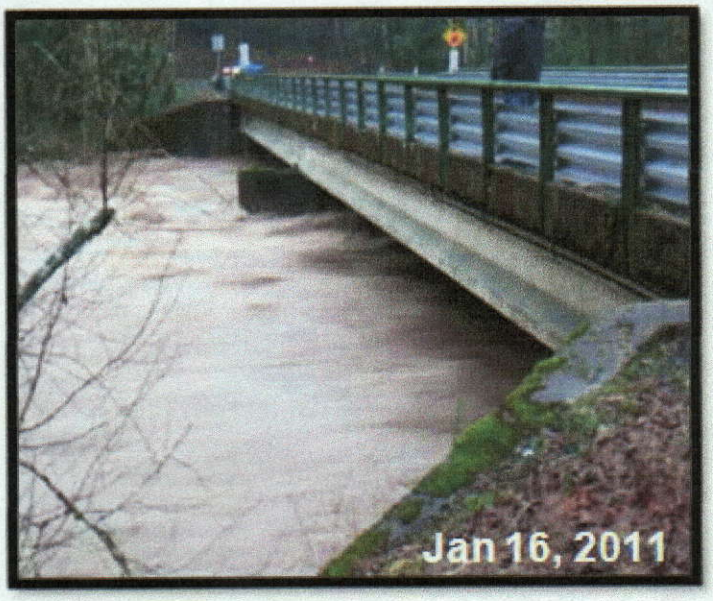
Brightwood Inset Map



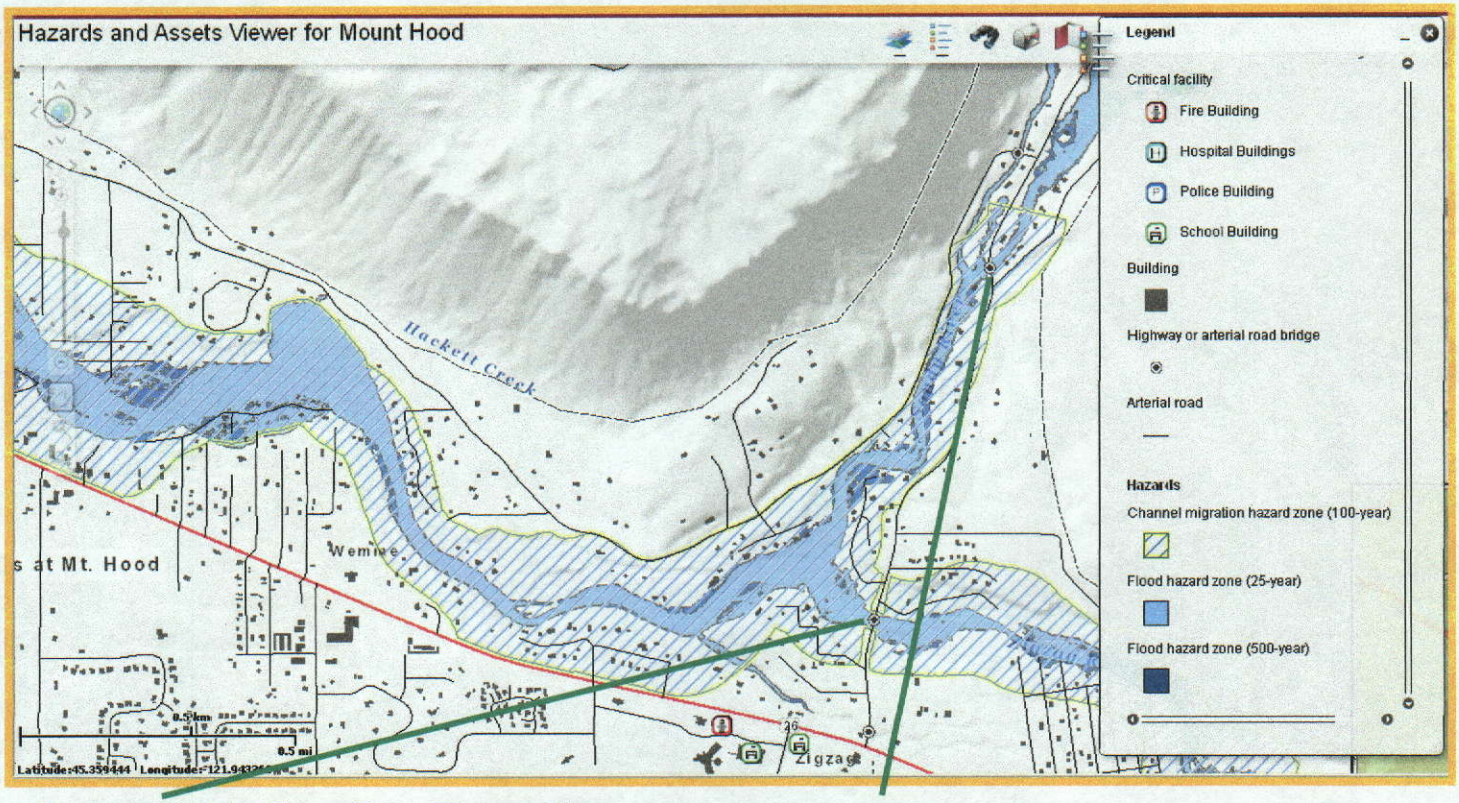
Sensor #1 Brightwood Bridge - Salmon River
Latitude: 45 22 31.34 N
Longitude: 122 01 26.42 W
Elevation: 1035 feet



Sensor #2 Brightwood - Sandy River
Latitude: 45 22 43.01 N
Longitude: 122 00 45.34 W
Elevation: 1681 feet

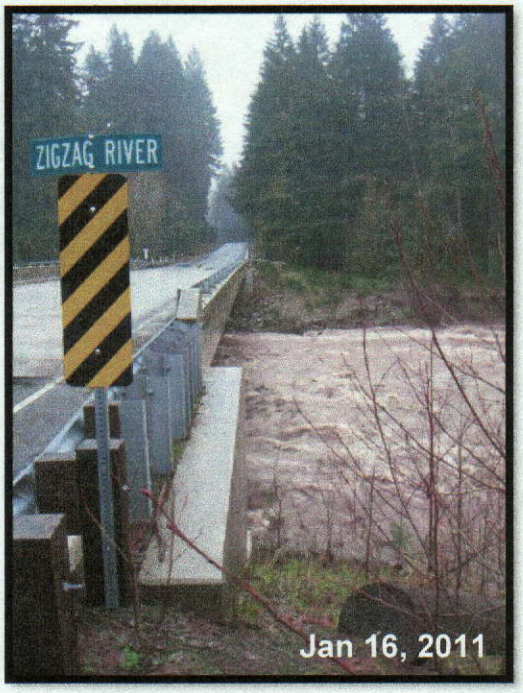


Lolo Pass Road Inset Map

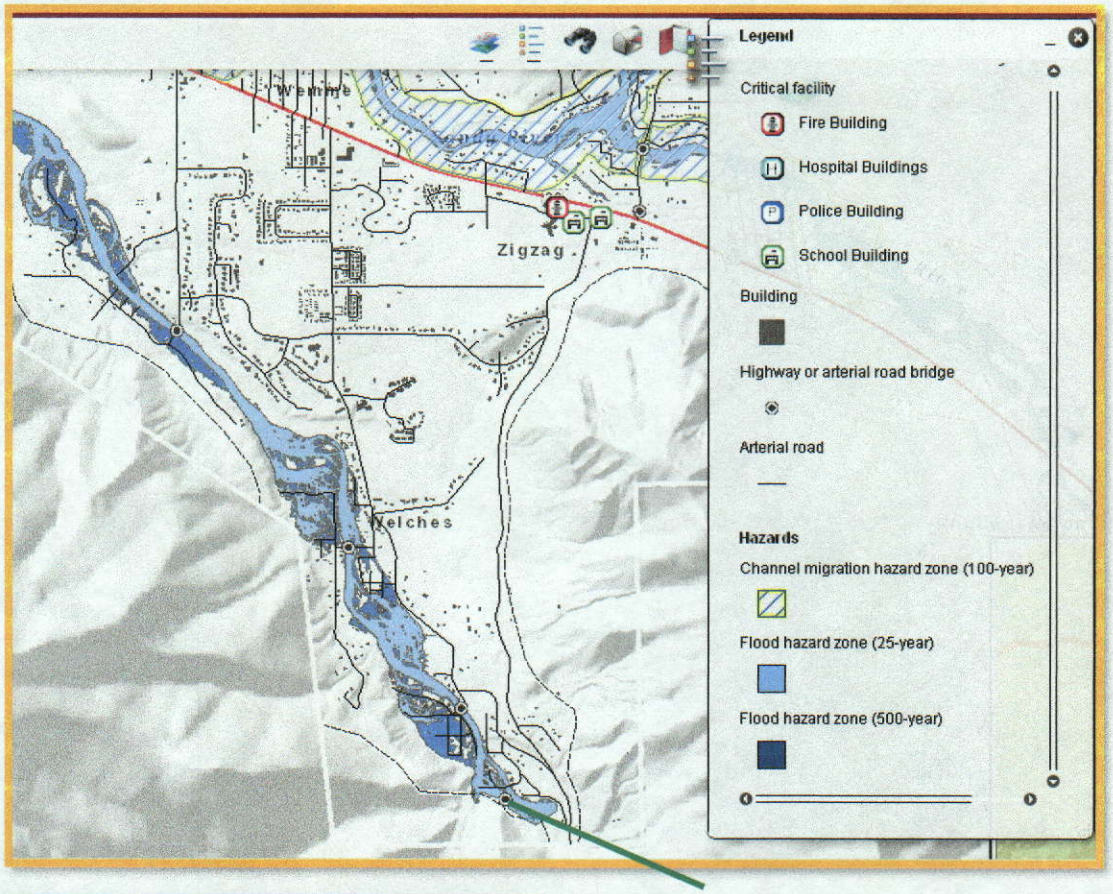


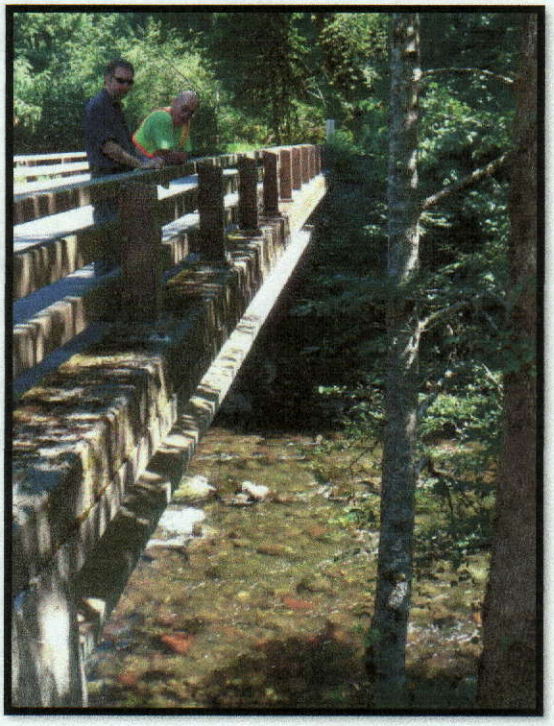
Sensor #3 Lolo Pass Rd – Zigzag River
Latitude: 45 20 49.68 N
Longitude: 121 56 32.77 W
Elevation: 1395 feet

Sensor #4 Lolo Pass Rd – Sandy River
Latitude: 45 21 23.19 N
Longitude: 121 56 17.00 W
Elevation: 1443 feet



Salmon River Inset Map

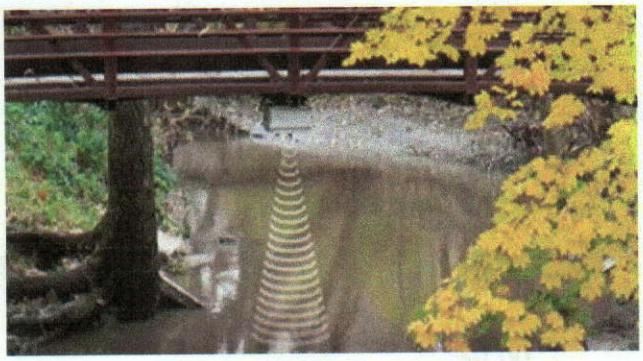




Sensor #5 Bridge Street – Salmon River
Latitude: 45 19 41.78 N
Longitude: 121 57 43.63 W
Elevation: 1291 feet

Flood Sensor Instruments

The basis for this proposal is the system developed at the Iowa Flood Center to design, build, install and maintain a low-cost and geographically distributed network for monitoring stream levels in near real time online http://ifis.iowafloodcenter.org/ifis/en/about.php .



The first stream sensor developed by IFC researchers and students was installed on Ralston Creek in Iowa City.

The sensor is placed on the side or bottom of bridges and uses a sonar signal to measure the distance from the water surface to the sensor. The sensor battery is charged with a solar panel and data is transmitted via a cell modem to the NWS website where the data is publicly available. Data from the sensor, and other known parameters at each site, are used to determine stream flow and thus flood stage. http://iowafloodcenter.org/projects/river-stage-sensors/

Project Responsibilities

County equipment packages will include 35' aluminum pole for mounting solar panel and antenna to improve solar exposure, enhance radio transmission and reduce vandalism.

Stream sensor packages will be assembled by Joseph Hannon, a technician with the National Weather Service – Portland Office.

County will donate dedicated CPU to Hoodland Fire for processing and uploading gauge information to NWS website.

County is pursuing an MOU with Hoodland Fire (and possibly other community-based groups) for cost share on annual expenses for operation and maintenance.

Iowa Flood Center stream sensor.

Work timeline

County staff will order all equipment upon grant approval and expect to begin installation within 60 days.

Week one:	Pole installation
Week two & three:	Install solar panels, cabinets, conduit to bridge.
Week four & five:	Install river gauges and wiring.
Week six:	Fire Station installation and system check out.