

CLACKAMAS COUNTY BOARD OF COUNTY COMMISSIONERS

Study Session Worksheet

Presentation Date: April 22, 2014 **Approx Start Time:** 3:00 PM **Approx Length:** 60 min

Presentation Title: Sandy River Area Flood Risk Management Update

Department: County Administration, Emergency Management, Transportation & Development, WES, Parks, PGA

Presenters: Laurel Butman, County Administration; Jay Wilson, Emergency Management; Joel Howie, Transportation Engineering, DTD; other team members as needed (listed under invitees)

Other Invitees: Nancy Bush, Emergency Management; Rick Gruen, County Parks & Natural Resources; Ellen Rogalin, PGA/DTD; Matt House, WES

WHAT ACTION ARE YOU REQUESTING FROM THE BOARD?

None at this time.

EXECUTIVE SUMMARY:

The upper Sandy River has recurrent flood events characterized by significant bank erosion and channel migration. Following the January 16, 2011 flood event, which significantly affected some residents and properties, Clackamas County led an effort with State and Federal regulatory agencies to develop a consolidated approach for all property owners to work toward flood recovery, coordinate permitting information and prepare for future flooding events.

This emergency response effort morphed into an ongoing internal Sandy River Sustainable Flood Recovery Team charged with supporting future efforts for expanded floodplain management in the area. This internal and cross-departmental team strives to:

- Preserve public safety for residents, property owners, employees, emergency responders and tourists;
- Protect the environment and public health;
- Promote a healthy river system in recognition of its value as a local, regional and national asset;
- Pursue enduring, equitable and cost-effective protection of public and private property;
- Facilitate public and agency communication, coordination and collaboration, and
- Follow *No Adverse Impacts* tenets and solutions.

The goal of this Study Session is to follow through on a commitment made at a January 14, 2014 study session to brief the Board on the team's progress so far this year and to share information about upcoming events and projects in the Upper Sandy River area.

Community Flood Risk Management Committee

The team established this Committee to bring together a representative group of residents and stakeholders to work with the County and other cooperating agencies to identify and develop appropriate floodplain planning solutions and risks communication for the Upper Sandy River watershed.

The committee is designed to promote constructive exchange of information and ideas between community stakeholders, the County, and other state and federal agencies that can improve communications overall and explore streamlining for disaster response in the area.

Committee goals include developing goal and strategy recommendations for a Floodplain Management Plan and the possible creation of a Floodplain District. The US Army Corps of Engineers is providing technical assistance with the public involvement aspects of this Committee.

A list of Committee members is in Attachment 1. The Committee's next meeting, scheduled for May 3, will cover Committee Charter development in the morning followed by ongoing permitting education/discussion in the afternoon with County and State agency representatives. A County permitting summary is in Attachment 2.

Current Area Activities & Upcoming Events

A timeline of Upper Sandy River activities and projects is in Attachment 3. Items of particular interest at present are listed below. Updates on the two studies and the 50th anniversary of the 1964 flood will be provided in this Study Session.

- Upper Sandy River Flood Erosion Study is underway
- Lolo Pass Road Alternatives Study is underway as is the East Barlow Trail Road Bank Stabilization Project
- Installation of flood gauges underway as a step toward a better flood warning system
- Development of a video about flood risk management
- 3rd annual *Flood of Information* event coming in Fall 2014
- Commemoration of the 50th anniversary of the 1964 Christmas Flood

Community Rating System (CRS) & Flood Insurance

The team is actively engaged in flood insurance education with the community, including residents and realtors. In response to national flood insurance reform legislation and the specter of rapidly rising insurance costs, the team spent last fall and winter in active outreach on this issue. Now that the reforms have been slowed and many costs pulled back through additional legislative action, these efforts, though ongoing, are a bit less urgent. A brochure the team developed for this outreach is in Attachment 4.

The National Flood Insurance Program's Community Rating System (CRS) is a voluntary opportunity for jurisdictions to become rated (e.g., designated) for flood insurance discounts for residents by demonstrating community and government floodplain management activities and efforts that exceed minimum requirements. The County has a CRS rating of 6, downgraded from 5 one year ago. With this designation, County residents in the mapped floodplain receive a 20% discount on flood insurance.

This rating downgrade happened in large part due to the economic downturn and diminished capacity of County departments to participate in the rigorous tracking and reporting the CRS requires. This had previously been a voluntary, non-budgeted activity led by County Planning.

Recently the CRS guidelines changed significantly, now requiring reengineering of the reports used for rating jurisdictions. For the County, converting to the new requirements would require a nearly complete overhaul of its data approach. The County's next review is coming in October 2014 so the team is strategizing about timing and capacity. Unless otherwise directed, the team anticipates returning to the Board later this year with a recommendation on how to proceed.

FINANCIAL IMPLICATIONS (current year and ongoing):

None at this point

LEGAL/POLICY REQUIREMENTS:

- Clean Water Act
- Local, State and Federal regulations
- National Flood Insurance Program
- Federal Emergency Management Requirements

PUBLIC/GOVERNMENTAL PARTICIPATION:

- The County partners with the Sandy River Basin Watershed Council on planning, tracking and funding activities related to flood response and restoration.
- The County continues to engage State and Federal agencies in floodplain management and permitting activities in the area.
- The US Army Corps of Engineers is providing public involvement technical assistance for ongoing community/County activities in the area.
- The County has established a Sandy River Area Community Flood Risk Management Committee which works in partnership with the County and other agencies to become educated on flood risks and work together on community solutions in the area. So far the Committee has met two times, with the next meeting set for May 3.
- The County has provided a "Flood of Information" open house/workshop for area residents and property owners for the last two years and is planning another for fall 2014.

OPTIONS:

N/A – information only

RECOMMENDATION:

N/A – information only

ATTACHMENTS:

1. List of Sandy River Area Community Flood Risk Management Committee members
2. County permitting summary
3. Timeline of Upper Sandy River activities and projects
4. Flood Insurance Brochure
5. Study Session PowerPoint Presentation

SUBMITTED BY:

Division Director/Head Approval _____

Department Director/Head Approval _____

County Administrator Approval _____ LSB _____

For information on this issue or copies of attachments, please contact Laurel Butman @ 503-655-8893.

**Sandy River Area Community Flood Risk Management Committee
Community Membership List (includes Sandy River Basin Watershed Council)**

Bob Reeves, Chair
Villages at Mount Hood Board

John Erickson, General Manager
Resort on the Mountain

Coni Scott, President
Villages of Mt Hood Chamber of Commerce

Tony Lasher, Superintendent
Resort on the Mountain

Ron McPherson, Chair
Autumn Lane HOA

Annie Wurke, Broker/Owner
Rose Country Realty

Robert Baker
Autumn Lane HOA

Gerald Murphy
Timberline Rim HOA

Dennis Merz
Autumn Lane HOA

Don Shay
Timberline Rim HOA

Nancy Dougherty
Rhododendron CPO & Chamber

George Wilson
Zig Zag Village HOA

Dave Lythgoe
Merit Properties & Chamber

Bruce Fisher, Chair
Shadowhawk HOA

Doug Saldivar
Salmon River Community

Steve Wise, Executive Director
Sandy River Basin Watershed Council



Just the Facts:

Permits to Work on Property in the Sandy River Basin / Floodplain

DRAFT IV -- January 24, 2013

DRAFT Jan. 23, 2014

General Information

Three agencies have jurisdiction in the Sandy River Basin area and administer regulations that require permits when work is done on property in the area. The three agencies are:

- [US Army Corps of Engineers](#) (USACE)
- [Oregon Department of State Lands](#) (DSL)
- [Clackamas County](#) (CC)

These three agencies, working together, enforce federal laws and regulations (USACE), state laws and regulations (DSL), and local laws and regulations (CC). In general, the laws and regulations are designed to:

- Protect the health and safety of the property owner;
- Protect the health and safety of others in the community who may be affected by actions taken on the property;
- Protect and preserve the natural environment.

The three agencies have worked together to create a [Regional General Permit](#) (RGP) for Sandy River Basin January 2011 Flood Response, which is in effect through August 31, 2016. A regional general permit is issued by the USACE for a specific geographic area. Each regional general permit has specific terms and conditions that must be met for project-specific actions to be verified. The [Sandy River Basin RGP](#):

- Provides an expedited permitting process for the agencies
- Takes into account impacts on public interest, compliance with applicable federal and state laws, and minimal individual and cumulative environmental consequences
- Is primarily focused on stabilization in place, but may involve minor replacement of eroded lands as needed to protect structures
- Relies heavily on strong bio-engineering components.
- Authorizes minor replacement of uplands to protect existing structures.
- May require compensatory mitigation for a project having more than minimal impacts to the aquatic environment.

A person or organization planning to do work on property in the Sandy River Basin / Floodplain should contact all three agencies to apply for appropriate permits. Applications may be submitted and considered concurrently. Fees are required for many of the permits in order to cover the costs of the agency to review the permit application and work with the applicant to ensure the action taken is both effective, safe, and complies with appropriate laws and regulations.



Clackamas County

- **JURISDICTION:** Depending on the situation, regulates all land and water in the floodplain, and in River and Stream Conservation Areas in unincorporated Clackamas County in order to protect health and safety, and ensure compliance with applicable laws and regulations.
- **WHAT**
 - Implements National Flood Insurance standards so insurance is available to residents
 - Provides property line information (Surveyor's Office)
 - Accepts applications for, reviews, notifies the public and issues River & Stream Conservation Area (RSCA) permits
 - Defines and regulates the riparian buffer along the river or stream
 - Protects native vegetation within the buffer
 - Requires bioengineered / composite methods of streambank stabilization, meaning a combination of rock, vegetation and woody debris
 - Limits structural streambank protection to only those circumstances where it is required to protect existing structures
 - Accepts applications for, reviews, notifies the public and issues Floodplain Development permits
 - Required for County compliance and membership in National Flood Insurance Program (NFIP) that, in turn, provides residents with access to federally-backed flood insurance
 - Regulates and sets standards for the effects of streambank stabilization facilities on the hydrology, hydraulics and general flood conditions of a stream, and how the hydrology and flood conditions effect adjacent properties as the result of installing streambank stabilization facilities
 - Usually requires analysis of project by professional with expertise in hydrology, hydraulics, fluvial geomorphology and / or hydrogeology
 - Does not issue emergency permits. In an emergency, applicants are advised to contact the County, resolve the emergency situation and then apply for appropriate permits.
- **PRE-APPLICATION MEETING:** Optional; at the request of the applicant, the County will bring representatives from other involved agencies to the meeting
- **TIMELINE:**
 - 6-8 weeks for staff review, including public notice
 - 150 days if initial decision is appealed
- **CONTACT**
 - Rebecca Ceniga: 503-742-4505 or beckycen@co.clackamas.or.us, Clackamas County Planning & Zoning Division, Development Services Building, 150 Beaver Creek, Oregon City, OR 97045; <http://www.clackamas.us/planning/flood.html>
 - Steve Hanschka: 503-742-4512 or stevehan@co.clackamas.or.us, Clackamas County Planning & Zoning Division, Development Services Building, 150 Beaver Creek, Oregon City, OR 97045; <http://www.clackamas.us/planning/flood.html>

Upper Sandy River Flood Risk Projects

2014

2015

	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Sustainable Flood Recovery Policy																
Floodplain Management Plan			Begin		Meet											
Regulatory Permitting (in water 7/15-8/31)			Meet			In water work										
Channel Migration Zone Overlay									Begin discussion							
Policy/District/Willing Seller Program									Begin discussion							
Upper Sandy River Flood Erosion Study					Study					Final report						
Upper Sandy River Basin Flood Warning System			Installation													
NFIP (National Flood Insurance Program)																
Sandy Basin Flood Insurance Rate Maps ¹			Public comment period													
Flood Insurance Reform Act						ON HOLD PENDING CONGRESSIONAL ACTION										
Community Rating System									Update							
Water Environment Services																
Wastewater Outfall Project			On hold													
Hoodland Master Plan for Wastewater																Completion December 2015
Sandy River Basin Watershed Council																
Restorative Flood Response II Design					Development											
CLT Side Channel Restoration													Permitting			
Community Playbook					Development											
64+50 Oral history/film					Interviews			Editing		Events						
Outreach																
Board of County Commissioners			Study S.													
Community Flood Risk Management Committee				Meet		Meet?		Meet?		Meet?		Meet?		Meet?		Meet?
USACE Public Involvement Pilot Project					Project period											
Other community events																
Villages meeting re Hoodland MP			Update													
Flood of Information (3rd Annual)					Planning			Event								
50th Anniversary - 1964 Christmas Flood					Field work			Outreach								
Hazardous Waste Collection Event ²					Event											
Transportation & Maintenance																
Lolo Pass Rd Alternate Study					Study begins with FHWA lead											
Barlow Trail Bank Project			60% design level		Right of way activities begin											

Help Prevent Floods

Don't dump or throw anything into ditches or streams: A plugged channel cannot carry water, and when it rains, the excess water must go somewhere.

Remove debris, trash, loose branches and vegetation: Keep banks clear of brush and debris to help maintain an unobstructed flow of water in stream channels. Do not, however, remove vegetation actively growing on a stream bank, which is regulated by local, state and federal agencies.

Obtain a floodplain development permit and/or building permit, if required: To minimize damage to structures during floods, the County requires all new construction in the floodplain to be anchored against movement by floodwaters, resistant to flood forces, constructed with flood-resistant materials and flood-proofed or elevated so the first floor of living space, as well as all mechanical and services, is at least one foot above the elevation of the 100-year flood.

These standards apply to new structures and to substantial improvements of existing structures. Most other types of development within the floodplain also require a floodplain development permit, such as grading, cut and fill, and bank stabilization techniques.

For More Information

- Clackamas County floodplain information:
<http://www.clackamas.us/planning/flood.html>
- Clackamas County Emergency Management Flood Hazards:
<http://www.clackamas.us/emergency/flooding.html>
- National Flood Insurance Program, Federal Emergency Management Agency: 202-646-2500 or
<http://www.fema.gov/national-flood-insurance-program>
- Clackamas County Planning & Zoning: 503-742-4500 or 503-742-4501.

DID YOU KNOW . . . Depending where you are in Clackamas County, you receive an average of 43 to more than 88 inches of rain every year.

FLOOD INSURANCE RATES RISING TO COVER COSTS; County Residents Still Eligible For Discount

Flood insurance rates are increasing. The NFIP, founded in 1968, provided subsidized insurance rates to people with homes that did not meet minimum standards but were built before FEMA's new flood mapping existed. Now, after years of massive storms such as Hurricanes Katrina and Sandy, NFIP is out of money and deeply in debt. In order to help the program become solvent and build a reserve fund, federal legislation approved in 2012 requires that flood insurance rates reflect the flood risk of the property.

While some people with flood insurance will not see an increase because their rates already reflect their flood risk, others will need to pay significantly more based on their actual flood risk. Some rate changes have taken place, and others become effective October 1, 2013. Triggers for rate changes include policy lapses, map changes and property purchases.

Because Clackamas County is a member of the National Flood Insurance Program (NFIP) Community Rating System, **residents in unincorporated areas who live in a floodplain receive a 20% discount** on flood insurance premiums; and all other residents receive a 5-10% premium reduction. For more information, contact your insurance company or lender.

As a NFIP member, the County must oversee floodplains based on Federal Emergency Management Agency (FEMA) standards. In turn, property owners must buy flood insurance for residences in the floodplain. By law, lending institutions require flood insurance for structures in a floodplain and have the option to require it for other areas.

September 2013

Clackamas County Planning & Zoning
150 Beavercreek Rd., Oregon City, OR 97045; 503-742-4500
<http://www.clackamas.us/planning/floodinsurance.html>

Clackamas County Emergency Management
2200 Kaen Rd., Suite A, Oregon City, OR 97045; 503-655-8378
<http://www.clackamas.us/emergency/>



**If you own a home or business in
unincorporated Clackamas County . . .**

***You May Need
FLOOD INSURANCE!***

**If you're a Clackamas County resident or property owner,
you have the option to buy flood insurance whether or
not you live in a floodplain.**



Here's Why . . .

- **Homeowner and business insurance do NOT cover flood damage.** Separate flood insurance must be purchased to cover flood damage and loss.
- **Just a few inches of flood water can cause tens of thousands of dollars in damage** not covered by homeowners insurance. Over the past 10 years, the average flood claim has been nearly \$48,000.
- **You're not just at risk of a flood if you live near a river;** floods can also occur because of clogged drains, surface water back-ups and flash-floods.
- **You don't have to be in a floodplain to buy flood insurance.** Because Clackamas County is in the National Flood Insurance Program, all residents and business owners in unincorporated areas are eligible to buy flood insurance.

Flood insurance is the most economical protection from devastating financial loss from a flood. In January 2011, when the Sandy River changed its channel because of torrential rains, three houses were destroyed beyond repair and one house was swept downstream. Of the property owners with the damaged houses, three had flood insurance, including one outside of the mapped flood zone. That owner had most of their loss covered by the flood insurance. The owner without flood insurance was left on their own to recover from the devastating loss.

Protect Yourself and Your Property

What is covered by flood insurance? Flood insurance covers buildings and their contents when inundated or undermined by floodwaters. Flood insurance may also provide financial help to upgrade buildings to current floodplain construction standards.

Building coverage includes:

- The insured building and its foundation
- Electrical and plumbing systems
- Central air conditioning, furnaces, water heaters
- Refrigerators, stoves and built-in appliances
- Permanent carpeting over unfinished flooring

Contents coverage includes:

- Clothing, furniture, curtains, electronic equipment
- Portable and window air conditioners
- Portable microwaves and dishwashers
- Carpeting not included in property coverage
- Clothes washers and dryers

How much coverage can I get?

- For homeowners, flood insurance covers damage up to \$250,000 and, if you purchase content coverage, up to \$100,000 for building contents.
- For business owners, flood insurance covers damage up to \$500,000 for the building and, if you buy content coverage, up to \$500,000 for contents.

Where can I buy flood insurance? Flood insurance is sold through private insurance companies and agents, and backed by the federal government; you can buy it through your insurance agent. It is required by law for federally-backed mortgages in floodplains.

When should I buy flood insurance? Buy it now, before a flood appears imminent! There is a 30-day waiting period for new coverage to become effective, so it's important not to wait until risk of a flood. (The only exception to the 30-day wait is when flood insurance is required of a loan upon closing.)

I live in a condo—can I get flood insurance? Yes, flood insurance is available to homeowners, renters, condo owners, condo renters and commercial owners and renters.

How much does flood insurance cost? Costs vary depending on how much insurance is purchased, what it covers and the property's flood risk. All policy forms provide coverage for buildings and contents. However, since contents coverage is optional, you might want to discuss insuring personal property with your agent.

What is Increased Cost of Compliance (ICC) coverage? If a flood damages your property, you may be required by law to bring your home up to community and/or state floodplain management standards. If you have flood insurance, and your home has been declared substantially damaged by your community, ICC coverage covers up to \$30,000 of the cost to elevate, flood-proof, demolish

or relocate your property. This ICC coverage is in addition to the coverage you receive to repair flood damages.

What is a floodplain? A floodplain is an area of land subject to flooding that is next to a river, stream, lake, estuary or other body of water. Clackamas County has about 20,000 acres of land and 10,000 individual land parcels in floodplains. Rivers and streams particularly prone to flood include the Clackamas, Molalla, Pudding, Salmon, Sandy, Tualatin, Willamette, Zig Zag, Johnson Creek, Abernethy Creek, Beaver Creek, Milk Creek and Cedar Creek.

How can I find out if I live in a floodplain? Contact the city in which you live, or call County Planning at 503-742-4500.

Can I buy flood insurance if I don't live in a floodplain?

Yes, because Clackamas County participates in the National Flood Insurance Program, federally-backed flood insurance is available for all structures in the county. In fact, more than 25% of NFIP claims are filed by owners of property outside the 100-year floodplain. And with rivers, like the Sandy, that flood outside of traditional floodplains, flood insurance is even more important.

Prepare for Possible Future Floods

- **Buy flood insurance** if you're in any floodplain, and consider it even if you're not, especially if you're near the Sandy River.
- **List all your personal property**, including furnishings, clothing and valuables. Take pictures or video of your home and contents, especially high value items; keep insurance policies, pictures, videos and lists of personal property in a safe place.
- **Put together a 72-hour disaster supply kit.** (For details, go to <http://www.redcross.org/> or <http://www.ready.gov/>.)
- **Consider ways to reduce long-term flooding risk**, such as elevating your home or moving it to higher ground, building floodwalls or berms, flood-proofing and protecting utilities.
- **Plan how you would evacuate in the threat of a flood**, such as what to take with you, the safest evacuation route and where to go.





Sandy River Managing Flood Risk

BCC Study Session
April 22, 2014



Current Area Activities & Upcoming Events

- Upper Sandy River Flood Erosion Study
- E. Barlow Trail Rd Bank Stabilization Project and Lolo Pass Road Alternatives Study
- Installation of flood gauges as a step toward a better flood warning system
- 3rd annual Flood of Information event in Fall 2014
- Commemoration of the 50th anniversary of the 1964 Christmas Flood
- Development of a video about flood risk management

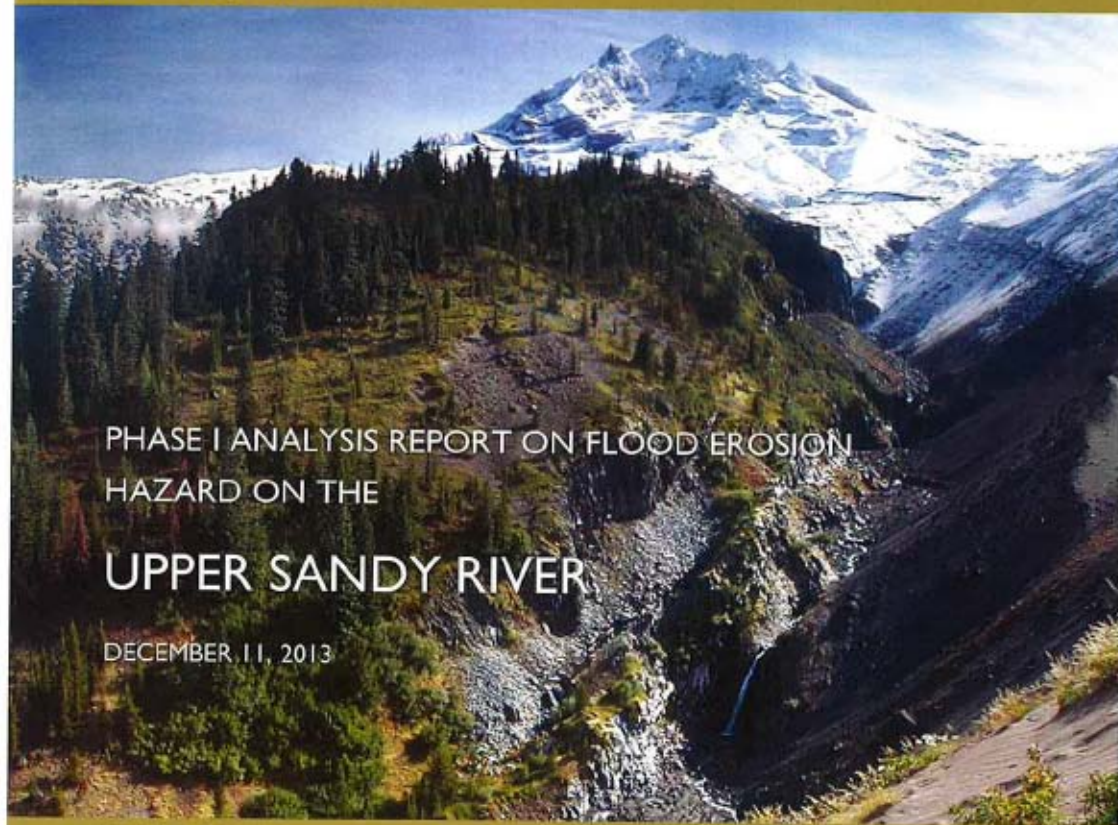
Flood Erosion Study

Base line of
analysis on channel
migration hazard

Basis for future
decisions/policy

Transparent
process

Statement of Qualifications for



PHASE I ANALYSIS REPORT ON FLOOD EROSION HAZARD ON THE UPPER SANDY RIVER

DECEMBER 11, 2013

Sandy River Headwaters

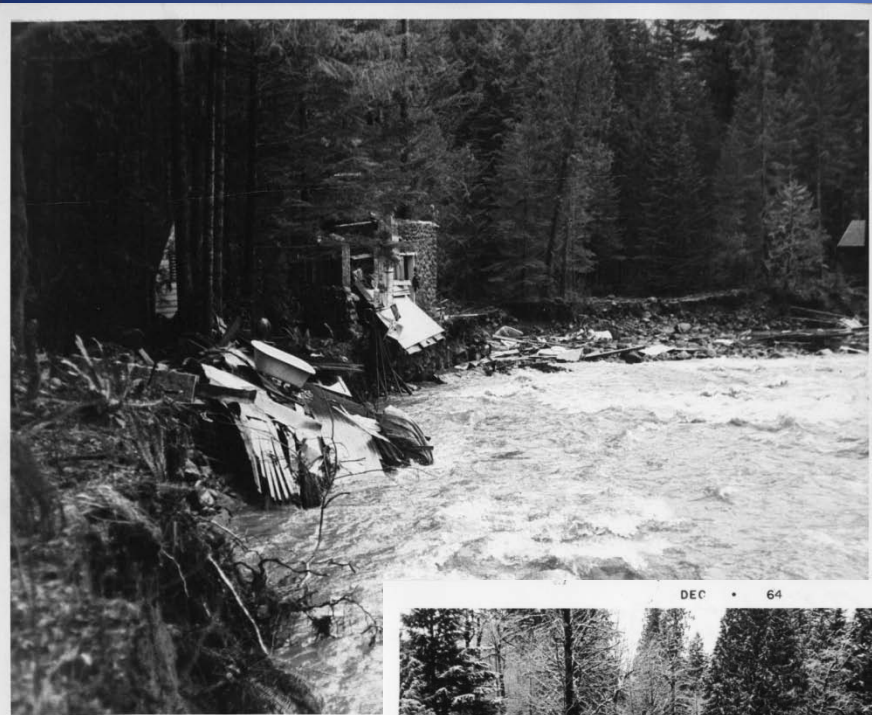
photo courtesy of Wikimedia Commons

Submitted to:
Mr. Lane Miller
Clackamas County
Purchasing
Public Services Building
2051 Kaen Road
Oregon City, OR 97045



Channel Migration Hazards

Upper Sandy River Basin – December 1964



Private summer home damage along the Sandy River.



Mt. Hood National Forest
US Forest Service



Photo: Oregonian

Zig Zag Village Area – Jan. 17, 2011

Outside of Mapped Flood Zone



Views from the Sandy River

Outside of Mapped Flood Zone



View of the Sandy River – Tranquil, yes?

DRAFT FLOOD ZONES - NOT FOR OFFICIAL USE



LOLO PASS RD



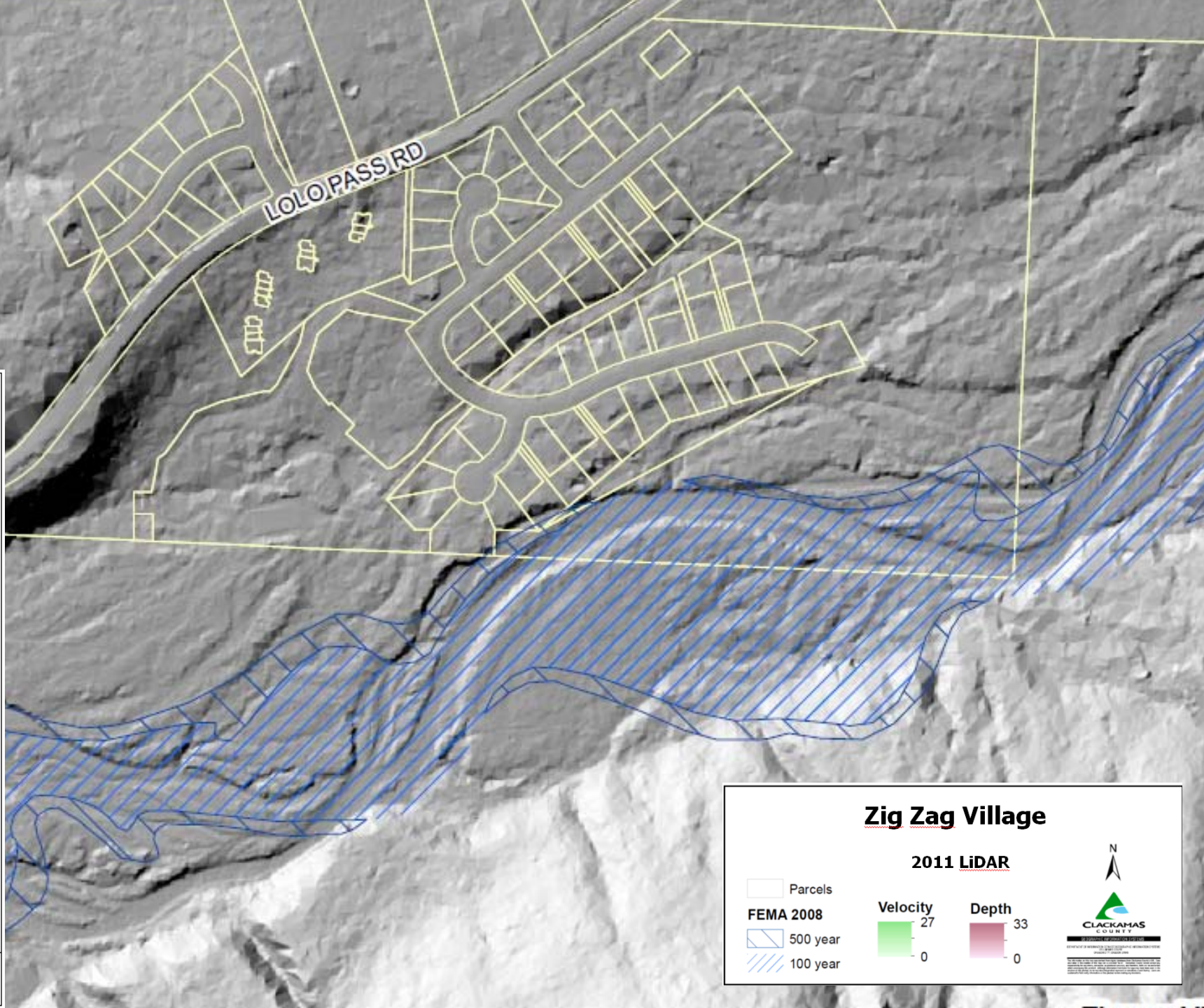
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Zig Zag Village

2007 LiDAR

Parcels	Velocity 27 0	Depth 33 0
FEMA 2008 500 year		
100 year		

DRAFT FLOOD ZONES - NOT FOR OFFICIAL USE



LOLO PASS RD

The information on this map is for informational purposes only. It is not intended to be used as a basis for any legal or financial decision. The user of this information assumes all liability for any use of this information. The user of this information assumes all liability for any use of this information.

STARR
STARR CONSULTANTS
2100 N. 10TH AVE.
SUITE 100
TACOMA, WA 98406
509.475.5500
WWW.STARRCONSULTANTS.COM



Zig Zag Village

2011 LiDAR

Parcels	Velocity	Depth
FEMA 2008 500 year	27	33
FEMA 2008 100 year	0	0

CLACKAMAS COUNTY
OFFICE OF PLANNING AND COMMUNITY DEVELOPMENT
2011 FLOOD HAZARD ANALYSIS FOR THE ZIG ZAG VILLAGE



Zig Zag Village Jan-22-2011
Post-Flood Aerial Reconnaissance
Civil Air Patrol - Oregon Wing, Ted Tanory



Zig Zag Village Jan-22-2011
Post-Flood Aerial Reconnaissance
Civil Air Patrol - Oregon Wing, Ted Tanory



Lower Lolo Pass Road Area

Photo: Jay Wilson



Lower Lolo Pass Road Area

Photo: Jay Wilson

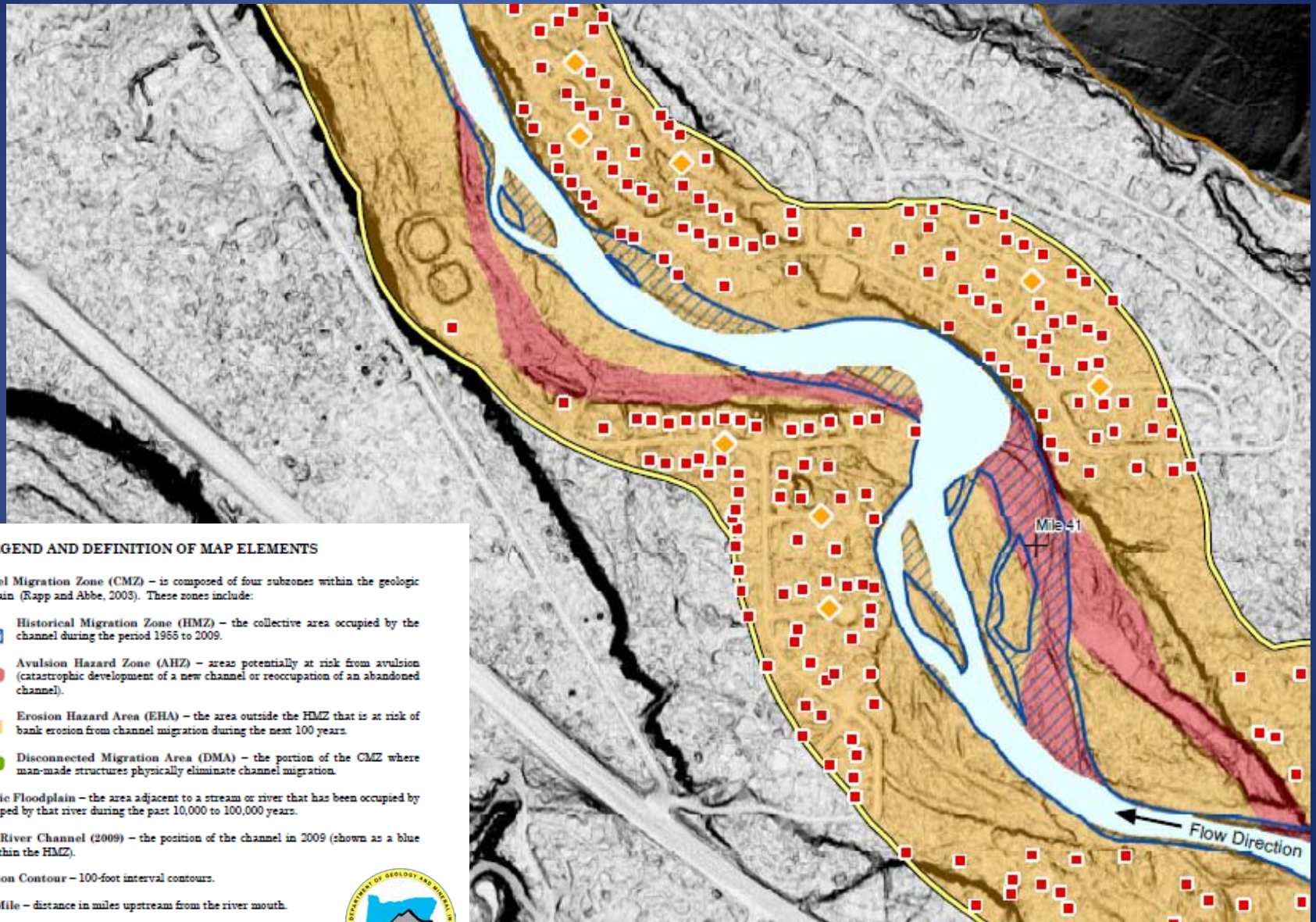
Timberline Rim Area 1967














Timberline Rim 1972



Channel Migration Zone



LEGEND AND DEFINITION OF MAP ELEMENTS

-  Channel Migration Zone (CMZ) – is composed of four subzones within the geologic flood plain (Rapp and Abbe, 2003). These zones include:
-  Historical Migration Zone (HMZ) – the collective area occupied by the channel during the period 1955 to 2009.
-  Avulsion Hazard Zone (AHZ) – areas potentially at risk from avulsion (catastrophic development of a new channel or reoccupation of an abandoned channel).
-  Erosion Hazard Area (EHA) – the area outside the HMZ that is at risk of bank erosion from channel migration during the next 100 years.
-  Disconnected Migration Area (DMA) – the portion of the CMZ where man-made structures physically eliminate channel migration.
-  Geologic Floodplain – the area adjacent to a stream or river that has been occupied by and shaped by that river during the past 10,000 to 100,000 years.
-  Sandy River Channel (2009) – the position of the channel in 2009 (shown as a blue zone within the HMZ).
-  Elevation Contour – 100-foot interval contours.
-  River Mile – distance in miles upstream from the river mouth.
-  Structural Asset At Risk – structure that falls within the CMZ.
-  Road Asset At Risk – road that falls within the CMZ.



Timberline Rim

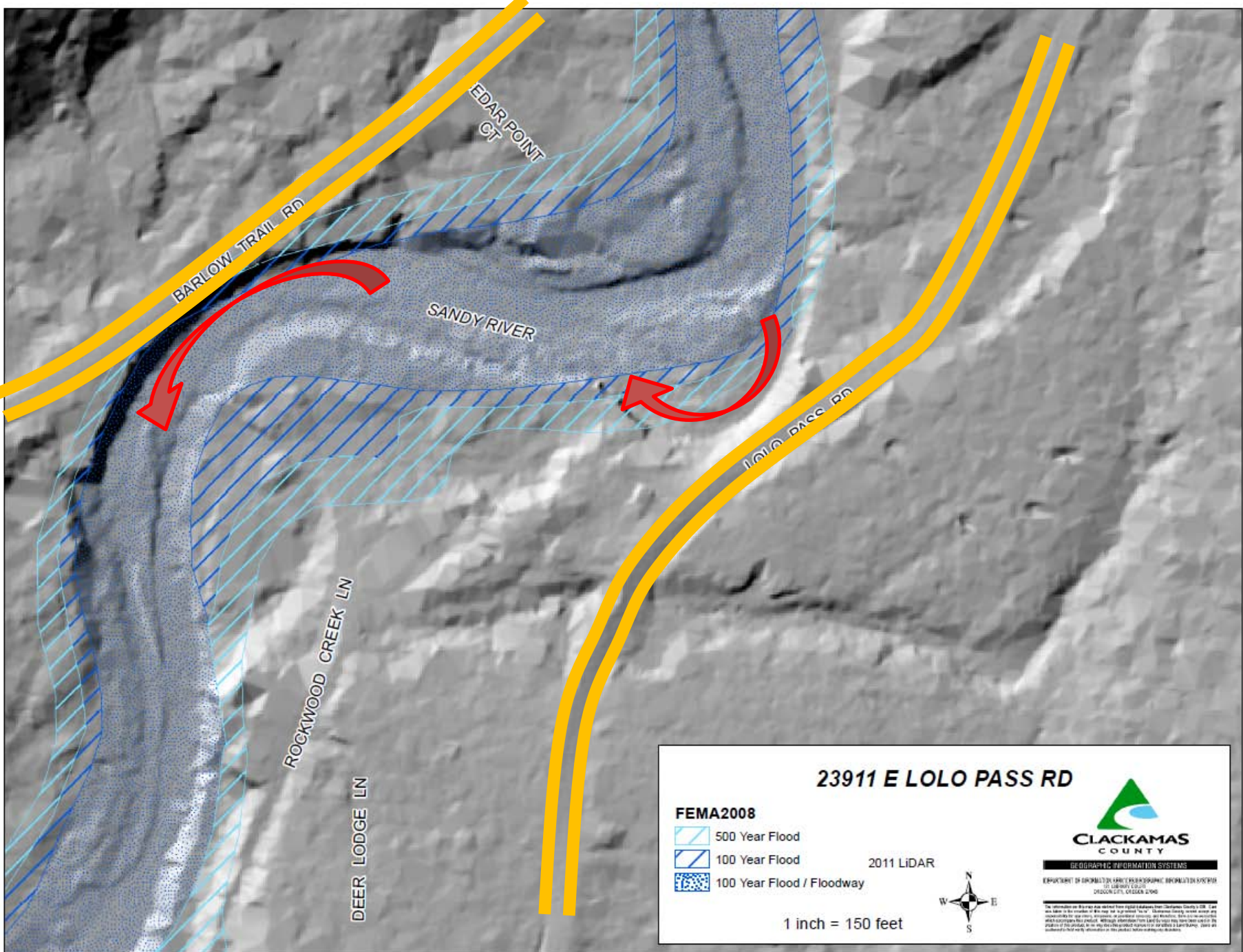
Got Flood Insurance?



Timberline Rim


Between river miles 41.5 and 42

- 14 flood-affected properties, with a total FMV of \$3.7 million
- 95 remaining unaffected properties at risk with a total Fair Market Value of \$19.7 million
- 48 flood insurance policies as of July 2011



23911 E LOLO PASS RD

FEMA2008

-  500 Year Flood
-  100 Year Flood
-  100 Year Flood / Floodway

2011 LIDAR

1 inch = 150 feet



GEOGRAPHIC INFORMATION SYSTEMS
 DEPARTMENT OF INFORMATION SYSTEMS & TECHNOLOGICAL SERVICES
 10000 NE MULTNOMAH ST., SUITE 200
 PORTLAND, OREGON 97220

This information was derived from digital datasets from Clackamas County GIS. Care has been taken to ensure that the data are accurate and reliable. Clackamas County does not warrant the accuracy or completeness of the data. While every effort has been made to ensure the accuracy of the data, the user should verify the accuracy of the data before using it for any purpose. Clackamas County is not responsible for any errors or omissions in this product. © 2010 Clackamas County GIS.



E. Barlow Trail Rd Bank Stabilization Project Location and Detour Map

EAST BARLOW TRAIL ROAD
Proposed Detour During Construction



Not to scale 12/02/2013

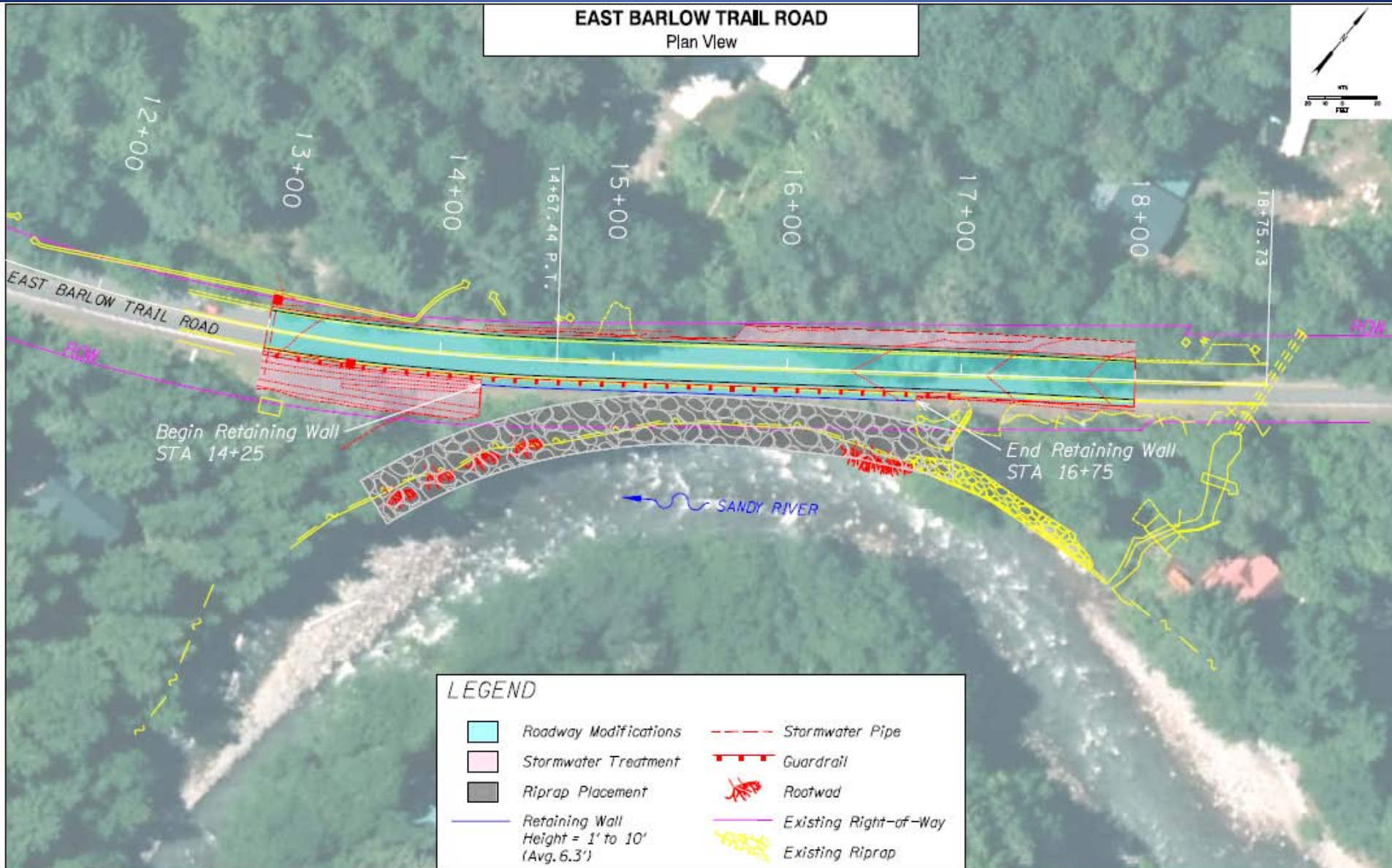
LEGEND

-  West Detour Route - 5.2 miles from Project Site to Hwy 26
-  East Detour Route - 1.8 miles from Project Site to Hwy 26

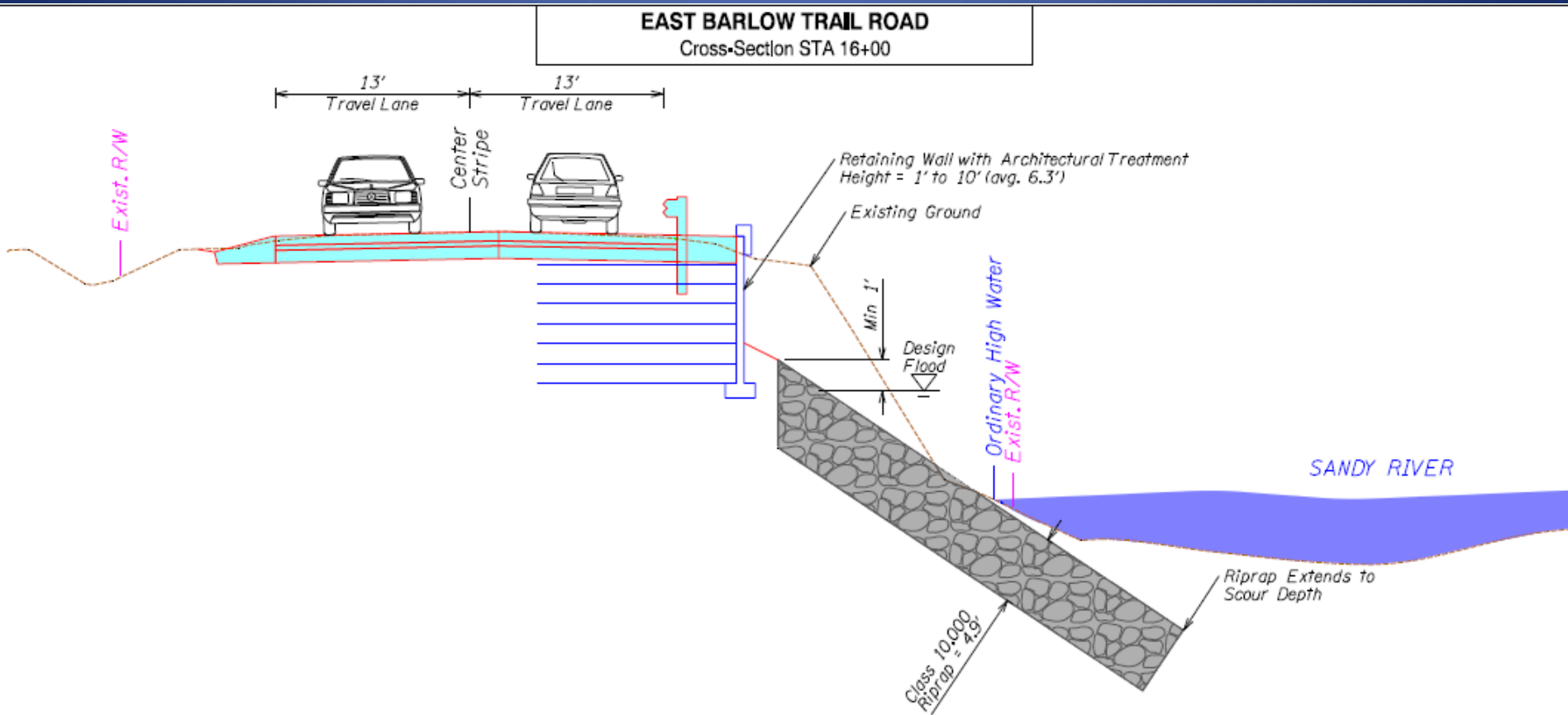
E. Barlow Trail Rd. – Site Photos



Open House Exhibit Plan



Open House Exhibit Cross Section



EXAMPLE WALL ARCHITECTURAL TREATMENTS



ASHLAR STONE WITH COLORATION



ASHLAR STONE NO COLORATION



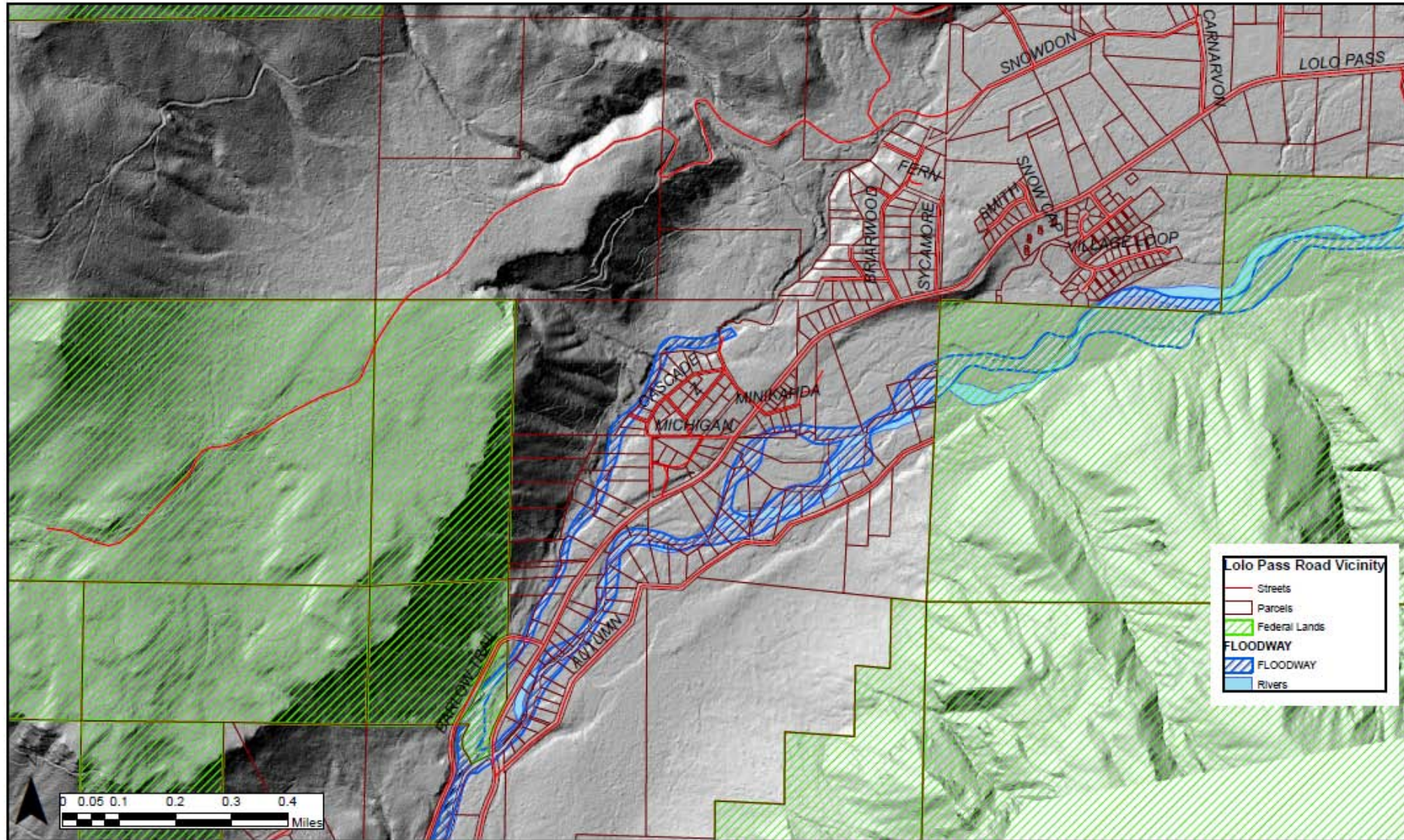
DRYSTACK



Photo: PGE

Lolo Pass Washout Across from Autumn Lane

Lolo Pass Road Alternative Study



Upper Sandy River Basin Flood Warning System

- Sonar-based sensor monitors level of river
- Five locations mounted on County bridges (4 installed)
- Solar powered
- Radio transmission to base station at Hoodland Fire



Iowa Flood Center stream sensor.



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

Upper Sandy River Basin Flood Warning System

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



Upper Sandy River Basin Flood Warning System

Sensor #3 Lolo Pass Rd – Zigzag River

Latitude: 45 20 49.68 N
Longitude: 121 56 32.77 W
Elevation: 1395 feet

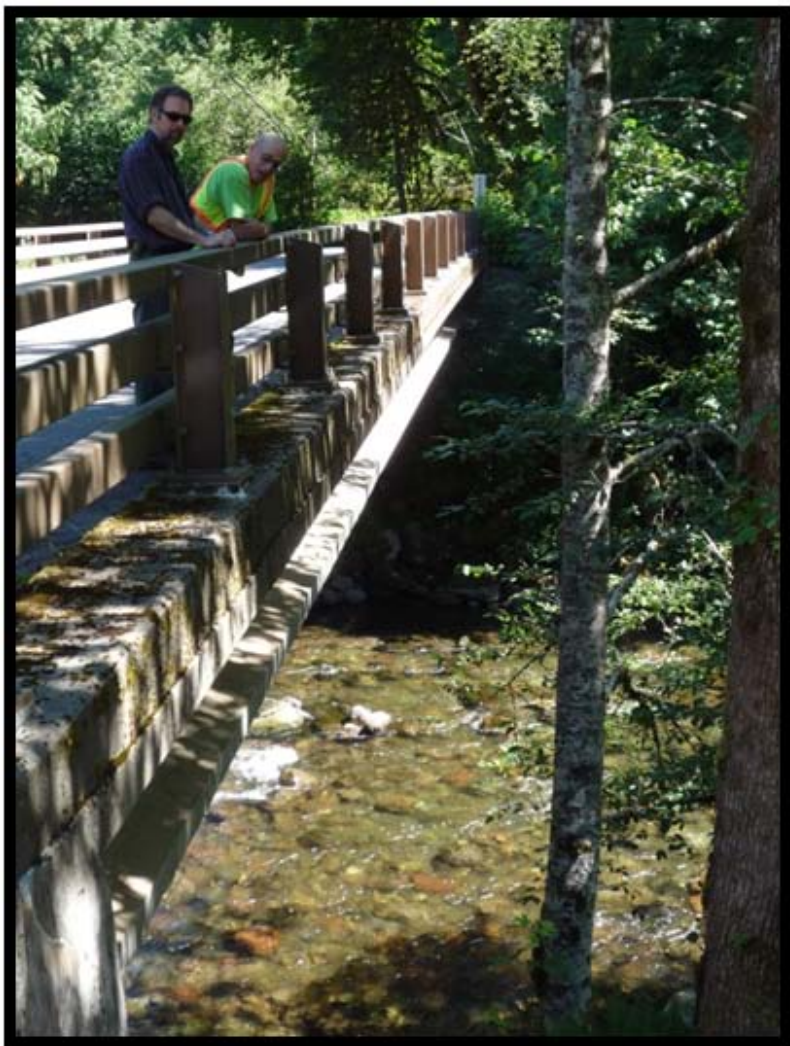


Sensor #4 Lolo Pass Rd – Sandy River

Latitude: 45 21 23.19 N
Longitude: 121 56 17.00 W
Elevation: 1443 feet



Upper Sandy River Basin Flood Warning System



Sensor #5 Bridge Street – Salmon River

Latitude: 45 19 41.78 N

Longitude: 121 57 43.63 W

Elevation: 1291 feet

Tracking Online River Gauge Levels in the Upper Sandy Basin

National Weather Service – Portland www.wrh.noaa.gov/pqr/

The screenshot shows the NWS Portland website. The "Rivers & Lakes" tab is circled in red in the navigation bar. The "Forecast" section shows a map of Northwest Oregon and Southwest Washington with the Sandy River area highlighted.

Go to the NWS Portland web page and click on the "Rivers and Lakes Tab

The screenshot shows the Advanced Hydrologic Prediction Service map. The "Sandy River" gauge icon is circled in red on the map. The "River Gauges" list on the left has "Sandy River and Tributaries" selected and circled in red.

Look for the Sandy River icon on the map or select the pull down tab in the left-hand column

The screenshot shows the gauge data page for the Sandy River at Brightwood Bridge. It features a graph of Stage (FT) vs. Site Time (PST) and a map of the gauge location. The gauge location is circled in red on the map.

View the river level during periods of high water

Be prepared to take necessary action if there is a potential for flooding in your area.

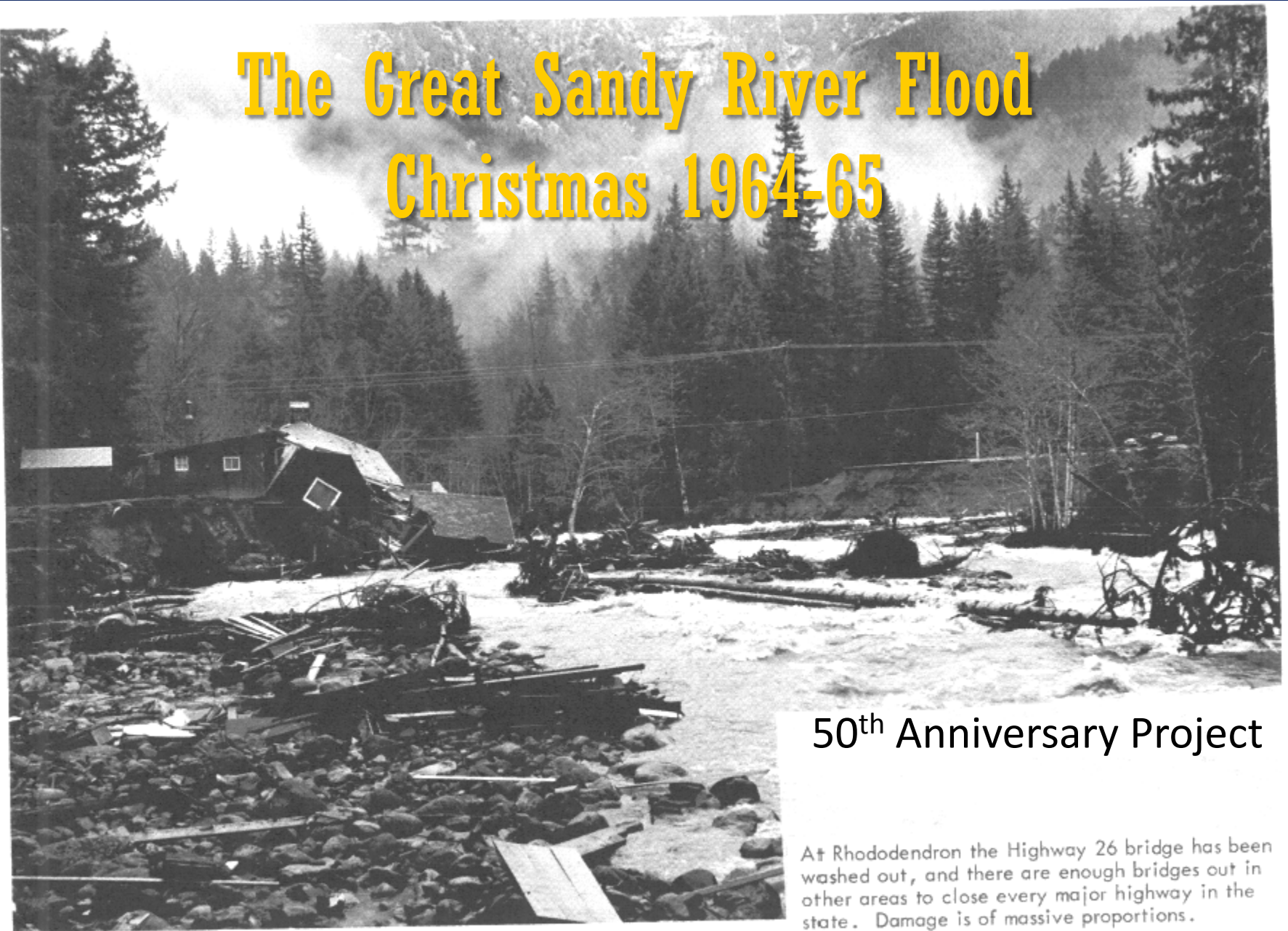
Second Annual Flood of Information

Upper Sandy River Basin

September 2013



The Great Sandy River Flood Christmas 1964-65



50th Anniversary Project

At Rhododendron the Highway 26 bridge has been washed out, and there are enough bridges out in other areas to close every major highway in the state. Damage is of massive proportions.

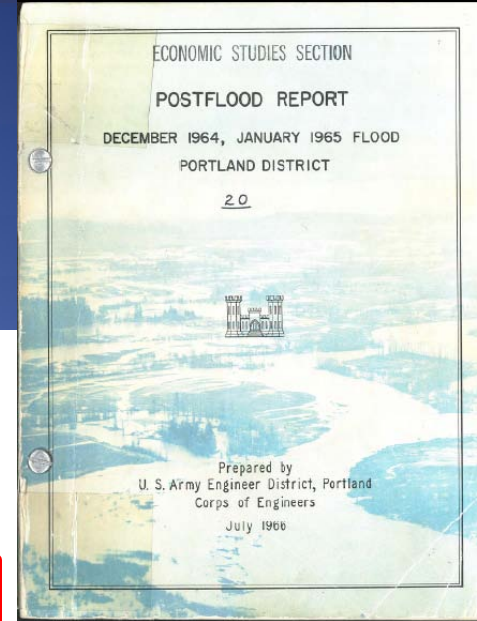
Confluence of Still Creek and Zigzag River,
afternoon, Dec. 23

1964-1965 Floods

Seeking Historical Accounts

The flood volume on the Sandy was the greatest of record. The river gradient is very steep, and the river bottom soil is a gravely silt which offers little resistance to erosion. The result was an action on the valleys and lower slope that was glacier-like. Complete changes in appearance of the valley resulted in many places; for example, the north bank of the Sandy just upstream from Brightwood showed no indication of buildings, vegetation or topsoil where a group of 40 houses existed prior to the flood. These conditions were repeated to a lesser extent throughout the upper basin.

A total of 155 homes were completely destroyed in the Sandy Basin, with a great many more being damaged. Of these a majority were unoccupied summer homes, or loss of life would doubtless have been greater than the one reported.



George Donnell Photo Album

Jan, Mar, & May 1965



Provided by Sue Allen

COUNTY OF CLACKAMAS

Board of Commissioners

COUNTY COURT HOUSE, CLACKAMAS COUNTY, OREGON CITY, OREGON 97045



February 26, 1965

Mr. Robert E. Hickson
525 S. E. 65th
Portland 16, Oregon

Dear Sir: 15

You are no doubt aware of the vast amount of damage done by the Sandy River during the Christmas Flood. The channel has changed drastically in some areas and has left piles of debris which should be cleaned up.

The United States Corps of Engineers has consented to do the necessary work to put the river back in the channel it was in prior to the Christmas flood. Also to clean up the accumulation of debris either by burning or stock piling.

Enclosed is a Temporary Permit of Entry which the Government requires signed before this work can be done.

You can be assured that this project will be completed as speedily and efficiently as possible, and your cooperation is appreciated by all concerned.

Sincerely,

Milo Poppen
Asst. Land Agent

M/ls
Enc.

*Sent Permit of Entry March 5 1965 -
RPH*

1964 Flood

- Record of practices we no longer endorse
- Point of transition from “flood control” to “flood risk management”

Human Stories



Private homes in town of Rhododendron.



Damage to summer homes on private lands, Zigzag area.



Emergency crossing of Zigzag River on Highway 26 bridge.



DEC • 64

Courtesy: Mt Hood National Forest



Carver Mobile Home Ranch

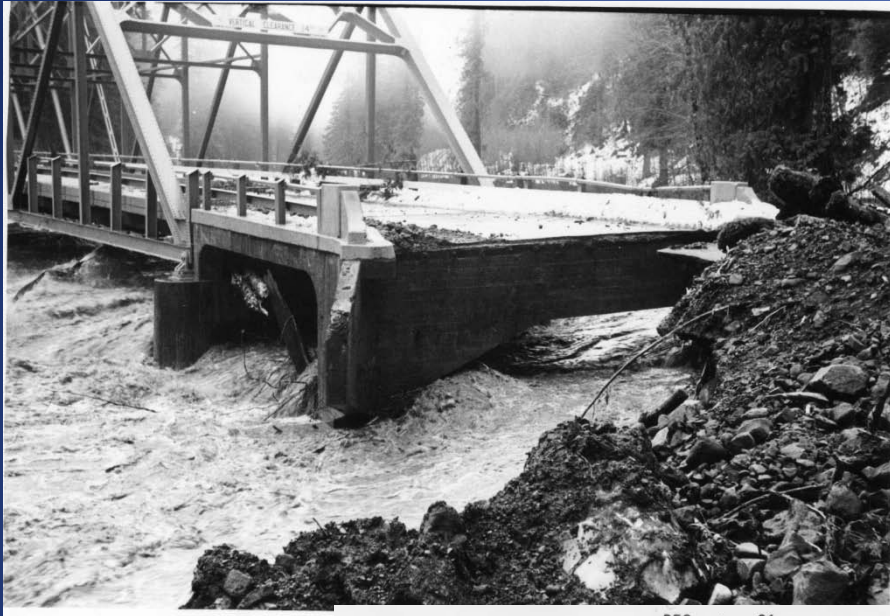
Permission Pending: Oregon Historical Society

Clackamas River Hwy 224 Above White Water



Courtesy: Mt Hood National Forest

1964 Was Rough on Bridges Too



DEC • 64



DEC • 64



Courtesy: Mt Hood National Forest



December 1964 Flood - Hwy 99E Clackamas River Bridge

Thank You

Questions?

